

Vacuum Technology Components





The company

from page 3



Vacuum is nothing, but everything to us.



Rotary vane pumps

from page 26



Compact and powerful rotary vane pumps for all rough and medium vacuum applications



Roots pumps

from page 88



The full line of Roots pumps for rough and medium vacuum applications



Dry compressing pumps

from page 120



Universal dry compressing pumps



Turbopumps

from page 138



Turbopumps for all high and ultrahigh vacuum applications



Components and feedthroughs

from page 278



Flange components and feedthroughs for all vacuum applications



Valves

from page 350



Valves for shutting off, venting and dosing



Vacuum measurement and control units

from page 410



Always the right pressure gauge for your application



Leak detectors

from page 504



SmartTest helium leak detector.
The solution for your quality assurance requirements



Appendix from page 530



Figures, data, facts

Dear vacuum technology user,



You are now holding in your hands the new catalog. Here you can find well-proven products, innovative products which have been further developed, and entirely new products.

For over 100 years Pfeiffer Vacuum – as the inventor of the turbopump – has been a partner in industry as well as in research and development.

We are proud of our

► Competence

By merging expert and industrial know-how, we are in a position to offer professional solutions for all market and application-specific requirements.

► Quality

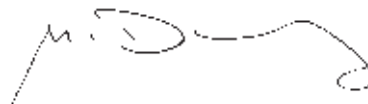
For decades, we have been convincing customers of our excellent product quality, long service life, and pleasing design.

► Presence

Well-trained sales and service engineers are internationally available to you – products and service always from a single source.

Challenge us, we are very much forward looking to a close co-operation with you!

Yours sincerely,



Wolfgang Dondorf
(Chairman of the Board)

New



CompactTurbo™

The new process turbopumps which you can install and then (almost) forget. Reliable operation, economic in the long run. Universal.

Page 146



XtraDry™

The pump that always stays clean. For clean and reliable processes. Absolutely "dry" and oil-free. Innovative technology without particle emissions.

Page 134



UnoLine™

Rugged, reliable, low maintenance. The rotary vane pump for any rough vacuum.

Page 30



HiMag™

World-wide the first magnetically suspended turbopump with integrated drive electronics.

Page 222



Gauges

Compact Pirani gauges for general vacuum applications.

Page 410



Roots pumps

The first magnetically coupled Roots pump series world-wide!

Page 88



Vacuum is nothing, but everything to us.

Contents



	Page
The company	3
Modern vacuum technology	8
Experience	9
Hightech	10
Markets	11
World-wide locations: Sales addresses	12
Service	15
World-wide locations: Service addresses	16
www.pfeiffer-vacuum.net	20
Know-how brochures	21
Mass spectrometers	22
System engineering	24
– Helium leak detection	
– Coating	
– Retrofit	



Modern vacuum technology



Vacuum generation

Dry pumps
Rotary vane pumps
Turbopumps
Roots pumps

Vacuum measurement and analytical instruments

Vacuum measurement and control instruments
Mass spectrometers
Leak detectors

Installation equipment

Components
Valves

Vacuum systems

Coating and leak detection systems
Vacuum pumping stations

Under vacuum, space-like pressure conditions are created which are essential in the manufacture of many high-tech products and items for everyday life. Production of solar cells, semiconductors, heat protection glass as well as coating of high-performance mechanical tools and eye glasses are only a few examples in which vacuum technology is used.

Vacuum plays an important role also in research and development, environmental engineering, analytics, as well as the automotive industry. Pfeiffer Vacuum is the leading manufacturer of components and systems for vacuum generation, measurement and analysis.

Experience



Pfeiffer Vacuum stands for innovative solutions, reliable high-tech products as well as a first class service.

For over 100 years now, Pfeiffer Vacuum has set milestones in the area of vacuum engineering. Our comprehensive line of products and services ranges from individual components up to complex vacuum systems.



As a leading supplier we have the right solution for every application. Quality and world-wide service play an important role. With the invention of the turbomolecular pump – turbo-pump for short – we have set new standards in vacuum engineering. Pfeiffer Vacuum is the world market leader in this area.





Hightech



Over 250,000 turbopumps from Pfeiffer Vacuum are used world-wide. They are capable of running for up to 200,000 hours without failure. Our products are optimized by a close working relationship with our customers from varying branches of industry, through recent technical development and through the commitment of our staff.

Numerous awards such as the Quality Award, for example, presented by a major American customer. And the distinction by The Aachen University of Technology (RWTH) substantiate this claim.

Products from Pfeiffer Vacuum are used in widely different industries.

For example, they accompany the International Space Station ISS in space.

The rotor speeds of our turbopumps exceed the speed of sound by a factor of 1.4.



Markets

Analytical industry

Mass spectrometry, gas analyzers, electron microscopy, leak detectors, surface analysis, spectroscopy

Semiconductor industry

Lithography, CVD (Chemical Vapor Deposition), ion implantation, PVD (Physical Vapor Deposition), etching processes, load lock and transfer chambers

Coating

Optical coatings, wear coatings, plate glass coatings, plastic coatings, decorative coatings, smelting furnaces, process engineering, solar cell coatings

Process engineering and chemistry

Evacuation, biotechnology and genetic engineering, drying, pharmaceuticals, distillation

Research and development

Fusion reactors, surface physics, space simulation, laboratory applications, particle accelerators, superconducting applications, high and ultrahigh vacuum chambers, nanotechnology

Other markets

Vacuum packaging, transport vacuum, extruder degassing, air conditioning and refrigeration, automotive





World-wide locations: Sales addresses

A

Argentina

ARO S. A.

Av. Belgrano 369
1092 Buenos Aires
Argentina
Phone: +54 11 4331 5766
Fax: +54 11 4331 3572
E-Mail: info@aroline.com.ar

Australia

Scitek Australia Pty. Ltd.

Suite 1B, 10 –18 Cliff Street
NSW 2061 Milsons Point
Australia
Phone: +61 2 9954 1925
Fax: +61 2 9954 1939
E-Mail: contact@scitek.com.au

Austria

Pfeiffer Vacuum Austria GmbH

Diefenbachgasse 35
1150 Wien
Austria
Phone: +43 1 894 17 04
Fax: +43 1 894 17 07
E-Mail: office@pfeiffer-vacuum.at

Represents the following countries:

Belarus, Bulgaria, Romania, Russia,
Ukraine

B

Baltic States

UAB Vildoma

Zirmunu str. 139
09120 Vilnius
Litauen
Phone: +37 05 236 36 56/57
Fax: +37 05 236 36 55
E-Mail: info@vildoma.lt

Represents the following countries:

Estonia, Latvia, Lithuania

Belgium/Luxemburg

Pfeiffer Vacuum Belgium NV/S. A.

Luxemburgstraat 5
9140 Temse
Belgium
Phone: +32 3 710 59 20
Fax: +32 3 710 59 29
E-Mail: sales@pfeiffer-vacuum.be

Brasil

Elmi Tec Assistência Técnica Representação e comércio S/C Ltda.

Rua Bernadino de Campos, 551-Brooklin
CEP 04620-002 BR-São Paulo - SP
Brazil
Phone: +55 11 5532 0740
Fax: +55 11 5535 3598
E-Mail: elmi-tec@elmi-tec.com.br

C

Chile

Bermat S. A.

Coyancura 2283, Oficina 601,
Providencia
Santiago
Chile
Phone: +56 2 231 8877
Fax: +56 2 231 4294
E-Mail: bermat@bermat.cl

China

Hakuto Enterprises (Shanghai) Ltd.

2F, No. 16 Building 69 Xi Ya Road
Wai Gao Qiao Free Trade Zone
Pu Dong, Shanghai 200 131
China
Phone: +86 21 5064 3746
Fax: +86 21 5046 1490
E-Mail:
leo-shih@pfeiffer-vacuum.com.cn

Hakuto Enterprises Ltd.

8th Floor, World Trade Center, No. 280
Gloucester Road, Causeway Bay
Hongkong
China
Phone: +852 2512 5715
Fax: +852 2807 0511
E-Mail: johntam@hakuto.com.hk

Hakuto Enterprises (Shanghai) Ltd.

Beijing Office
Room 9G, China Merchants Tower
No. 118, Jian Guo Road
Chao Yang District
Peking 100022
China
Phone: +8610 6566 0071
Fax: +8610 6566 0075
E-Mail: osamus@hakuto.com.cn

Colombia

Arotec Colombia S. A.

Carrera 16 No. 36 –95 (Bogotá)
Santafe de Bogotá / D. C.
Colombia
Phone: +57 1 288 7799
Fax: +57 1 285 3604
E-Mail: arotec@arotec.net

Czech Republic

Pfeiffer Vacuum Austria GmbH

Branch Office Praha
Zvonarsha 885
15600 Praha 5
Czech Republic
Phone: +42 0 2 579 23 888
Fax: +42 0 2 579 23 014
E-Mail: office@pfeiffer-vacuum.cz

D

Denmark

Pfeiffer Vacuum Scandinavia AB

Vesterengen 2
2630 Taastrup
Denmark
Phone: +45 43 523 800
Fax: +45 43 523 850
E-Mail: efa@pfeiffer-vacuum.dk

F

Finland

Pfeiffer Vacuum Scandinavia AB

Johanneslundsvägen 3
19461 Upplands Väsby
Sweden
Phone: +46 8 590 748 10
Fax: +46 8 590 748 88
E-Mail: sales@pfeiffer-vacuum.se

France

Pfeiffer Vacuum France SAS

45 rue Senouque BP 139
78531 BUC Cedex
France
Phone: +33 1 30 83 04 00
Fax: +33 1 30 83 04 04
E-Mail: info@pfeiffer-vacuum.fr

G**Germany****Pfeiffer Vacuum GmbH**

Headquarters
 Berliner Strasse 43
 35614 Asslar
 Germany
 Phone: +49 6441 802-0
 Fax: +49 6441 802-202
 E-Mail: info@pfeiffer-vacuum.de

Greece**Servimat Vamvacas Ltd./
Analytical Instruments S. A.**

14-16 Mykonon Str.
 15231 Chalandri-Athens
 Greece
 Phone: +30 210 67 11 140
 Fax: +30 210 67 45 834
 E-Mail: contact@analytical.gr

GUS-States**Pfeiffer Vacuum GmbH**

Berliner Strasse 43
 35614 Asslar
 Germany
 Phone: +49 6441 802 515
 Fax: +49 6441 802 202
 E-Mail: info@pfeiffer-vacuum.de

H**Hungary****MAGNIFICAT KFT**

Deák Ferenc Str. 8
 1047 Budapest
 Hungary
 Phone: +36 1 231 7030
 Fax: +36 1 231 7035
 E-Mail: info@magnificat.hu

I**Iceland****Pfeiffer Vacuum Scandinavia AB**

Johanneslundsvägen 3
 19461 Upplands Väsby
 Sweden
 Phone: +46 8 590 748 10
 Fax: +46 8 590 748 88
 E-Mail: sales@pfeiffer-vacuum.se

India**Pfeiffer Vacuum India Ltd.**

25-5, Nicholson Road, Tarbund
 500 009 Secunderabad
 India
 Phone: +91 40 2775 0014
 Fax: +91 40 2775 7774
 E-Mail: pfeiffer@vsnl.net

Indonesia**APP Systems Services Pte. Ltd.**

Twink Centre 8th floor, Jl. Kapten
 Pierre Tandean No. 82
 12790 Jakarta Selatan
 Indonesia
 Phone: +62 21 794 3337 x 163
 Fax: +62 21 798 9121
 E-Mail: appindo@cbn.net.id

Israel**ODEM Scientific Applications Ltd.**

Rabin Park, 3 Pekris Str.,
 Rechovot 76702
 Israel
 Phone: +97 2 8948 0788
 Fax: +97 2 8948 0789
 E-Mail: ori@odemltd.com

Italy**Pfeiffer Vacuum Italia S.p.A.**

Via San Martino 44
 20017 RHO (Mailand)
 Italy
 Phone: +39 02 93 99 05 1
 Fax: +39 02 93 99 05 33
 E-Mail: contact@pfeiffer-vacuum.it

J**Japan****Hakuto Co., Ltd. Head Office**

1-13, Shinjuku 1-Chome, Shinjuku-ku
 Tokio 160-8910
 Japan
 Phone: +81 3 3225 8910
 Fax: +81 3 3225 9011
 E-Mail: pfeiffer@hakuto.co.jp

Hakuto Co., Ltd. Kansai Branch

3-18, Miyamae 2-Chome, Itami-City
 Hyogo-ken 664-8555
 Japan
 Phone: +81 72 784 8910
 Fax: +81 72 784 8286
 E-Mail: pfeiffer@hakuto.co.jp

K**Korea****Pfeiffer Vacuum Korea Ltd.**

703 Ho, 853-1, Hankuk Mulru,
 Dongchondong
 449-120 Yong-in City, Kyungkido
 Korea
 Phone: +82 31 266 0741
 Fax: +82 31 266 0747
 E-Mail: sales@pfeiffer-vacuum.co.kr

M**Malaysia****APP Engineering Sdn. Bhd.**

Kuala Lumpur Office
 No. 5F-7, Pusat Perdagangan IOI,
 Persiaran Puchong Jaya Selatan
 Bandar Puchong Jaya
 47100 Puchong, Selangor Darul Ehsan
 Malaysia
 Phone: +60 3 8070 1611
 Fax: +60 3 8070 1636
 E-Mail: admin_kl@app-msia.com

N**Netherlands****Pfeiffer Vacuum Nederland BV**

Veldzigt 30a
 3454 PW De Meern
 Netherlands
 Phone: +31 30 6666 050
 Fax: +31 30 6662 794
 E-Mail: sales@pfeiffer-vacuum.nl

Norway**Granzow AS**

Ringeriksveien 179
 1313 Vøyenenga
 Norway
 Phone: +47 6713 6980
 Fax: +47 6713 4635
 E-Mail: baard.helmersen@granzow.no

P**Peru****Ing. E. Brammertz s. r. l.**

Av. Jose Pardo 182 of 905
 Miraflores
 Lima 18, Peru
 Phone: +511 445 0181/445 8178
 Fax: +511 445 1931
 E-Mail: braming@terra.com.pe



World-wide locations: Sales addresses

Philippines

APP Systems Services Pte. Ltd.

Unit 306, Garmer Building
Pasig Blvd. Ext,
Corner C. Raymundo Avenue
Pasig City
Philippines
Phone: +63 2 747 1885
Fax: +63 2 747 1886
E-Mail: admin.mnl@appsystems.com.sg

Poland

Softtrade Sp.z o.o.

ul. Grunwaldzka 391
60-173 Poznan
Poland
Phone: +48 61 8677 168
Fax: +48 61 8677 111
E-Mail: softtrade@softtrade.com.pl

Portugal

Tecnovac Tecnologia de Vacio S. L.

Sector Literatos, 38 – Local 1
28760 Tres Cantos (Madrid)
Spain
Phone: +34 91 804 1134
Fax: +34 91 804 3091
E-Mail: tecnovac@tecnovac.es

S

Singapore

APP Systems Services Pte. Ltd.

11, Toh Guan Road East, #03-01
APP Enterprise Building
Singapur 608 603
Singapore
Phone: +65 6425 6611
Fax: +65 6560 6616
E-Mail: sales@appsystems.com.sg

Slovakia

Vakuum Servis s. r. o.

Hasická 2643
75661 Roznov pod Radhostem
Czech Republic
Phone: +42 0 651-602 314
Fax: +42 0 651-602 166
E-Mail: office@vakuum-servis.cz

Slovenia

SCAN, d. o. o., Preddvor

Breg ob Kokri 7
4205 Preddvor
Slovenia
Phone: +38 6 4 27 50 200
Fax: +38 6 4 27 50 240
E-Mail: scan@siol.net

South Africa

Labotec Pty. Ltd.

21 Bavaria Rd., Randjespark Ext.11
1685 Halfway House
Johannesburg
South Africa
Phone: +27 11 315 5434
Fax: +27 11 315 5882
E-Mail: wolf.frank@labotec.co.za

Spain

Tecnovac Tecnologia de Vacio S. L.

Sector Literatos, 38 – Local 1
28760 Tres Cantos (Madrid)
Spain
Phone: +34 91 804 1134
Fax: +34 91 804 3091
E-Mail: tecnovac@tecnovac.es

Sweden

Pfeiffer Vacuum Scandinavia AB

Johanneslundsvägen 3
19461 Upplands Väsby
Sweden
Phone: +46 8 590 748 10
Fax: +46 8 590 748 88
E-Mail: sales@pfeiffer-vacuum.se

Represents the following countries:

Danmark, Finland, Iceland,
Sweden, Norway

Switzerland

Pfeiffer Vacuum (Schweiz) AG

Foerlibuckstrasse 30
8037 Zürich
Switzerland
Phone: +41 44 444 22 55
Fax: +41 44 444 22 66
E-Mail: info@pfeiffer-vacuum.ch

T

Taiwan R.O.C.

Hakuto Taiwan Ltd.

3-F1, No. 25, PuDing Rd,
HsinChu, Taiwan, 300
Taiwan R.O.C.
Tel.: +88 6 2 2753 0188
Fax: +88 6 2 2746 5282
E-Mail: sales@pfeiffer-vacuum.com.hk

Thailand

Hakuto (Thailand) Ltd.

16th Floor, Q. House Asoke Building,
66 Sukhumvit 21 Road (Asoke),
Klongtoey Nua, Wattana
10110 Bangkok
Thailand
Phone: +66 2 259 6244
Fax: +66 2 259 6243
E-Mail: tmgroup@hakutothailand.com

U

United Kingdom

Pfeiffer Vacuum Ltd.

2-4 Cromwell Business Centre,
Howard Way, Interchange Park
Newport Pagnell
MK16 9QS
United Kingdom
Phone: +44 1908 500600
Fax: +44 1908 500601
E-Mail: sales@pfeiffer-vacuum.co.uk

USA

Pfeiffer Vacuum Inc.

24 Trafalgar Square
Nashua, NH 03063-1988
USA
Phone: +1 603 578 6500
Fax: +1 603 578 6550
E-Mail: contact@pfeiffer-vacuum.com

Pfeiffer Vacuum Inc.

568 Gibraltar Drive
Milpitas, CA 95035
USA
Phone: +1 408 956 2578
Fax: +1 408 263 7826
E-Mail: contact@pfeiffer-vacuum.com

V

Venezuela

Secotec S. A.

Av. Andres Bello Edificio Vam
Torre Este Piso 1
1010-A Caracas
Venezuela
Phone: +58 212 573 8687
Fax: +58 212 573 1932
E-Mail: secotec@cantv.net

Service

Maximum service life of vacuum components combined with low down times of a system are clear customer expectations. We react to these requirements through a quick responsive service, perfectly matching customer requirements in each case.

Standardized services

To us, it is important that our products can be serviced according to the same standard anywhere in the world. To this end, we have qualified each individual service location as a ServiceCenter or a ServicePoint. Here, proximity to our customers and competence are of great importance to our service organization. You can find the current overview on the next pages and respectively on the Internet.

Service network

Our service organization offers a world-wide service network for local service or maintenance on turbopumps. Moreover, Pfeiffer Vacuum is the only manufacturer of turbopumps capable of performing a bearing replacement by its field service at the customer site. This is especially advantageous to large manufacturers using our pumps.

Cost of ownership

This is a term which is constantly becoming more important, not only for the purchase price but, in particular, for the operating and maintenance costs, that have an impact on the expenditure of a customer during the life cycle of a pump. Our world-wide service network, the high level of reliability of our products and to perform maintenance or replace the bearings of a turbopump at the customer site offer the lowest operating costs of all turbopumps equipped with conventional bearings on the market. This applies to the entire line – from the TPD 011, the smallest turbopump of the world to the “workhorses” of the 2000 liter class.

Original spare parts

make a difference. Our specially trained technicians and engineers ensure maximum product reliability. We use only original spare parts which meet our high standards of quality. The use of third-party parts involves a considerable risk for failure and expensive secondary damage.

LifeTime Service

This means that our products, should they become defective, are not immediately scrapped, but are reworked instead so as to keep the costs to our customers as low as possible. With regular maintenance, our products attain a very long service life and this even under the most demanding conditions in data storage or coating systems.

Our services at a glance:

- ▶ Field service for fast and competent servicing at the customer site
- ▶ Commissioning of components and systems at the customer site
- ▶ Maintenance and repair work at our service locations
- ▶ Standard and maintenance replacement, for fast repair
- ▶ Service contracts which match the customer's requirements
- ▶ Delivery of maintenance and refurbishing kits as well as spare parts
- ▶ Engineering consulting/help-desk/hotline
- ▶ Customer trainings





World-wide locations: Service addresses

A

Argentina

ServicePoint Buenos Aires ARO S. A.

Av. Belgrano 369
1092 Buenos Aires
Argentina
Phone: +54 11 4331 5766
Fax: +54 11 4331 3572
E-Mail: info@aroline.com.ar

Australia

ServicePoint Sydney

Scitek Australia Pty. Ltd.
Suite 1B, 10–18 Cliff Street
NSW 2061 Milsons Point
Australia
Phone: +61 2 9954 1925
Fax: +61 2 9954 1939
E-Mail: contact@scitek.com.au

Austria

ServiceCenter Wien

Pfeiffer Vacuum Austria GmbH
Diefenbachgasse 35
1150 Wien
Austria
Phone: +43 1 894 17 04
Fax: +43 1 894 17 07
E-Mail: service@pfeiffer-vacuum.at

Represents the following countries:

Belarus, Bulgaria, Romania, Russia, Ukraine,

B

Belgium/Luxemburg

ServiceCenter Temse

Pfeiffer Vacuum Belgium NV/S. A.
Luxemburgstraat 5
9140 Temse
Belgium
Tel.: +32 3 710 59 20
Fax: +32 3 710 59 29
E-Mail: service@pfeiffer-vacuum.be

Brasil

ServicePoint São Paulo Elmi Tec Assistência Técnica Representação e comercio S/C Ltda.

Rua Bernadino de Campos, 551-Brooklin
CEP 04620-002 BR-São Paulo - SP
Brazil
Phone: +55 11 5532 0740
Fax: +55 11 5535 3598
E-Mail: elmi-tec@elmi-tec.com.br

C

Chile

ServicePoint Santiago Bermat S. A.

Coyancura 2283, Oficina 601,
Providencia
Santiago
Chile
Phone: +56 2 231 8877
Fax: +56 2 231 4294
E-Mail: bermat@bermat.cl

China

ServiceCenter Shanghai

Hakuto Enterprises (Shanghai) Ltd.
2F., No. 16 Building 69 Xi Ya Road
Wai Gao Qiao Free Trade Zone
Pu Dong, Shanghai 200 131
China
Phone: +86 21 5064 3746
Fax: +86 21 5046 1490
E-Mail: leo-shih@pfeiffer-vacuum.com.cn

ServicePoint Hong Kong

Hakuto Enterprises
8th Floor, World Trade Center,
No. 280 Gloucester Road,
Causeway Bay
Hongkong
China
Phone: +85 2 2578 4921
Fax: +85 2 2807 0511
E-Mail: johntam@hakuto.com.hk

ServicePoint Beijing

Hakuto Peking Office
Room 9G China Merchants Tower
No. 118 Jian Guo Road
Chao Jang District
Peking 100022
China
Phone: +86 10 6566 0071
Fax: +86 10 6556 0075
Email: osamus@hakuto.com.cn

Colombia

ServicePoint Bogota

Arotec Colombia S. A.
Carrera 16 No. 36–95 (Bogotá)
Santafe de Bogotá / D. C.
Colombia
Phone: +57 1 288 7799
Fax: +57 1 285 3604
E-Mail: arotec@arotec.net

Czech Republic

ServicePoint Roznov

Vakuum Servis
Hasciska 2643
75661 Roznov
Czech Republic
Phone: +42 0 571 842 314
Fax: +42 0 571 843 166
E-Mail: office@vakuum-servis.cz

F

France

ServiceCenter Versailles

Pfeiffer Vacuum France SAS
45 rue Senouque BP 139
78531 BUC Cedex
France
Phone: +33 1 30 83 04 00
Fax: +33 1 30 83 04 04
E-Mail: info@pfeiffer-vacuum.fr

G

Germany

Pfeiffer Vacuum GmbH

Headquarters
Berliner Strasse 43
35614 Asslar
Germany
Phone: +49 6441 802 333
Fax: +49 6441 802 339
E-Mail: service@pfeiffer-vacuum.de

ServiceCenter Berlin

Pfeiffer Vacuum GmbH
Carl-Scheele-Strasse 12
12489 Berlin-Adlershof
Germany
Phone: +49 30 6399 4432
Fax: +49 30 6399 4435
E-Mail: service.berlin@pfeiffer-vacuum.de

ServicePoint Bremen

MassTech GmbH
Barkhausenstrasse 2
28197 Bremen
Germany
Phone: +49 421 52881 40
Fax: +49 421 52881 42
E-Mail:
service.bremen@pfeiffer-vacuum.de

ServicePoint Karlsruhe

Phone: +49 7247 963 114
Fax: +49 7247 963 115
E-Mail:
service.karlsruhe@pfeiffer-vacuum.de

ServicePoint München

Lochhamer Strasse 31
82152 München
Germany
Phone: +49 89 740 80 876
Fax: +49 89 740 80 877
E-Mail:
service.muenchen@pfeiffer-vacuum.de

ServicePoint Nürnberg

Phone: +49 8467 801 434
Fax: +49 8467 801 435
E-Mail:
service.nuernberg@pfeiffer-vacuum.de

Greece**ServicePoint Athens**

Servimat Vamvacas Ltd./
Analytical Instruments S. A.
14 –16 Mykonon Str.
15231 Chalandri-Athens
Greece
Phone: +30 210 67 48 973
Fax: +30 210 67 48 978
E-Mail: contact@analytical.gr

H**Hungary****ServicePoint Budapest**

MAGNIFICAT KFT
Deák Ferenc Str. 8
1047 Budapest
Hungary
Phone: +36 1 231 7030
Fax: +36 1 231 7035
E-Mail: info@magnificat.hu

I**India****ServiceCenter Secunderabad**

Pfeiffer Vacuum India Ltd.
25 – 5, Nicholson Road, Tarbund
500 009 Secunderabad
India
Phone: +91 40 2775 0014
Fax: +91 40 2775 7774
E-Mail: pfeiffer@vsnl.net

Israel**ServicePoint Rehovot**

ODEM Scientific Applications Ltd.
Rabin Park, 3 Pekris Str.,
Rehovot 76702
Israel
Phone: +97 2 8 9480 788
Fax: +97 2 8 9480 789
E-Mail: ron@odemltd.com

Italy**ServiceCenter Milan**

Pfeiffer Vacuum Italia S. p. A.
Via San Martino 44
20017 RHO (Mailand)
Italy
Phone: +39 02 93 99 05 1
Fax: +39 02 93 99 05 33
E-Mail: service@pfeiffer-vacuum.it

ServicePoint Rom

Italy
Phone: +39 335 52841 42
Fax: +39 06 552 688 66
E-Mail: service@pfeiffer-vacuum.it

J**Japan****ServiceCenter Isehara**

Hakuto Co., Ltd.
42 Suzukawa, Isehara-Shi
Isehara 1146
Japan
Phone: +81 3 3225 8910
Fax: +81 3 3225 9011
E-Mail: kakinuma-h@hakuto.co.jp

K**Korea****ServiceCenter Seoul**

Pfeiffer Vacuum Korea Ltd.
703 Ho, 853-1, Hankuk Mulru,
Dongchondong
449-120 Yong-in City, Kyungkido
Korea
Phone: +82 31 266 0741
Fax: +82 31 266 0747
E-Mail: service@pfeiffer-vacuum.co.kr

M**Malaysia****ServicePoint Penang**

APP Engineering Sdn. Bhd.
No. 66 G & 1st Floor,
Persiaran Bayan Indah
Bayan Bay, Sungai Nibong
11900 Penang
Malaysia
Phone: +60 4 646 7758
Fax: +60 4 646 7759
E-Mail: admin_pg@app-msia.com

ServicePoint Kuala Lumpur

APP Engineering Sdn Bhd
No. 5F –7, Pusat Perdagangan IOI,
Persiaran Puchong Jaya Selatan,
Bandar Puchong Jaya
47100 Puchong, Selangor Darul
Ehsan,
Malaysia
Phone: +60 3 8070 1611
Fax: +60 3 8070 1636
E-Mail: admin_kl@app-msia.com

N**Netherlands****ServicePoint Utrecht**

Pfeiffer Vacuum Nederland BV
Veldzigt 30a
3454 PW De Meern
Netherlands
Phone: +31 30 6666 050
Fax: +31 30 6662 794
E-Mail: service@pfeiffer-vacuum.nl



World-wide on location: Service addresses

P

Peru

ServicePoint Miraflores **Ing. E. Brammertz s. r. l.**

Av. Jose Pardo 182 of 905
0173 PE-Miraflores
Lima 18
Peru
Phone: +511 445 0181/445 8178
Fax: +511 445 1931
E-Mail: braming@terra.com.pe

Poland

ServicePoint Poznan

Softtrade Sp.z o.o.
Ul. Grunwaldzka 391
60-173 Poznan
Poland
Phone: +48 61 8677 168
Fax: +48 61 8677 111
E-Mail: softtrade@softtrade.com.pl

S

Singapore

ServiceCenter Singapore

APP Systems Services Pte. Ltd.
11, Toh Guan Road East, #03-01
APP Enterprise Building
608 603 Singapur
Singapore
Phone: +65 6425 6611
Fax: +65 6560 6616
E-Mail:
gimchwee.cheok@appsystems.com.sg

Slovenia

ServicePoint Preddvor

SCAN, d. o. o., Preddvor
Breg ob Kokri 7
SL-4205 Preddvor
Slovenia
Phone: +38 6 4 27 50 200
Fax: +38 6 4 27 50 240
E-Mail: scan@siol.net

South Africa

ServicePoint Labotec Pty. Ltd.

21 Bavaria Rd., Randjespark Ext.11
1685 Halfway House
Johannesburg
South Africa
Phone: +27 11 315 5434
Fax: +27 11 315 5882
E-Mail: wolf.frank@labotec.co.za

Spain

ServicePoint Madrid

Tecnovac Tecnologia de Vacio S. L.
Sector Literatos, 38 – Local 1
28760 Tres Cantos (Madrid)
Spain
Phone: +34 91 804 1134
Fax: +34 91 804 3091
E-Mail: tecnovac@tecnovac.es

Sweden

ServiceCenter Stockholm

Pfeiffer Vacuum Scandinavia AB
Headquarters
Johanneslundsvägen 3
19461 Upplands Väsby
Sweden
Phone: +46 8 590 748 10
Fax: +46 8 590 748 88
E-Mail: service@pfeiffer-vacuum.se

Represents the following countries:

Danmark, Finland, Iceland,
Sweden, Norway

ServicePoint Gothenburg

Backa Bergögata 14
42243 Kungälv
Sweden
Phone: +46 31 52 60 60
Fax: +46 31 52 60 60
E-Mail: service@pfeiffer-vacuum.se

Switzerland

ServiceCenter Zürich

Pfeiffer Vacuum (Schweiz) AG
Foerlibuckstrasse 30
8037 Zürich
Switzerland
Phone: +41 44 444 22 55
Fax: +41 44 444 22 66
E-Mail: service@pfeiffer-vacuum.ch

ServicePoint Morges

Switzerland

Phone: +41 44 444 22 55
Fax: +41 44 444 22 66
E-Mail: service@pfeiffer-vacuum.ch

T

Taiwan R.O.C.

ServiceCenter HsinChu

Hakuto Taiwan Ltd.
3F-1, No 25, PuDing Road
HsinChu, Taiwan, 300
Taiwan R.O.C.
Phone: +88 6 2 2753 0188 ext 160
Fax: +88 6 2 2746 5282
+88 6 2 2746 5283
E-Mail: info@hakuto.com.tw

Thailand

ServicePoint Bangkok

Hakuto Thailand Ltd.
16th floor, Q. House Asoke Building,
66 Sukhumvit 21 Road (Asoke),
Klongtoey Nua, Wattana,
Bangkok 10110
Thailand
Phone: +66 2 259 6244
Fax: +66 2 259 6243
E-Mail: wichan@hakutothailand.com

U

United Kingdom

ServiceCenter Newport Pagnell

Pfeiffer Vacuum Ltd.
2–4 Cromwell Business Centre,
Howard Way, Interchange Park
Newport Pagnell
MK16 9QS
United Kingdom
Phone: +44 1908 500600
Fax: +44 1908 500601
E-Mail: service@pfeiffer-
vacuum.co.uk



USA

ServiceCenter Nashua

Pfeiffer Vacuum Inc.
24 Trafalgar Square
Nashua, NH 03063-1988
USA
Phone: +1 603 578 6500
Fax: +1 603 578 6550
E-Mail: service@pfeiffer-vacuum.com

ServiceCenter Milpitas

Pfeiffer Vacuum Inc.
568 Gibraltar Drive
Milpitas, CA 95035
USA
Phone: +1 408 956 2578, Ext. 309
Fax: +1 408 263 7826
E-Mail: service@pfeiffer-vacuum.com

V

Venezuela

ServicePoint Caracas Secotec S. A.

Av. Andres Bello Edificio Vam
Torre Este Piso 1
1010-A Caracas
Venezuela
Phone: +58 212 573 8687
Fax: +58 212 573 1932
E-Mail: secotec@cantv.net



Online catalog

The online catalog from Pfeiffer Vacuum offers quick and easy access to our current product portfolio with additional ability to send online inquiries to the company.

The online catalog is equipped with a “quick finder” for rapid searching of our products. Be it ordering numbers, product/item description or keywords – everything is displayed after only a few clicks of the mouse. Under menu options it is possible to make selections and combine products according to specific requirements. Through the shopping cart function, the inquiry is then passed onto one of our skilled technical engineers within the company who will then contact the customer.

Training

Training is offered by Pfeiffer Vacuum for our customers who operate vacuum components and perform maintenance work on their systems. Participants in the training courses are effectively trained in small groups as to the proper operation and maintenance of their equipment. The course, “Foundations of Vacuum Technology”, allows participants without prior knowledge to easily familiarize themselves with the topics of interest.

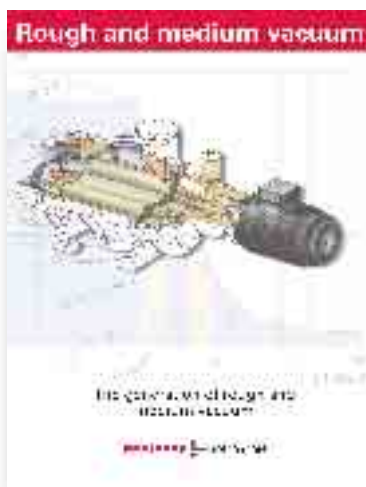
The training courses take place in our training center at Asslar, Germany. Upon request, we also offer courses in your facility for your specific vacuum applications. More details on dates and contents of the training courses can be found on the Internet.

Operating instructions

For our catalog products, operating instructions are compiled. These operating instructions are made available on the Internet.

You can find operating instructions on the Internet under “Products”.





Rough and medium vacuum

What is a backing pump? Which backing pump is the right one for my process? The information brochure "Rough and medium vacuum" provides detailed information and the background for the vacuum user. Design and operation of rotary vane pumps, Roots pumps, liquid ring pumps and pumping stations are covered. A collection of data and engineering equations supplements this information.

Brochure:

Ordering Number **PW 0013 PE**



Working with turbopumps

How does a turbopump operate? How do I calculate the effective pumping speed? Which backing pump is suitable? How is a vacuum system dimensioned for a specific process? The answers to these and many other questions are supplied in the brochure, "Working with turbopumps". It is a useful and informative tool for all those using turbopumps in everyday vacuum practice. In a highly descriptive way, the design and operation of the various turbopump lines, the accessories as well as the selection of the matching backing pump are detailed. Especially helpful to the user are the very detailed calculation examples as well as a comprehensive collection of data.

Brochure:

Ordering Number **PT 0053 PE**



Vacuum Solutions for the Analytical Industry

For today's analytical methods, modern vacuum engineering is indispensable. Especially in the areas of mass spectrometry, leak detection, gas analysis as well as electron microscopy and surface analysis, Pfeiffer Vacuum has available highly efficient engineering solutions for producing, controlling and measuring vacuum. The components and systems relevant in the area of analytics are clearly described and supplemented by examples.

Brochure:

Ordering Number **PI 0043 PE**

All brochures can be requested through the Internet.

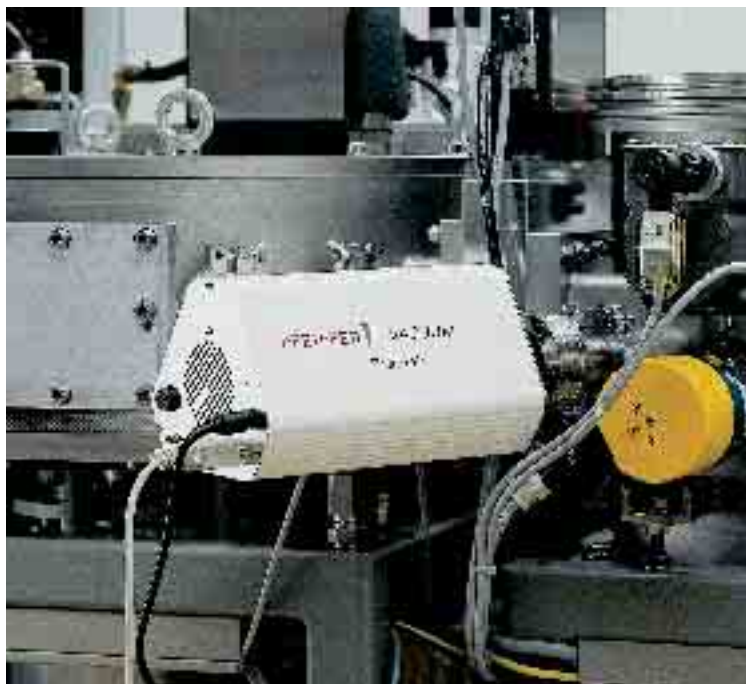
Vacuum and process gas analysis

Often it is not only important to know how low the pressure within a vacuum chamber is, but also which gas compositions are present. In order to find this out, a mass spectrometer is an important tool.

Mass spectrometers exist in many varieties. Of special interest in vacuum engineering is the Quadrupole mass spectrometer.

Advantages of the Quadrupole mass spectrometer:

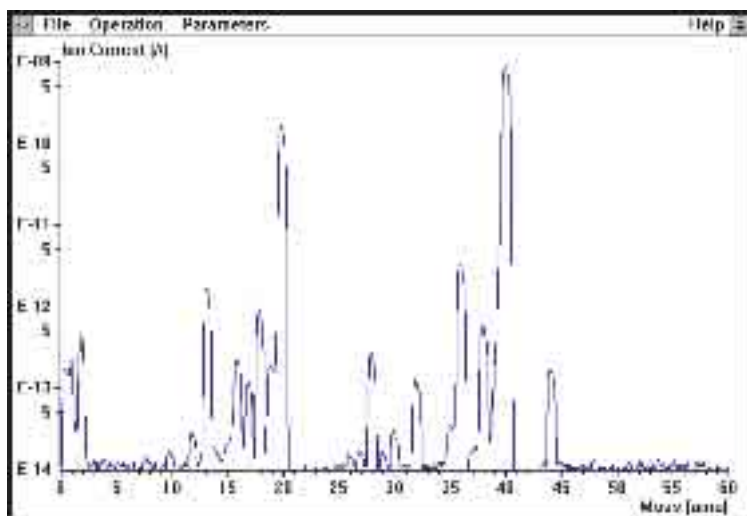
- ▶ Small size
- ▶ Wide mass range
- ▶ Online measurements
- ▶ Many uses



Pfeiffer Vacuum offers a broad spectrum of Quadrupole mass spectrometers. It ranges from small and simple instruments to high-performance mass spectrometers.

Residual gas analyses in a vacuum are performed with cost-effective and small instruments.

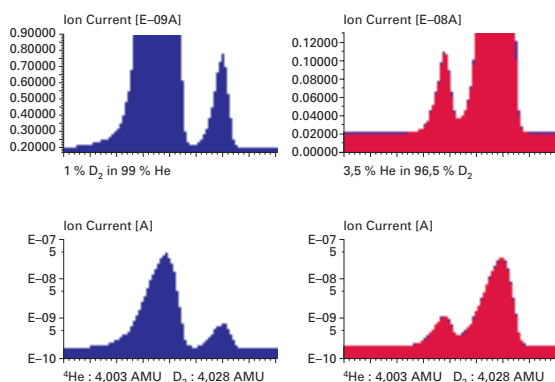
Prisma™ on a sputtering system



The possibilities of high-performance mass spectrometers extend from gas analysis to secondary ion analysis right up to plasma analysis. If the gas which is to be analyzed is present at atmospheric pressure, a differentially pumped inlet system will be required in most cases. Pfeiffer Vacuum offers perfectly matched pumping sets for such applications.

A benchtop instrument represents a compact version of this analysis system.

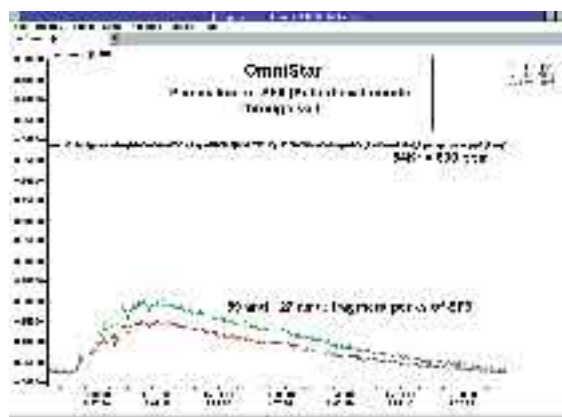
The Quadrupole mass spectrometers from Pfeiffer Vacuum are presented in a separate brochure. Here the special requirements of the users employing mass spectrometers are covered and the fundamentals of Quadrupole mass spectrometry are presented.



Spectrum He D₂



HiQuad™



SF₆-concentration after permeation through soil.



OmniStar™

Brochure:
Mass spectrometer

Order.-No.
PA 0065 PE

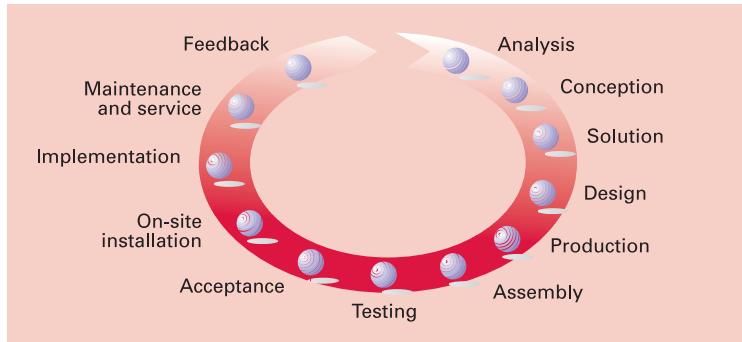


System Engineering – more than the sum of its components

Custom system solutions for coating systems and leak detection systems are an important addition to our full line of vacuum components.

Decades of vacuum engineering experience go into designing these systems.

The full performance system



Brochures:

Helium leak detection systems

Coating systems

Retrofit

Helium leak detection and recovery unit for climate system accumulators

Helium leak detection systems for solenoid valves of air suspension systems

Helium leak detection systems for metal fuel tanks

Helium leak detection systems for plastic fuel tanks

Helium leak detection systems for quality control of airbag inflators

Helium leak detection systems for testing activated carbon filters

Helium leak detection systems for gray cast iron valves used in air conditioning compressors

Order.-No.

PA 0028 PE

PA 0034 PE

PA 0054 PE

PA 0039 PE

PA 0049 PE

PA 0048 PE

PA 0050 PE

PA 0040 PE

PA 0047 PE

PA 0046 PE

Leak detection

Helium leak detection systems

Helium leak detection systems are tailor-made leak detection systems for quality assurance purposes. Even minute leaks in products such as fuel tanks or air conditioning units are reliably detected.

- ▶ Integral leak test for determining the total leak rate of a sample
- ▶ Sniffer leak test for pinpointing the leak
- ▶ High, objective measurement accuracy

- ▶ Suitable for automation and integration in existing production cycles

- ▶ Economic through helium recovery
- ▶ Custom system design
- ▶ Fully automated



Coating

Classic

Comprehensive line of equipment, different sizes depending on throughput and type of application:

- ▶ Evaporation processes (thermal and with electron beam)
- ▶ Sputtering processes (DC, RF, ion beam)
- ▶ Plasma processes (deposition, pretreatment, cleaning)
- ▶ For laboratory, development and pilot production
- ▶ Industry compatible design, best manufacturing quality, rugged long-life design
- ▶ Low operating costs
- ▶ Clean room compatible



Fast and cost effective refurbishment of coating systems

- ▶ Short delivery times
- ▶ Low initial costs
- ▶ Minimization of risk
- ▶ Fully automatic control system

Based on long-term experience in the field of coating technology and a high level of technical know how, Pfeiffer Vacuum provides customized refurbishment of existing coating systems.

Modular system

The basic package mainly consists of a new, fully automatic control system with visualization in Windows. Based on this package, the modular retrofit concept aims to refurbish other sub-assemblies if it is necessary or required by the customer.

Integration of existing components

All subsystems which are useful will be integrated into the new control system.

Use of standard components

To avoid bottlenecks regarding the availability of spare parts, Pfeiffer Vacuum only uses standard components from well-known suppliers (e. g. Siemens, FESTO).

Strategic partnerships

Carefully chosen and world-wide partners, help us give the best support to our customers.

Refurbishment on site

To minimize the loss of production, the coaters are reconstructed at the customer site.



Compact and powerful rotary vane pumps for all rough and medium vacuum applications

Contents

	Page
Selection aid	28
Your advantages/Applications	29
 UnoLine™ – single-stage rotary vane pumps	 30
Your advantages/Applications	31
UNO 2.5	32
UNO 6	34
UNO 20	36
UNO 60 & 90	38
UNO 200 & 240	40
UNO 400 & 630	42
UnoLine™ accessories	44
 DuoLine™ – two-stage rotary vane pumps	 50
Your advantages/Applications	51
DUO 2.5	52
DUO 5 M	54
DUO 10 M	56
DUO 20 M	58
DUO 35	60
DUO 65	62
DUO 120	64
DUO 250	66
DuoLine™ accessories	68



Selection aid

	Operating pressure range		General vacuum technology			Vacuum drying	Vacuum metallurgy		Vacuum chemistry		
	Operating pressure 1 to 600 mbar	Operating pressure 10 ⁻³ to 50 mbar	Backing pump HV pumping station	Backing pump UHV pumping station	Backing pump for Roots pump	High share of H ₂ O vapors Low share of H ₂ O vapors	Sintering, melting, casting	Soldering, welding, annealing	Aggressive gases/vapors for pump in general	Reactive gases/vapors with operating fluid in general	Gas mixtures with a high oxygen share
Rotary vane pump											
UnoLine™ single-stage rotary vane pump	●	▲	▲		▲	●	●	●	▲	▲	
DuoLine™ two-stage rotary vane pump	▲	●	●	●	▲	▲	●	▲	▲	▲	▲
DuoLine™ C two-stage rotary vane pump		▲	●	●	▲	▲	●	▲	●	●	●
Accessories											
Inlet/separators and traps											
Dust separator STP	●	▲	▲	▲	▲		▲	●	●	▲	▲
Activated carbon filter FAK	▲	▲	▲	▲	▲			▲	▲	▲	▲
Fuller's earth filter FBL	▲	▲						▲	▲	▲	▲
Zeolite trap ZFO		▲	●	▲	▲						
Catalyzer trap URB		▲	▲	●							
Condensate separator KAS	▲	▲			▲	●	▲	▲	▲	▲	▲
Outlet/separators											
Oil mist filter ONF	●	●	●	●	●	●	●	●	●	●	●
Oil return unit ORF	●	▲	▲	▲	▲			▲	▲	▲	▲
Condensate separator KAS	▲	▲	▲	▲	▲	●	●	▲	▲	▲	▲
Oil filters											
Chemical oil filter OFC for DUO 35/65	▲	▲	▲	▲	▲			▲	▲	●	▲
Mechanical oil filter OFC for DUO 35/65	▲	▲	▲	▲	▲			●	●	●	▲
Monitoring units											
Oil pressure switch for monitoring operation		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲

● Recommended ▲ Possible

Your advantages

- ▶ Single and two-stage designs with pumping speeds from 2.5 to 250 m³/h
- ▶ High pumping speed in a compact package
- ▶ High reliability through forced lubrication of the bearings
- ▶ Process safety through integrated high vacuum safety valve
- ▶ Free of nonferrous metals
- ▶ Comprehensive accessories for monitoring and system integration
- ▶ Also corrosive gas version available



Applications

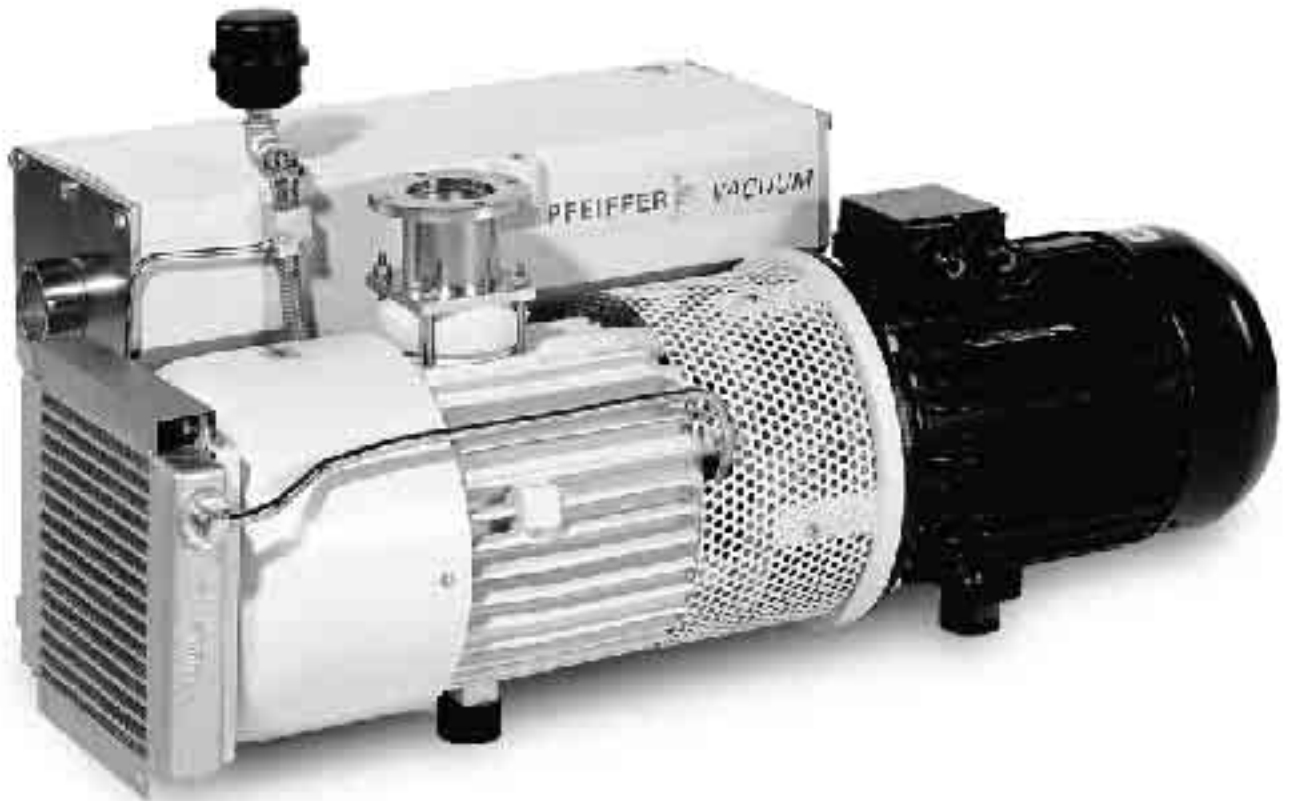
- ▶ All rough and medium vacuum applications
- ▶ Backing pump for turbopumps and Roots pumps
- ▶ General laboratory applications
- ▶ Analytical instruments
- ▶ Chemical laboratories
- ▶ Freeze drying
- ▶ Process engineering



UnoLine™ – single-stage rotary vane pump



DuoLine™ – two-stage rotary vane pump



**The “rugged” one among the rotary vane pumps.
Good for any rough vacuum**

Your advantages

- ▶ Strong – a full line of pumps with pumping speeds from 2.5 to 630 m³/h
- ▶ Economical – lowest operating costs with highest uptime
- ▶ Rugged – designed for a long service life
- ▶ Environment friendly – with fewer oil changes
- ▶ Process integrity due to integrated safety valve and oil return unit
- ▶ A variety of accessories provide flexibility to meet process requirements

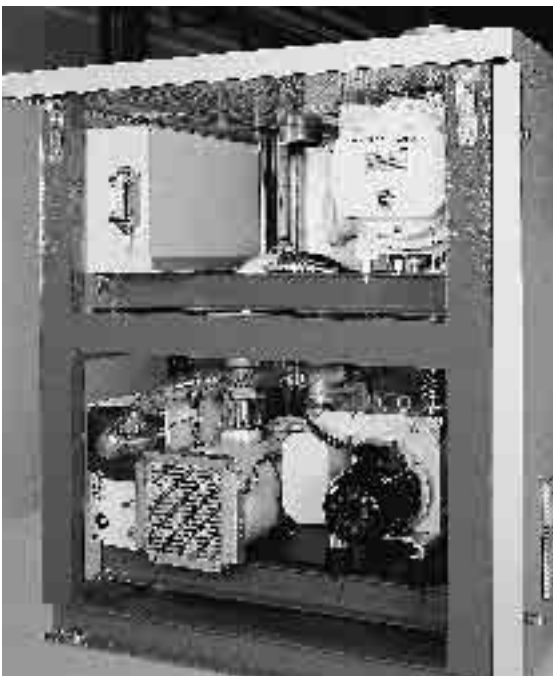


Applications

Field proven in many areas, for example:

- ▶ Packaging
- ▶ Electron beam welding
- ▶ Production of incandescent and fluorescent lamps
- ▶ Surface coatings
- ▶ Drying
- ▶ Leak detection
- ▶ Metallurgy

For direct production of a rough vacuum in industrial research or in the laboratory. Or integrated in pumping stations as a backing pump for Roots vacuum pumps and turbo-pumps.



UNO 250 – here operated in a helium leak detection unit for air bellows



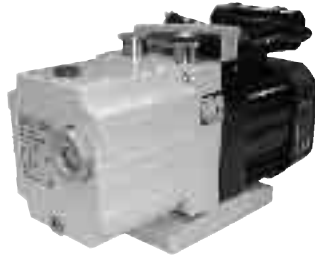
Transformer drying plant with rotary vane pumps UnoLine™



Electron beam welding unit (WKP 4000/UNO 630)

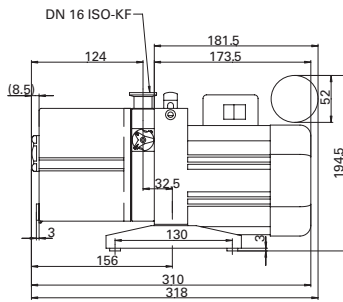
Rotary vane pump with a pumping speed of 2.5 m³/h

UNO 2.5

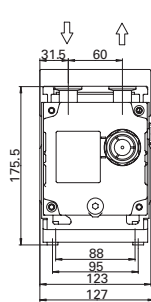


- Compact - small - powerful
- Integrated gas ballast and high vacuum safety valve
- The only pump with this volume flow and pressure range in the world
- For rough and medium vacuum applications

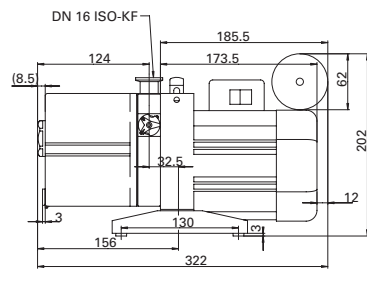
Dimensions (in mm)



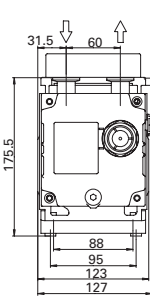
PK D31 707



PK D31 709

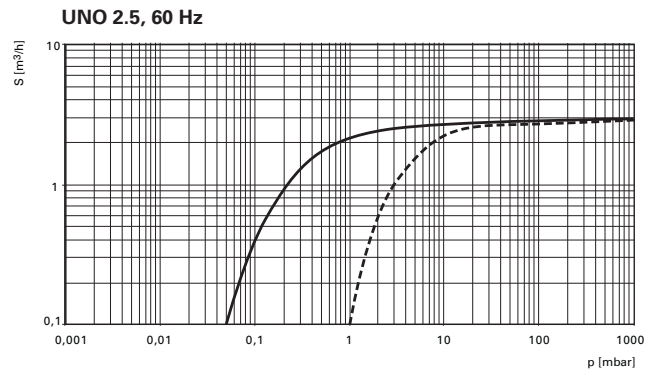
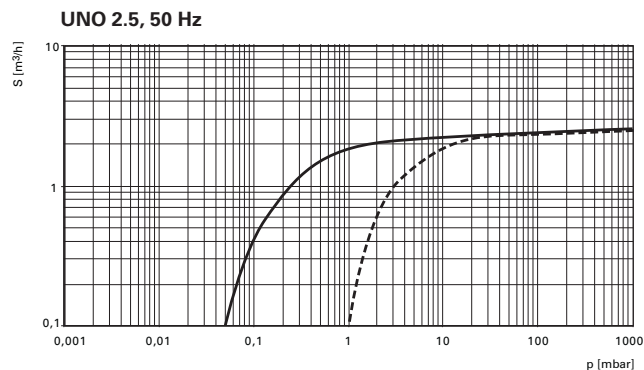


PK D31 708



PK D31 712

Pumping speed



— without gas ballast ----- with gas ballast



Technical data

UNO 2.5 1-ph Motor

Pumping speed at 50 Hz	2.5 m ³ /h
Pumping speed at 60 Hz	2,9 m ³ /h
Ultimate pressure: Total with gas ballast	< 1 mbar
Ultimate pressure: Total without gas ballast	< 5·10 ⁻² mbar
Flange (in)	DN 16 ISO-KF
Flange (out)	DN 16 ISO-KF
Mains requirement: voltage (range)	100-105 V, +/- 5 %, 50 Hz 110-130 V, +/- 5 %, 60 Hz
Rated power 50 Hz	0.15 kW
Rated power 60 Hz	0.18 kW
Nominal rotation speed at 50 Hz	2880 rpm
Nominal rotation speed at 60 Hz	3420 rpm
Water vapor tolerance at 50 Hz	15 mbar
Water vapor tolerance at 60 Hz	15 mbar
Water vapor capacity 50 Hz	26 g/h
Water vapor capacity 60 Hz	30 g/h
Emission sound pressure level	53 dB (A)
Pump fluid filling	0.4 l
Weight	10.2 kg

Ordering Number

1-phase motor for mains voltage 100-105 V, 50 Hz; 110-130 V, 60 Hz	PK D31 707
1-phase motor for mains voltage 95-105 V, 50 Hz; 100-115 V, 60 Hz	PK D31 708
1-phase motor for mains voltage 200 V, 50 Hz; 210 V, 60 Hz	PK D31 709
1-phase motor for mains voltage 220-240 V, 50/60 Hz	PK D31 712

Accessories

Oil mist separator ONF 16	PK Z40 003
Condensate separator KAS 16	PK Z10 003
Dust filter STP 016	PK Z60 203
Pump fluid	
Mineral oil P3, 0.5 l	PK 001 136-T

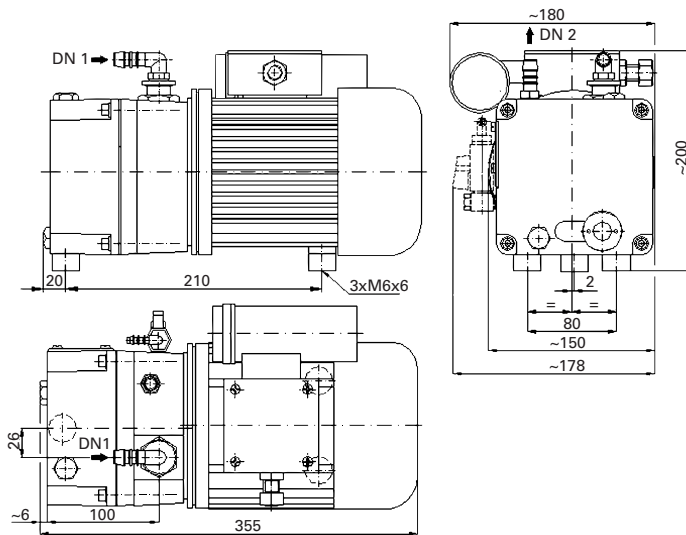
Rotary vane pump with a pumping speed of 6 m³/h

UNO 6



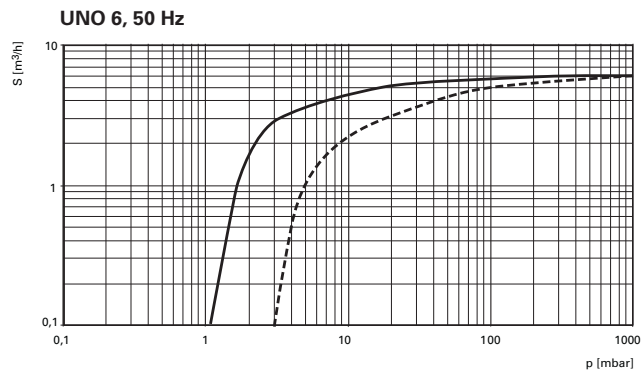
- ▶ Rugged and powerful
- ▶ Integrated gas ballast and high vacuum safety valve
- ▶ For all rough vacuum applications
- ▶ High water vapor tolerance

Dimensions (in mm)



UNO 6

Pumping speed



— without gas ballast - - - - with gas ballast



Technical data

UNO 6 1-ph Motor

Pumping speed at 50 Hz	6 m ³ /h
Ultimate pressure: Total with gas ballast	< 3 mbar
Ultimate pressure: Total without gas ballast	< 2 mbar
Flange (in)	DN 16 ISO-KF with G 3/8" female thread
Flange (out)	G 3/8" with hose connection average 12
Mains requirement: voltage (range)	200-240 V, 50 Hz
Rated power 50 Hz	0.55 kW
Nominal rotation speed at 50 Hz	1350 rpm
Water vapor tolerance at 50 Hz	23 mbar
Water vapor capacity 50 Hz	102 g/h
Emission sound pressure level	65 dB (A)
Pump fluid filling	0.2 l
Weight	17 kg

Ordering Number

1-phase motor for mains voltage 230 V, 50 Hz	PK D01 151
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Accessories

Adapter for pumps

Adapter G 3/8" / DN 16 ISO-KF	PK 101 002
Adapter DN 16 ISO-KF / GF 1/2"	PK 101 056
Dust filter SAS 20	PK Z60 502
Ball valves VKP 20	PK Z50 002

Measurement instruments (Measurement range: 1000 - 10 mbar)

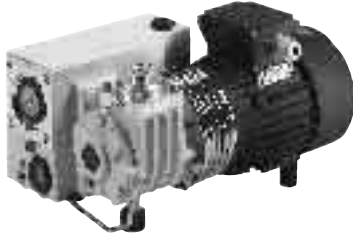
with G 1/2"	P6 006 102 ZC
with DN 10 ISO-KF	PK M10 001 A

Pump fluid

Oil D1, 0.25 l	PK 005 870-T
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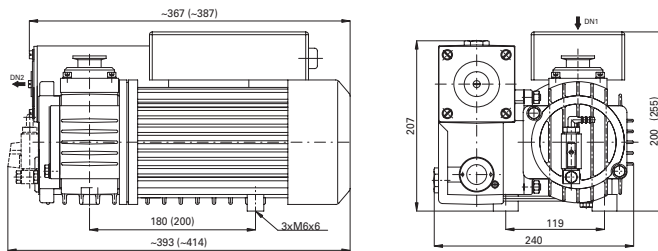
Rotary vane pump with a pumping speed of 20 m³/h

UNO 20



- ▶ Rugged - powerful - low maintenance
- ▶ Integrated high vacuum safety valve
- ▶ For all rough vacuum applications
- ▶ Suited for continuous operation at high intake pressures due to integrated oil return

Dimensions (in mm)

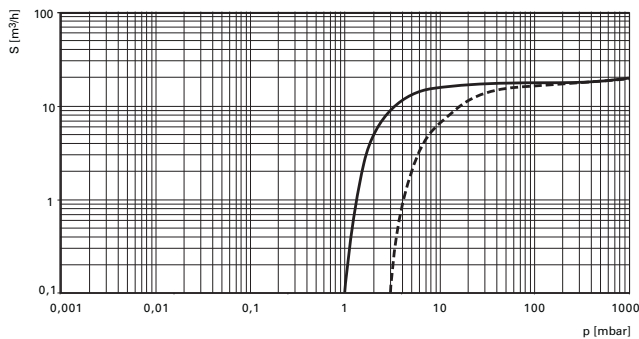


UNO 20

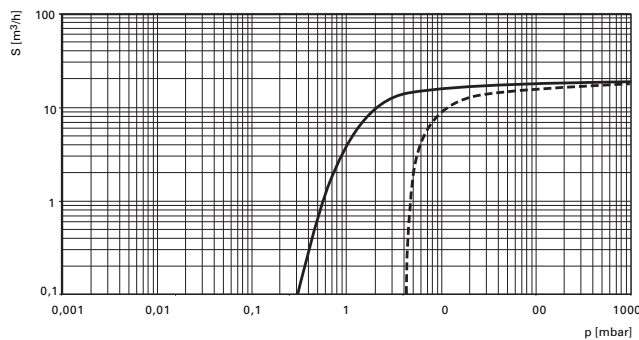
Dimensions in brackets = 1-ph motor

Pumping speed

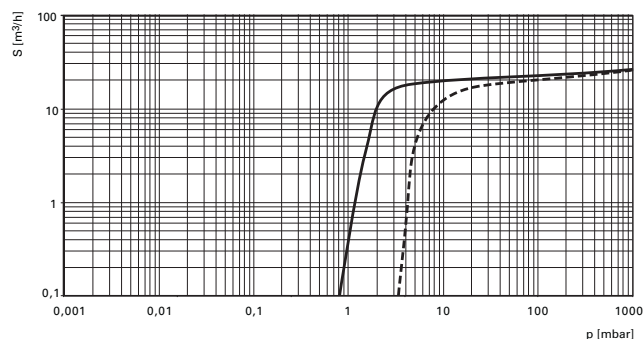
UNO 20, 1-ph, 50 Hz



UNO 20, 3-ph, 50 Hz



UNO 20, 3-ph, 60 Hz



— without gas ballast ----- with gas ballast



Technical data	UNO 20 1-ph Motor	UNO 20 3-ph Motor
Pumping speed at 50 Hz	20 m ³ /h	21 m ³ /h
Pumping speed at 60 Hz	-	25 m ³ /h
Ultimate pressure: Total with gas ballast	< 3 mbar	< 3 mbar
Ultimate pressure: Total without gas ballast	< 1 mbar	< 1 mbar
Flange (in)	DN 25 ISO-KF, female thread G 1/2"	DN 25 ISO-KF, female thread G 1/2"
Flange (out)	-	-
Mains requirement: voltage (range)	200-240 V, 50 Hz	360-440 V, 50 Hz
Rated power 50 Hz	0.75 kW	0.75 kW
Rated power 60 Hz	-	0.85 kW
Nominal rotation speed at 50 Hz	1350 rpm	1400 rpm
Nominal rotation speed at 60 Hz	-	1700 rpm
Water vapor tolerance at 50 Hz	18 mbar	17 mbar
Water vapor tolerance at 60 Hz	-	18 mbar
Water vapor capacity 50 Hz	180 g/h	190 g/h
Water vapor capacity 60 Hz	-	210 g/h
Emission sound pressure level	60 dB (A)	63 dB (A)
Pump fluid filling	0.35 l	0.35 l
Weight	27 kg	20 kg

Ordering Number

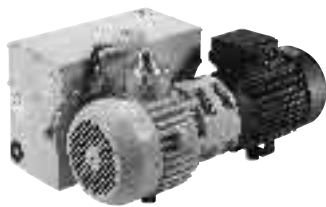
1-phase motor for mains voltage 230 V, 50 Hz	PK D01 250	-
3-phase motor 230-400 V, 50 Hz; 400-690 V, 50 Hz, 265-460 V, 60 Hz, 460-795 V, 60 Hz	-	PK D01 200

Accessories

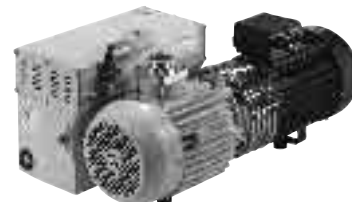
Adapter for pumps		
Output DN 25 ISO-KF	PK 101 005	PK 101 005
Dust filter SAS 20	PK Z60 502	PK Z60 502
Ball valves VKP 20	PK Z50 002	PK Z50 002
Measurement instruments (Measurement range: 1000 - 10 mbar)		
with G 1/2"	P6 006 102 ZC	P6 006 102 ZC
with DN 10 ISO-KF	PK M10 001 A	PK M10 001 A
Pump fluid		
Oil D1, 1 l	PK 005 875-T	PK 005 875-T
Oil D1, 5 l	PK 005 876-T	PK 005 876-T

Rotary vane pump with a pumping speed of 60 and 90 m³/h

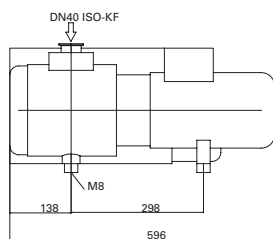
UNO 60 and UNO 90



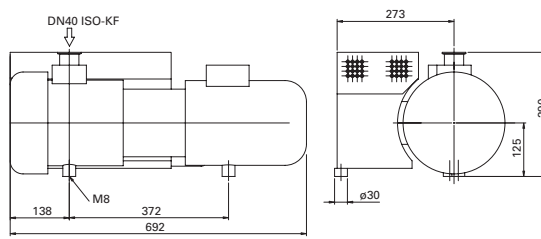
- ▶ Rugged - powerful - low maintenance
- ▶ Integrated gas ballast and high vacuum safety valve
- ▶ For all rough vacuum applications
- ▶ High water vapor tolerance
- ▶ Suited for continuous operation at high intake pressures due to integrated oil return



Dimensions (in mm)



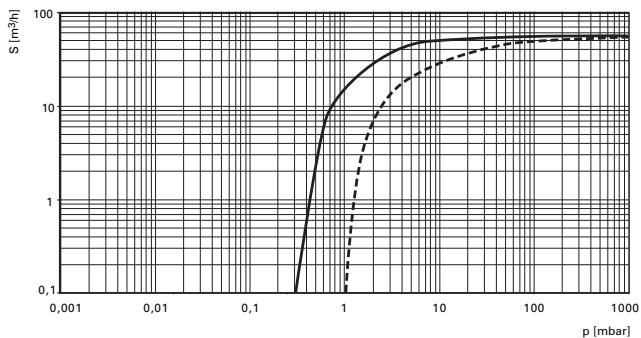
UNO 60



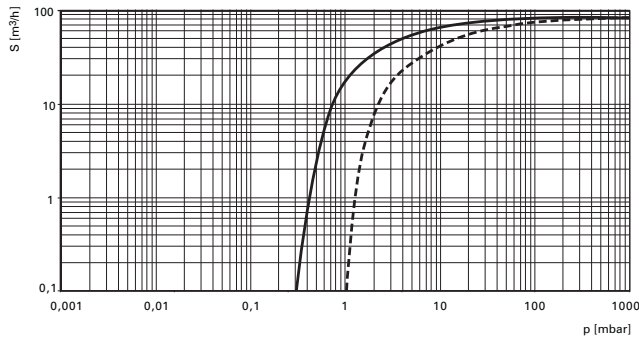
UNO 90

Pumping speed

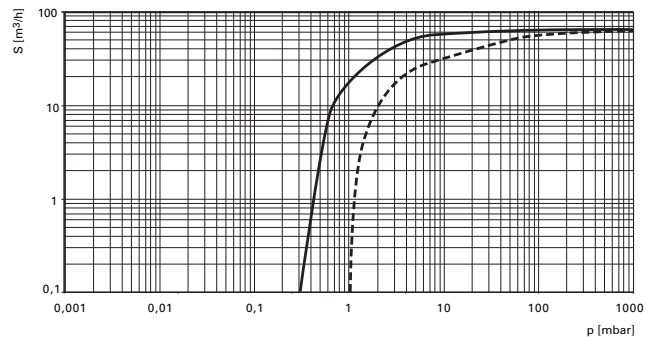
UNO 60, 50 Hz



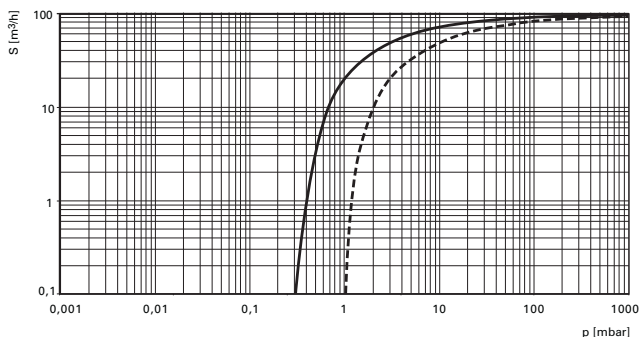
UNO 90, 50 Hz



UNO 60, 60 Hz



UNO 90, 60 Hz



— without gas ballast ----- with gas ballast



Technical data	UNO 60 3-ph Motor	UNO 90 3-ph Motor
Pumping speed at 50 Hz	54 m ³ /h	81 m ³ /h
Pumping speed at 60 Hz	62 m ³ /h	94 m ³ /h
Ultimate pressure: Total with gas ballast	< 1 mbar	< 1 mbar
Ultimate pressure: Total without gas ballast	< 3·10 ⁻¹ mbar	< 3·10 ⁻¹ mbar
Flange (in)	DN 40 ISO-KF, female thread G 1 1/4"	DN 40 ISO-KF, female thread G 1 1/4"
Flange (out)	-	-
Mains requirement: voltage (range)	220-240 / 380-420 V, +/- 5 %, 50 Hz 254-277 / 440-480 V, +/- 5 %, 60 Hz	220-240 / 380-420 V, +/- 5 %, 50 Hz 254-277 / 440-480 V, +/- 5 %, 60 Hz
Rated power 50 Hz	1.5 kW	2.2 kW
Rated power 60 Hz	2.2 kW	3 kW
Nominal rotation speed at 50 Hz	1420 rpm	1420 rpm
Nominal rotation speed at 60 Hz	1700 rpm	1700 rpm
Water vapor tolerance at 50 Hz	15 mbar	13 mbar
Water vapor tolerance at 60 Hz	15 mbar	15 mbar
Water vapor capacity 50 Hz	440 g/h	450 g/h
Water vapor capacity 60 Hz	500 g/h	525 g/h
Emission sound pressure level	70 dB (A)	75 dB (A)
Pump fluid filling	1.8 l	1.8 l
Weight	58 kg	76 kg

Ordering Number

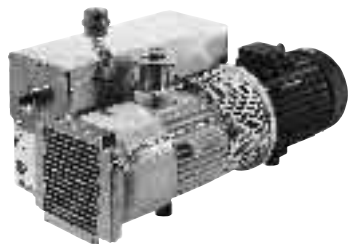
3-phase motor	PK D01 300	PK D01 400
230-400 V, 50 Hz; 400-690 V, 50 Hz, 265-460 V, 60 Hz; 460-795 V, 60 Hz		

Accessories

Adapter for pumps		
Output DN 40 ISO-KF	PK 101 006	PK 101 006
Dust filter SAS 90	PK Z60 503	PK Z60 503
Ball valves VKP 90	PK Z50 003	PK Z50 003
Measurement instruments (Measurement range: 1000 - 10 mbar)		
with G 1/2"	P6 006 102 ZC	P6 006 102 ZC
with DN 10 ISO-KF	PK M10 001 A	PK M10 001 A
Pump fluid		
Oil D1, 1 l	PK 005 875-T	PK 005 875-T
Oil D1, 5 l	PK 005 876-T	PK 005 876-T

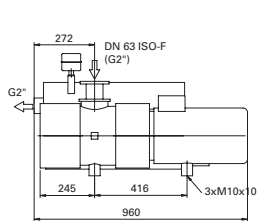
Rotary vane pump with a pumping speed of 200 and 240 m³/h

UNO 200 and UNO 240

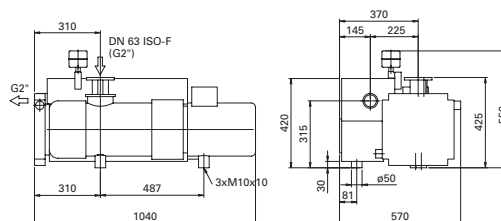


- ▶ Rugged - powerful - low maintenance
- ▶ Integrated gas ballast and high vacuum safety valve
- ▶ For all rough vacuum applications
- ▶ High water vapor tolerance
- ▶ Suited for continuous operation at high intake pressures due to integrated oil return

Dimensions (in mm)



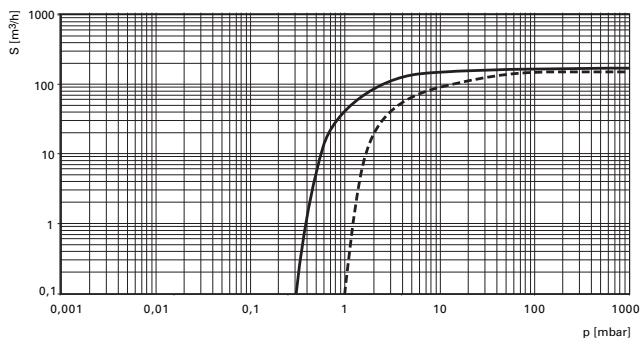
UNO 200



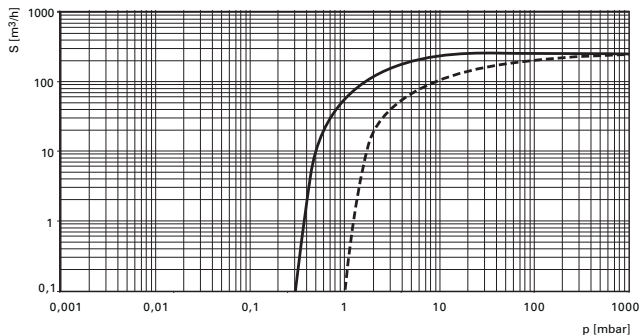
UNO 240

Pumping speed

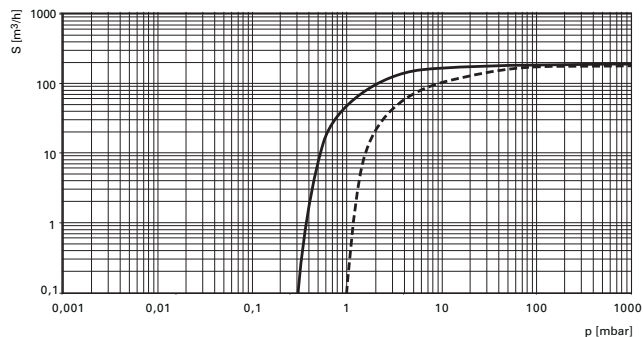
UNO 200, 50 Hz



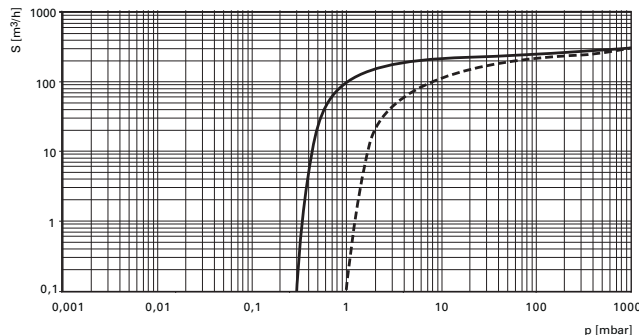
UNO 240, 50 Hz



UNO 200, 60 Hz



UNO 240, 60 Hz



— without gas ballast ----- with gas ballast



Technical data	UNO 200 3-ph Motor	UNO 240 3-ph Motor
Pumping speed at 50 Hz	180 m ³ /h	230 m ³ /h
Pumping speed at 60 Hz	210 m ³ /h	270 m ³ /h
Ultimate pressure: Total with gas ballast	< 1 mbar	< 1 mbar
Ultimate pressure: Total without gas ballast	< 3·10 ⁻¹ mbar	< 3·10 ⁻¹ mbar
Flange (in)	DN 63 ISO-F, female thread G 2"	DN 63 ISO-F, female thread G 2"
Flange (out)	female thread G 2"	female thread G 2"
Mains requirement: voltage (range)	220-240 / 380-420 V, +/- 5 %, 50 Hz 254-277 / 440-480 V, +/- 5 %, 60 Hz	220-240 / 380-420 V, +/- 5 %, 50 Hz 254-277 / 440-480 V, +/- 5 %, 60 Hz
Rated power 50 Hz	5.5 kW	7.5 kW
Rated power 60 Hz	6.6 kW	9 kW
Nominal rotation speed at 50 Hz	1450 rpm	1450 rpm
Nominal rotation speed at 60 Hz	1740 rpm	1740 rpm
Water vapor tolerance at 50 Hz	36 mbar	13 mbar
Water vapor tolerance at 60 Hz	36 mbar	15 mbar
Water vapor capacity 50 Hz	4800 g/h	2600 g/h
Water vapor capacity 60 Hz	5500 g/h	3100 g/h
Emission sound pressure level	78 dB (A)	80 dB (A)
Pump fluid filling	6 l	6 l
Weight	170 kg	185 kg

Ordering Number

3-phase motor	PK D01 800	PK D01 500
230-400 V, 50 Hz; 400-690 V, 50 Hz, 265-460 V, 60 Hz; 460-795 V, 60 Hz		

Accessories

Adapter for pumps		
Output DN 63 ISO-K	PK 101 007	PK 101 007
Dust filter SAS 250	PK Z60 504	PK Z60 504
Ball valves VKP 250	PK Z50 004	PK Z50 004
Measurement instruments (Measurement range: 1000 - 10 mbar)		
with G 1/2"	P6 006 102 ZC	P6 006 102 ZC
with DN 10 ISO-KF	PK M10 001 A	PK M10 001 A
Operation fluid level control	PK 101 059	PK 101 059
Water cooling	PK 101 030-T	PK 101 030-T
Pump fluid		
Oil D1, 1 l	PK 005 875-T	PK 005 875-T
Oil D1, 5 l	PK 005 876-T	PK 005 876-T
Oil D1, 20 l	PK 005 877-T	PK 005 877-T

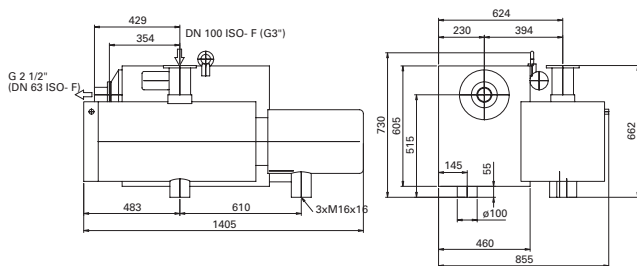
Rotary vane pump with a pumping speed 400 and 630 m³/h

UNO 400 and UNO 630

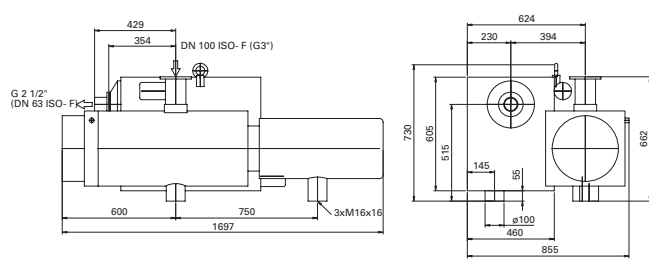


- ▶ Rugged - powerful - low maintenance
- ▶ Integrated gas ballast and high vacuum safety valve
- ▶ For all rough vacuum applications
- ▶ High water vapor tolerance
- ▶ Suited for continuous operation at high intake pressures due to integrated oil return

Dimensions (in mm)



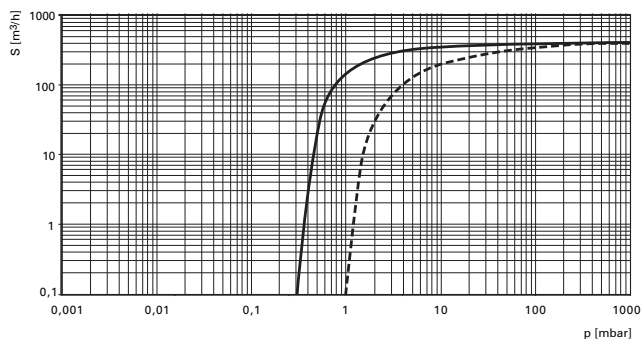
UNO 400



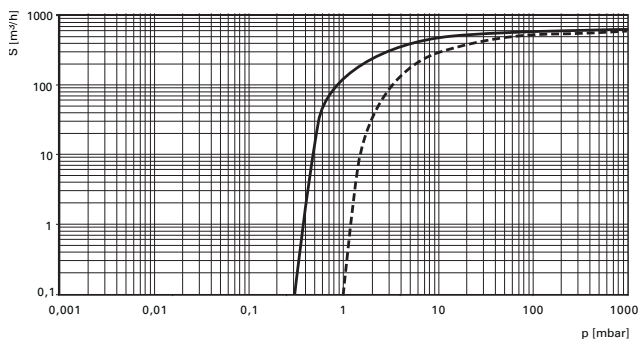
UNO 630

Pumping speed

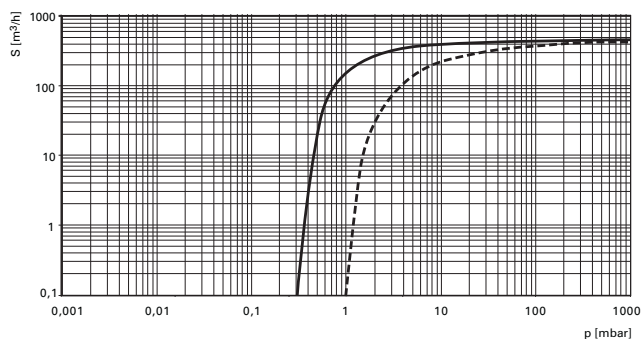
UNO 400, 50 Hz



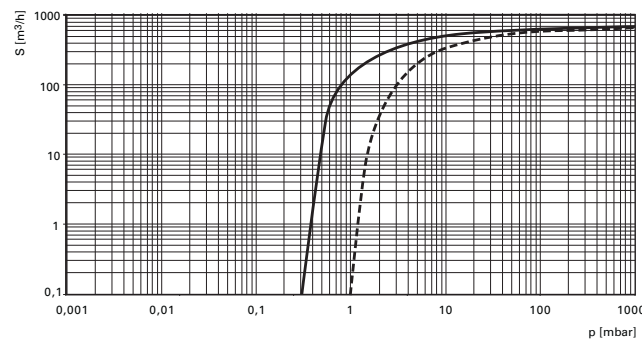
UNO 630, 50 Hz



UNO 400, 60 Hz



UNO 630, 60 Hz



— without gas ballast ----- with gas ballast



Technical data	UNO 400 3-ph Motor	UNO 630 3-ph Motor
Pumping speed at 50 Hz	400 m ³ /h	600 m ³ /h
Pumping speed at 60 Hz	460 m ³ /h	680 m ³ /h
Ultimate pressure: Total with gas ballast	< 1 mbar	< 1 mbar
Ultimate pressure: Total without gas ballast	< 3·10 ⁻¹ mbar	< 3·10 ⁻¹ mbar
Flange (in)	DN 100 ISO-F, female thread G 3"	DN 100 ISO-F, female thread G 3"
Flange (out)	DN 63 ISO-F, female thread G 2 1/2"	DN 63 ISO-F, female thread G 2 1/2"
Mains requirement: voltage (range)	400/690 V, +/- 10 %, 50 Hz 460/795 V, +/- 10 %, 60 Hz	400/690 V, +/- 10 %, 50 Hz 460/795 V, +/- 10 %, 60 Hz
Rated power 50 Hz	11 kW	15 kW
Rated power 60 Hz	13.2 kW	18 kW
Nominal rotation speed at 50 Hz	960 rpm	970 rpm
Nominal rotation speed at 60 Hz	1150 rpm	1175 rpm
Water vapor tolerance at 50 Hz	13 mbar	11 mbar
Water vapor tolerance at 60 Hz	13 mbar	10 mbar
Water vapor capacity 50 Hz	3900 g/h	5000 g/h
Water vapor capacity 60 Hz	4500 g/h	5700 g/h
Emission sound pressure level	85 dB (A)	85 dB (A)
Pump fluid filling	17 l	17 l
Weight	420 kg	540 kg

Ordering Number

3-phase motor	PK D01 600	PK D01 700
230-400 V, 50 Hz; 400-690 V, 50 Hz, 265-460 V, 60 Hz; 460-795 V, 60 Hz		

Accessories

Dust filter SAS 630	PK Z60 505	PK Z60 505
Ball valves VKP 630	PK Z50 005	PK Z50 005
Measurement instruments (Measurement range: 1000 - 10 mbar)		
with G 1/2"	P6 006 102 ZC	P6 006 102 ZC
with DN 10 ISO-KF	PK M10 001 A	PK M10 001 A
Operation fluid level control	PK 101 059	PK 101 059
Water cooling	PK 101 031-T	PK 101 031-T
Pump fluid		
Oil D1, 1 l	PK 005 875-T	PK 005 875-T
Oil D1, 5 l	PK 005 876-T	PK 005 876-T
Oil D1, 20 l	PK 005 877-T	PK 005 877-T

Accessories overview



Rotary vane pumps		UNO 2.5	UNO 6	UNO 20	UNO 60
Dust separator*	STP/SAS	STP 016	SAS 20	SAS 20	SAS 90
	Ordering number	PK Z60 203	PK Z60 502	PK Z60 502	PK Z60 503
Ball valve*	VKP	-	VKP 20	VKP 20	VKP 90
	Ordering number	-	PK Z50 002	PK Z50 002	PK Z50 003
Oil mist separator	ONF	ONF 16	integrated	integrated	integrated
	Ordering number	PK Z40 003	-	-	-
Oil return unit from oil mist separator			-	integrated	integrated
	Ordering number	PK 194 315-T			
Water cooling					
	Ordering number	-	-	-	-
Oil fluid level control					
	Ordering number	-	-	-	-
Vacuum gauge FV1*	DN 10 ISO-KF	-	PK M10 001 A	PK M10 001 A	PK M10 001 A
	G 1/2"	-	P6 006 102 ZC	P6 006 102 ZC	P6 006 102 ZC

* Zum Anschluss dieses Zubehörs benötigen Sie evtl. Anschlussadapter, die bei den jeweiligen Artikeln gesondert aufgeführt sind.



UNO 90	UNO 200	UNO 240	UNO 400	UNO 630
SAS 90	SAS 250	SAS 250	SAS 630	STP 630
PK Z60 503	PK Z60 504	PK Z60 504	PK Z60 505	PK Z60 505
VKP 90	VKP 250	VKP 250	VKP 630	VKP 630
PK Z50 003	PK Z50 004	PK Z50 004	PK Z50 005	PK Z50 005
integrated	integrated	integrated	integrated	integrated
-	-	-	-	-
integrated	integrated	integrated	integrated	integrated
-	PK 101 030-T	PK 101 030-T	PK 101 031-T	PK 101 031-T
-	PK 101 059	PK 101 059	PK 101 059	PK 101 059
PK M10 001 A	PK M10 001 A	PK M10 001 A	PK M10 001 A	PK M10 001 A
P6 006 102 ZC	P6 006 102 ZC	P6 006 102 ZC	P6 006 102 ZC	P6 006 102 ZC

Dust separator



Dust separator with
paper filter insert

Technical data

	SAS 20	SAS 90	SAS 250	SAS 630
Flange (out)	DN female thread G 1/2" NPT 1/2" cone	Female thread G 1 1/4"	Female thread G 2"	DN female thread R3" cone
Flange (in)	DN female thread G 1/2" NPT 1/2" cone	Female thread G 1 1/4"	Female thread G 2"	DN female thread R3" cone
For pumping speed up to	20 m³/h	90 m³/h	250 m³/h	630 m³/h
Mounting orientation	vertical	vertical	vertical	vertical
Conductance	1 mbar: 16 l/s 100 mbar: 33 l/s	1 mbar: 140 l/s 100 mbar: 700 l/s	1 mbar: 350 l/s 100 mbar: 1850 l/s	1 mbar: 500 l/s 100 mbar: 8000 l/s
Grain size limit (separable)	10 µm	10 µm	10 µm	10 µm
Weight	0.4 kg	1.4 kg	7 kg	15 kg

Ordering Number

Dust separator	PK Z60 502	PK Z60 503	PK Z60 504	PK Z60 505
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Accessories

Screw-in flange with R 1/2" external thread, cone to DN 25 ISO-KF, for SAS 20/VKP 20	PK 101 034	-	-	-
Screw-in flange with R 1 1/4" external thread, cone to DN 40 ISO-KF, for SAS 90/VKP 90	-	PK 101 035	-	-
Screw-in flange with R 2" external thread, cone to DN 63 ISO-F, for SAS 250/VKP 250	-	-	PK 101 036	-
Screw-in flange with R 3" external thread, cone to DN 100 ISO-F, for SAS 630/VKP 630	-	-	-	PK 101 037

Ball valve

- Manually operated thru-type isolation ball valve
- With inside thread on both sides for the intake side of the pump



Technical data

	VKP 20	VKP 90	VKP 250	VKP 630
Flange (out)	Female thread G 1/2"	Female thread G 1 1/4"	Female thread G 2"	Female thread G 3"
Flange (in)	Female thread G 1/2"	Female thread G 1 1/4"	Female thread G 2"	Female thread G 3"
Length	56 mm	87 mm	110 mm	165 mm

Ordering Number

Ball valve	PK Z50 002	PK Z50 003	PK Z50 004	PK Z50 005
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Accessories

Screw-in flange with R 1/2" external thread, cone to DN 25 ISO-KF, for SAS 20/VKP 20	PK 101 034	-	-	-
Screw-in flange with R 1 1/4" external thread, cone to DN 40 ISO-KF, for SAS 90/VKP 90	-	PK 101 035	-	-
Screw-in flange with R 2" external thread, cone to DN 63 ISO-F, for SAS 250/VKP 250	-	-	PK 101 036	-
Screw-in flange with R 3" external thread, cone to DN 100 ISO-F, for SAS 630/VKP 630	-	-	-	PK 101 037

Vacuum gauges



Vacuum gauge for monitoring the operating pressure

Technical data

	FV 1, G 1/2"	FV 1, DN 10 ISO-KF
Dimension (diameter)	80 mm	80 mm
Connection	G 1/2"	DN 10 ISO-KF
Mounting orientation	vertical	vertical
Weight	0.3 kg	0.3 kg
Measurement range max.	10-1000 mbar	10-1000 mbar

Ordering Number

Vacuum gauges	P6 006 102 ZC	PK M10 001 A
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Adapter

Adapter flange for pumps

	Order.-No.
Adapter, G 3/8" at DN 16 ISO-KF	PK 101 002
Adapter, G 3/8" at DN 25 ISO-KF	PK 101 004
Adapter, G 1/2" at DN 25 ISO-KF	PK 101 005
Adapter, G 1 1/4" at DN 25 ISO-KF	PK 101 006
Adapter, G 2" at DN 63 ISO-K	PK 101 007

Adapter flange for dust separator and ball valves

	Order.-No.
Screw-in flange with R 1/2" external thread, cone to DN 25 ISO-KF, for SAS 20/VKP 20	PK 101 034
Screw-in flange with R 1 1/4" external thread, cone to DN 40 ISO-KF, for SAS 90/VKP 90	PK 101 035
Screw-in flange with R 2" external thread, cone to DN 63 ISO-F, for SAS 250/VKP 250	PK 101 036
Screw-in flange with R 3" external thread, cone to DN 100 ISO-F, for SAS 630/VKP 630	PK 101 037
Screw-in flange with R 1/2" external thread-cone to DN 26 ISO-KF/ R 1/2, for SAS 20 / VKP 20	PK 101 056

Water cooling

With temperature switch and solenoid valve

	Order.-No.
Water cooling for UNO 200/240	PK 101 030-T
Water cooling for UNO 400/630	PK 101 031-T

Oil fluid level control

Operating fluid level control for UNO 200-630, 230 V AC

Technical data

Supply	19 - 253 V AC, 50/60 Hz
Current consumption	max. 4 mA

Ordering Number

Oil fluid level control	PK 101 059
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**Two-stage rotary vane pumps which could not be cleaner and more reliable for process and environment.
With integrated magnetic coupling**

Your advantages

Safe operation

- ▶ Environment friendly
- ▶ No oil leakage through a defective shaft seal
- ▶ No interchange between process gas and the environment
- ▶ Corrosion resistant because no nonferrous metals are used
- ▶ Comprehensive accessories for monitoring and system integration

- ▶ Process safety through integrated hydraulically controlled "high-speed" high vacuum safety valve

Low operating costs

- ▶ No maintenance on shaft seals is necessary

High uptime

- ▶ No unexpected interruptions to the process due to oil leaks

Quiet operation

- ▶ No additional silencing is necessary



Applications

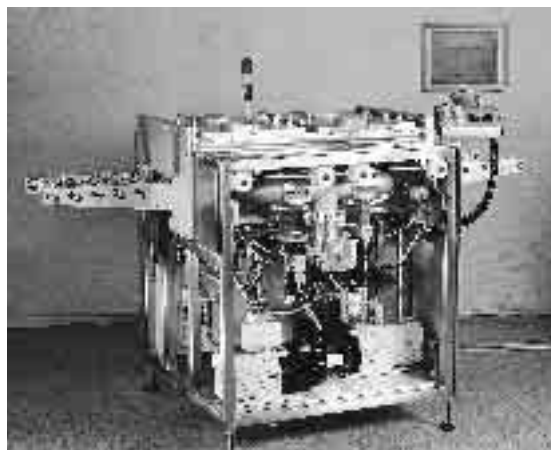
- ▶ Chemical and process engineering
- ▶ Thin-film technology
- ▶ Semiconductor process engineering
- ▶ Research and development
- ▶ Mechanical engineering
- ▶ Metallurgy
- ▶ Packaging/freeze drying (foodstuff compatible)
- ▶ Mass spectrometry
- ▶ Backing pump for turbo pumps
- ▶ Laboratory operation



Pumping station with Roots pump and rotary vane pump DUO 65 M



Vacuum pumping station with magnetically coupled WKP 500 AM and two-stage magnetically coupled rotary vane pump DUO 65 M



Vacuum chamber for the manufacture of LCD displays with magnetically coupled rotary vane pump DUO 10 M



Coating unit with rotary vane pump DUO 35 and a turbopump TPH 2101

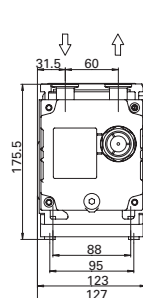
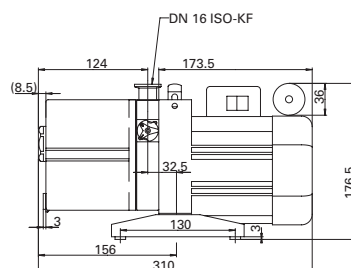
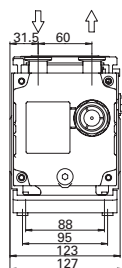
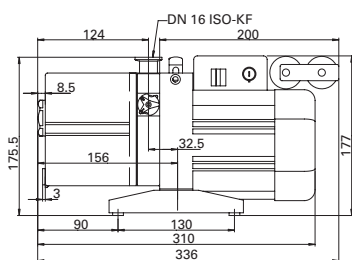
Two-stage rotary vane pump with a pumping speed of 2.5 m³/h

DUO 2.5



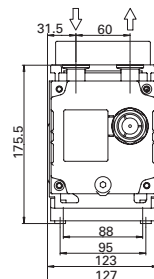
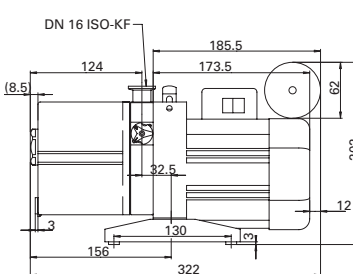
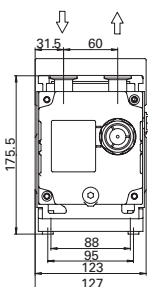
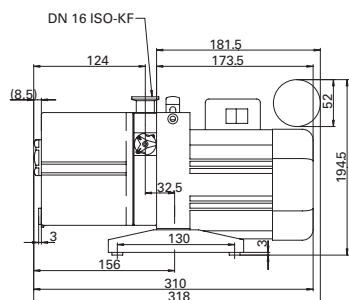
- Compact design - excellent performance data
- Versions for handling corrosive gases are available (C types)
- Integrated safety and gas ballast valve
- Free of nonferrous metals
- Different motor voltages allow worldwide use

Dimensions (in mm)



PK D41 050

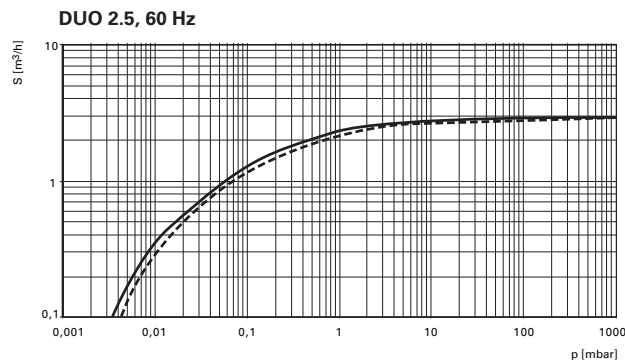
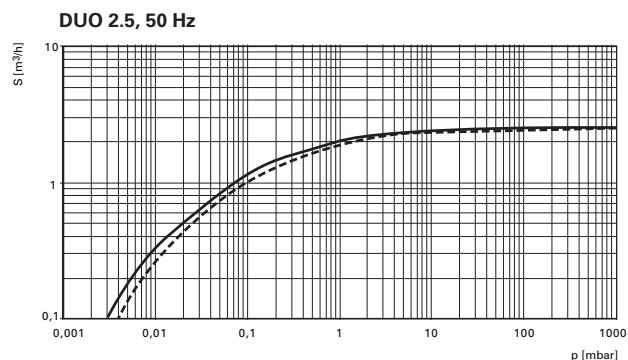
PK D41 014 / PK D41 709 / PK D41 712



PK D41 019 / PK D41 707

PK D41 708

Pumping speed



— without gas ballast - - - - with gas ballast



Technical data

	DUO 2.5	DUO 2.5 C
Pumping speed at 50 Hz	2.5 m ³ /h	2.5 m ³ /h
Pumping speed at 60 Hz	2.9 m ³ /h	2.9 m ³ /h
Ultimate pressure: Total with gas ballast	6·10 ⁻³ mbar	6·10 ⁻³ mbar
Ultimate pressure: Total without gas ballast	6·10 ⁻³ mbar	6·10 ⁻³ mbar
Flange (in)	DN 16 ISO-KF	DN 16 ISO-KF
Flange (out)	DN 16 ISO-KF	DN 16 ISO-KF
Rated power 50 Hz	0.15 kW	0.15 kW
Rated power 60 Hz	0.18 kW	0.18 kW
Water vapor tolerance at 50 Hz	15 mbar	15 mbar
Water vapor tolerance at 60 Hz	15 mbar	15 mbar
Water vapor capacity 50 Hz	30 g/h	30 g/h
Water vapor capacity 60 Hz	34 g/h	34 g/h
Emission sound pressure level	53 dB (A)	53 dB (A)
Pump fluid filling	0.4 l	0.4 l
Weight	10.5 kg	10.5 kg

Ordering Number

115/230 V, 50/60 Hz	PK D41 050	-
95-105 V, 50 Hz; 100-115 V, 60 Hz	PK D41 708	-
220-240 V, 50/60 Hz	PK D41 712	PK D41 014
190-210 V, 50 Hz; 200-220 V, 60 Hz	PK D41 709	-
100-105 V, 50 Hz; 110-130 V, 60 Hz	PK D41 707	PK D41 019

Accessories

Oil mist separator ONF 16	PK Z40 003	-
Oil return device from oil mist separator ONF	PK 194 315-T	-
Condensate separator KAS 16	PK Z10 003	-
Dust separator STP 016	PK Z60 203	-
Zeolite trap ZFO 016	PK Z70 003	-

Operating fluid

Mineral oil P3, 0.5 l	PK 001 136-T	-
Perfluoropolyether F4, 0.5 l	-	PK 005 886-T

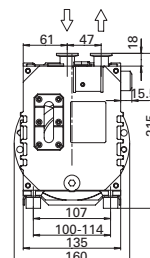
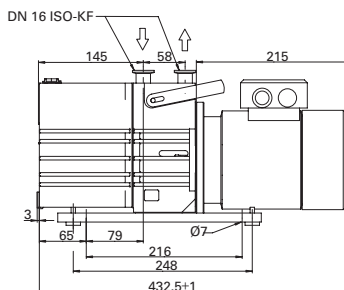
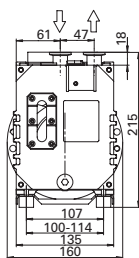
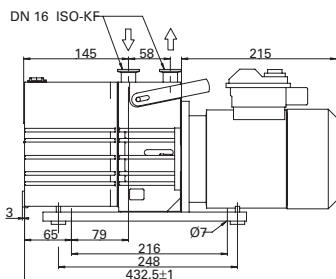
Two-stage rotary vane pump with a pumping speed of 5 m³/h

DUO 5 M



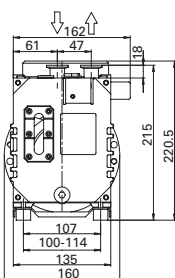
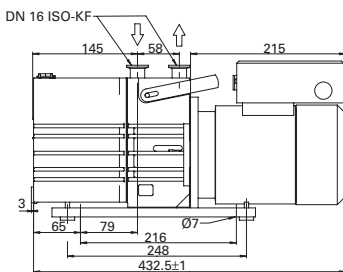
- Magnetically coupled - safe, clean, low maintenance
- Compact design - excellent performance data
- Versions for handling corrosive gases are available (C types)
- Integrated safety and gas ballast valve
- Free of nonferrous metals
- Different motor voltages allow worldwide use

Dimensions (in mm)



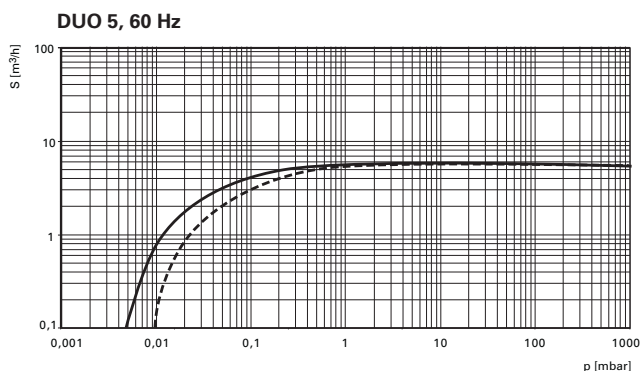
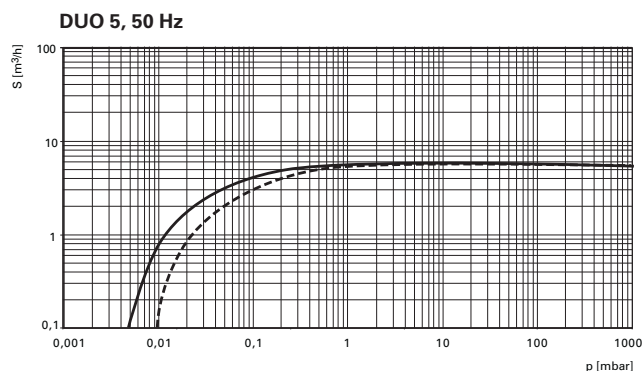
PK D61 712 / PK D61 732

PK D61 105 / PK D61 115 / PK D61 125



PK D61 305 / PK D61 707 / PK D61 727

Pumping speed



— without gas ballast - - - with gas ballast



Technical data

	DUO 5 M	DUO 5 MC
Pumping speed at 50 Hz	5 m ³ /h	5 m ³ /h
Pumping speed at 60 Hz	6 m ³ /h	6 m ³ /h
Ultimate pressure: Total with gas ballast	2·10 ⁻² mbar	2·10 ⁻² mbar
Ultimate pressure: Total without gas ballast	5·10 ⁻³ mbar	5·10 ⁻³ mbar
Flange (in)	DN 16 ISO-KF	DN 16 ISO-KF
Flange (out)	DN 16 ISO-KF	DN 16 ISO-KF
Rated power 50 Hz	0.37 kW	0.37 kW
Rated power 60 Hz	0.37 kW	0.37 kW
Water vapor tolerance at 50 Hz	25 mbar	25 mbar
Water vapor tolerance at 60 Hz	28 mbar	28 mbar
Water vapor capacity 50 Hz	90 g/h	90 g/h
Water vapor capacity 60 Hz	120 g/h	120 g/h
Emission sound pressure level	55 dB (A)	55 dB (A)
Pump fluid filling	0.75 l	0.75 l
Weight	19 kg	19 kg

Ordering Number

230/400 V, 50 Hz; 265/460 V, 60 Hz	PK D61 105	PK D61 125
400 V, 50 Hz	PK D61 305	-
200/346 V, 50 Hz; 220/380 V, 60 Hz	PK D61 115	-
230 V, 50/60 Hz	PK D61 712	PK D61 732
115 V, 60 Hz	PK D61 707	PK D61 727

Accessories

Oil mist separator ONF 16	PK Z40 003	-
Oil return device from oil mist separator ONF	PK 196 172-T	-
Condensate separator KAS 16	PK Z10 003	-
Dust separator STP 016	PK Z60 203	-
PTC resistor tripping unit	P4 768 051FQ	P4 768 051FQ
Operation fluid level control	PK 196 157-T	PK 196 157-T
Zeolite trap ZFO 016	PK Z70 003	-
Operation control unit: fluid level, temperature, exhaust pressure	PK 196 141-T	PK 196 141-T
Operating control: pump is running	PK 196 449	PK 196 449

Operating fluid

Mineral oil P3, 1 l	PK 001 106-T	-
Perfluoropolyether F4, 1 l	-	PK 005 887-T

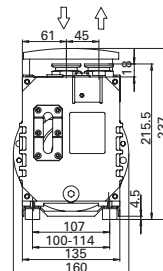
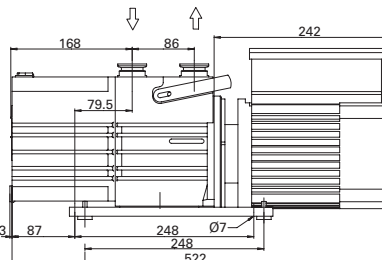
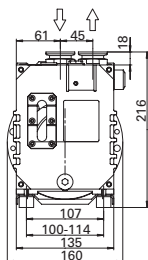
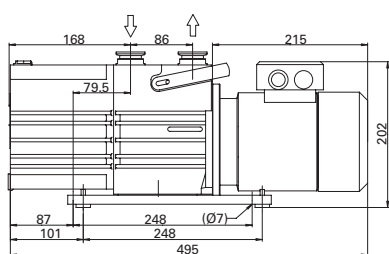
Two-stage rotary vane pump with a pumping speed of 10 m³/h

DUO 10 M



- Magnetically coupled - safe, clean, low maintenance
- Compact design - excellent performance data
- Versions for handling corrosive gases are available (C types)
- Integrated safety and gas ballast valve
- Free of nonferrous metals
- Different motor voltages allow worldwide use

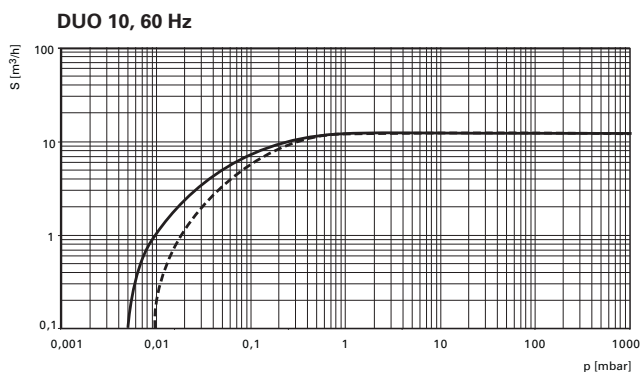
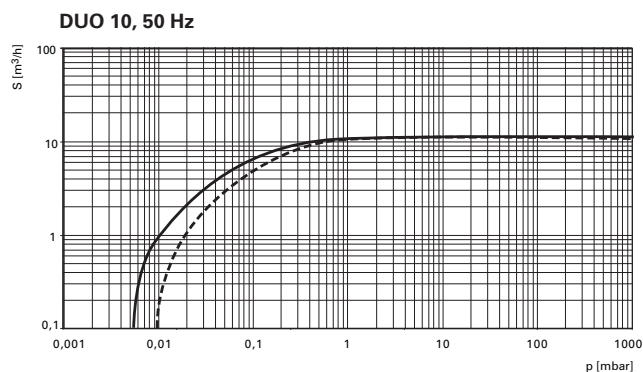
Dimensions (in mm)



PK D62 105 / PK D62 115 / PK D62 305 / PK D62 325

PK D62 707 / PK D62 712 / PK D62 727 / PK D62 732

Pumping speed



— without gas ballast ---- with gas ballast



Technical data

	DUO 10 M	DUO 10 MC
Pumping speed at 50 Hz	10 m ³ /h	10 m ³ /h
Pumping speed at 60 Hz	12 m ³ /h	12 m ³ /h
Ultimate pressure: Total with gas ballast	1·10 ⁻² mbar	1·10 ⁻² mbar
Ultimate pressure: Total without gas ballast	5·10 ⁻³ mbar	5·10 ⁻³ mbar
Flange (in)	DN 25 ISO-KF	DN 25 ISO-KF
Flange (out)	DN 25 ISO-KF	DN 25 ISO-KF
Rated power 50 Hz	0.45 kW	0.45 kW
Rated power 60 Hz	0.55 kW	0.55 kW
Water vapor tolerance at 50 Hz	30 mbar	30 mbar
Water vapor tolerance at 60 Hz	36 mbar	36 mbar
Water vapor capacity 50 Hz	210 g/h	210 g/h
Water vapor capacity 60 Hz	300 g/h	300 g/h
Emission sound pressure level	57 dB (A)	57 dB (A)
Pump fluid filling	1 l	1 l
Weight	27 kg	27 kg

Ordering Number

400 V, 50 Hz	PK D62 305	PK D62 325
230/400 V, 50 Hz; 265/460 V, 60 Hz	PK D62 105	-
200/346 V, 50 Hz; 208-230/360-400 V, 60 Hz	PK D62 115	-
100-110 V, 50 Hz; 100-120 V, 60 Hz	PK D62 707	PK D62 727
200-230 V, 50 Hz; 200-240 V, 60 Hz	PK D62 712	PK D62 732

Accessories

Oil mist separator ONF 25	PK Z40 157	PK Z40 406
Oil return device from oil mist separator ONF	PK 196 172-T	PK 196 177-T
Condensate separator KAS 25	PK Z10 032	-
Dust separator STZ 025	PK Z60 006	-
Dust separator STR 025	PK Z60 106	-
Dust separator STP 025	PK Z60 206	-
PTC resistor tripping unit	P4 768 051FQ	-
Operation fluid level control	PK 196 157-T	PK 196 157-T
Operation control unit: fluid level, temperature, exhaust pressure	PK 196 141-T	PK 196 141-T
Operating control: pump is running	PK 196 449	PK 196 449

Adsorption filter

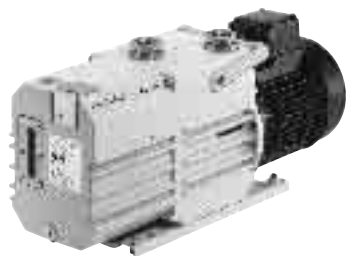
Activated carbon filter FAK 025	PK Z30 006	-
Bleaching earth filter FBL 025	PK Z30 106	-
Zeoline trap ZFO 025	PK Z70 006	-
Catalytic trap URB 025, 230 V	PT U10 760	-
Catalytic trap URB 025, 115 V	PT U10 761	-

Operating fluid

Mineral oil P3, 1 l	PK 001 106-T	-
Perfluoropolyether F4, 1 l	-	PK 005 887-T

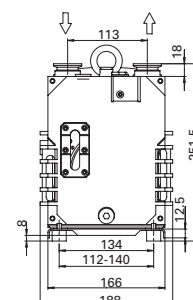
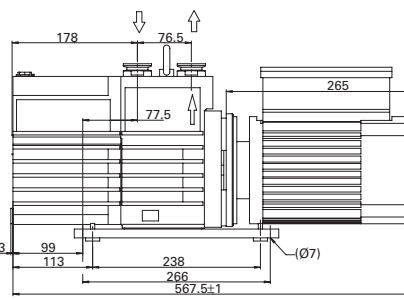
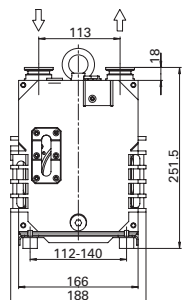
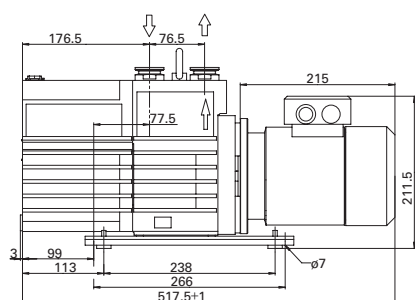
Two-stage rotary vane pump with a pumping speed of 20 m³/h

DUO 20 M



- ▶ Magnetically coupled - safe, clean, low maintenance
- ▶ Compact design - excellent performance data
- ▶ Versions for handling corrosive gases are available (C types)
- ▶ Integrated safety and gas ballast valve
- ▶ Free of nonferrous metals
- ▶ Different motor voltages allow worldwide use

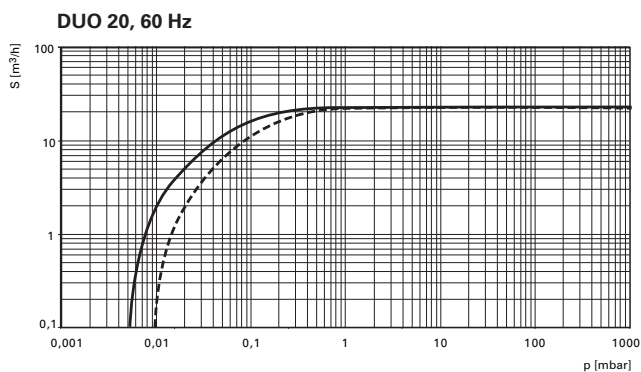
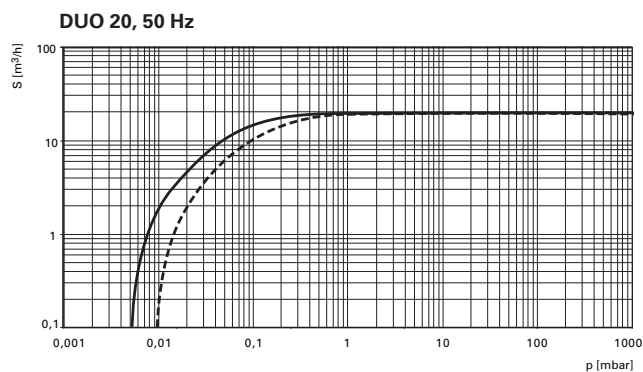
Dimensions (in mm)



PK D63 105 / PK D63 115 / PK D63 125 / PK D63 135

PK D63 707 / PK D63 712 / PK D63 727 / PK D 63 732

Pumping speed



— without gas ballast - - - - with gas ballast



Technical data

	DUO 20 M	DUO 20 MC
Pumping speed at 50 Hz	20 m ³ /h	20 m ³ /h
Pumping speed at 60 Hz	24 m ³ /h	24 m ³ /h
Ultimate pressure: Total with gas ballast	1·10 ⁻² mbar	1·10 ⁻² mbar
Ultimate pressure: Total without gas ballast	5·10 ⁻³ mbar	5·10 ⁻³ mbar
Flange (in)	DN 25 ISO-KF	DN 25 ISO-KF
Flange (out)	DN 25 ISO-KF	DN 25 ISO-KF
Rated power 50 Hz	0.55 kW	0.55 kW
Rated power 60 Hz	0.65 kW	0.65 kW
Water vapor tolerance at 50 Hz	30 mbar	30 mbar
Water vapor tolerance at 60 Hz	36 mbar	36 mbar
Water vapor capacity 50 Hz	400 g/h	400 g/h
Water vapor capacity 60 Hz	550 g/h	550 g/h
Emission sound pressure level	55 dB (A)	55 dB (A)
Pump fluid filling	1 l	1 l
Weight	33 kg	33 kg

Ordering Number

230/400 V, 50 Hz; 265/460 V, 60 Hz	PK D63 105	PK D63 125
200/346 V, 50 Hz; 220/380 V, 60 Hz	PK D63 115	PK D63 135
100-110 V, 50 Hz; 100-120 V, 60 Hz	PK D63 707	PK D63 727
200-230 V, 50 Hz; 200-240 V, 60 Hz	PK D63 712	PK D63 732

Accessories

Oil mist separator ONF 25	PK Z40 158	PK Z40 406
Oil return device from oil mist separator ONF	PK 196 172-T	PK 196 177-T
Condensate separator KAS 25	PK Z10 033	-
Dust separator STZ 025	PK Z60 006	-
Dust separator STR 025	PK Z60 106	-
Dust separator STP 025	PK Z60 206	-
PTC resistor tripping unit	P4 768 051 FQ	P4 768 051 FQ
Operation fluid level control	PK 196 157-T	PK 196 157-T
Operation control unit: fluid level, temperature, exhaust pressure	PK 196 141-T	PK 196 141-T
Operating control: pump is running	PK 196 449	PK 196 449

Adsorption filter

Activated carbon filter FAK 025	PK Z30 006	-
Bleaching earth filter FBL 025	PK Z30 106	-
Zeoline trap ZFO 025	PK Z70 006	-
Catalytic trap URB 025, 230 V	PT U10 760	-
Catalytic trap URB 025, 115 V	PT U10 761	-

Operating fluid

Mineral oil P3, 1 l	PK 001 106-T	-
Mineral oil P3, 5 l	PK 001 107-T	-
Perfluoropolyether F4, 0.5 l	-	PK 005 886-T
Perfluoropolyether F4, 1 l	-	PK 005 887-T

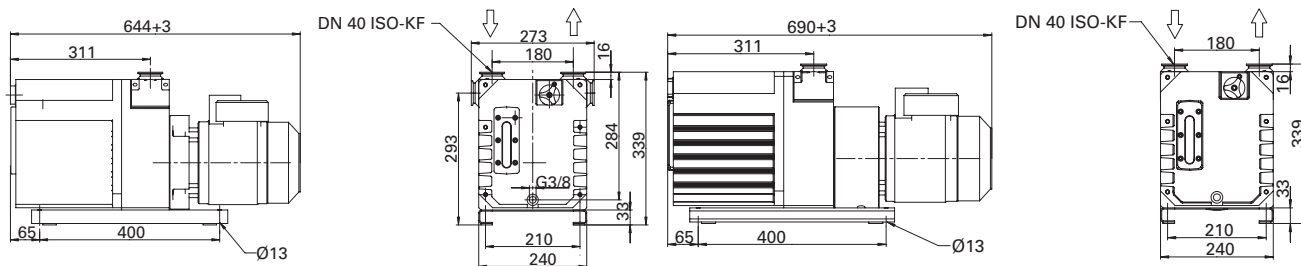
Two-stage rotary vane pump with a pumping speed of 35 m³/h

DUO 35



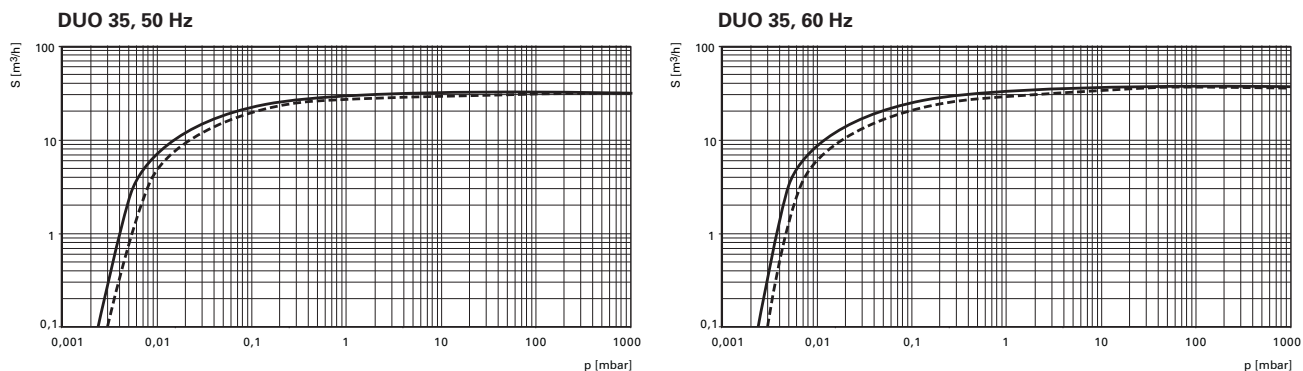
- ▶ Magnetically coupled - safe, clean, low maintenance (M types)
- ▶ Versions for handling corrosive gases are available (C types)
- ▶ Integrated safety and gas ballast valve
- ▶ Free of nonferrous metals
- ▶ Different motor voltages allow worldwide use

Dimensions (in mm)



PK D45 202 / PK D45 242 / PK D45 602 / PK D45 305 / PK D45 642 PK D45 013

Pumping speed



— without gas ballast - - - - with gas ballast



Technical data

	DUO 35	DUO 35 M	DUO 35 C
Pumping speed at 50 Hz	32 m ³ /h	32 m ³ /h	32 m ³ /h
Pumping speed at 60 Hz	36 m ³ /h	36 m ³ /h	36 m ³ /h
Ultimate pressure: Total with gas ballast	5·10 ⁻³ mbar	5·10 ⁻³ mbar	5·10 ⁻³ mbar
Ultimate pressure: Total without gas ballast	3·10 ⁻³ mbar	3·10 ⁻³ mbar	3·10 ⁻³ mbar
Flange (in)	DN 40 ISO-KF	DN 40 ISO-KF	DN 40 ISO-KF
Flange (out)	DN 40 ISO-KF	DN 40 ISO-KF	DN 40 ISO-KF
Rated power 50 Hz	1.1 kW	1.1 kW	1.1 kW
Rated power 60 Hz	1.25 kW	1.3 kW	1.25 kW
Water vapor tolerance at 50 Hz	20 mbar	20 mbar	20 mbar
Water vapor tolerance at 60 Hz	20 mbar	20 mbar	20 mbar
Water vapor capacity 50 Hz	500 g/h	500 g/h	500 g/h
Water vapor capacity 60 Hz	560 g/h	560 g/h	560 g/h
Emission sound pressure level	61 dB (A)	61 dB (A)	61 dB (A)
Pump fluid filling	3.2 l	3.2 l	3.2 l
Weight	56 kg	56 kg	56 kg

Ordering Number

400 V, 50 Hz	PK D45 305	-	-
230/400 V, 50 Hz; 265/460 V, 60 Hz	PK D45 602	-	PK D45 202
200/346 V, 50 Hz; 220/380 V, 60 Hz	PK D45 642	-	PK D45 242
230/400 V, 50 Hz; 250/440 V, 60 Hz	-	PK D45 013	-

Accessories

Oil mist separator ONF 35/65	PK Z40 150	PK Z40 150	PK Z40 152
Oil mist separator ONFR	PK Z40 151	PK Z40 151	PK Z40 153
Oil return device from oil mist separator ONF	PK 005 710-T	PK 005 710-T	PK 005 710-T
Condensate separator KAS 40	PK Z10 008	PK Z10 008	PK Z10 408
Dust separator STZ 040	PK Z60 008	PK Z60 008	-
Dust separator STR 040	PK Z60 108	PK Z60 108	-
Dust separator STP 040	PK Z60 208	PK Z60 208	-
Mechanical oil filter OFM	PK Z90 321	PK Z90 321	-
Chemical oil filter OFC	PK Z90 320	PK Z90 320	-
PTC resistor tripping unit	P4 768 051 FQ	P4 768 051 FQ	P4 768 051 FQ
Operation fluid level control	PK 223 718-U	PK 223 718-U	PK 223 718-U
Operation control unit: fluid level, temperature, exhaust pressure	PK 223 739-U	PK 223 739-U	PK 223 739-U
Operating control: pump is running	PK 223 720-U	PK 223 720-U	PK 223 720-U
Operating control when using OFM/OFC: pump is running	PK 223 741-U	PK 223 741-U	PK 223 741-U

Adsorption filter

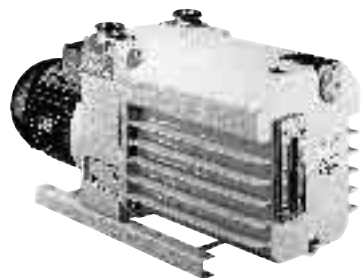
Activated carbon filter FAK 040	PK Z30 008	PK Z30 008	-
Bleaching earth filter FBL 040	PK Z30 108	PK Z30 108	-
Zeoline trap ZFO 040	PK Z70 008	PK Z70 008	-
Catalytic trap URB 040, 230 V	PT U10 260	PT U10 260	-
Catalytic trap URB 040, 115 V	PT U10 261	PT U10 261	-

Operating fluid

Mineral oil P3, 1 l	PK 001 106-T	PK 001 106-T	-
Mineral oil P3, 5 l	PK 001 107-T	PK 001 107-T	-
Mineral oil P3, 20 l	PK 001 108-T	PK 001 108-T	-
Perfluoropolyether F5, 1 l	-	-	PK 001 852-T
Perfluoropolyether F5, 5 l	-	-	PK 001 853-T
Perfluoropolyether F5, 20 l	-	-	PK 001 854-T

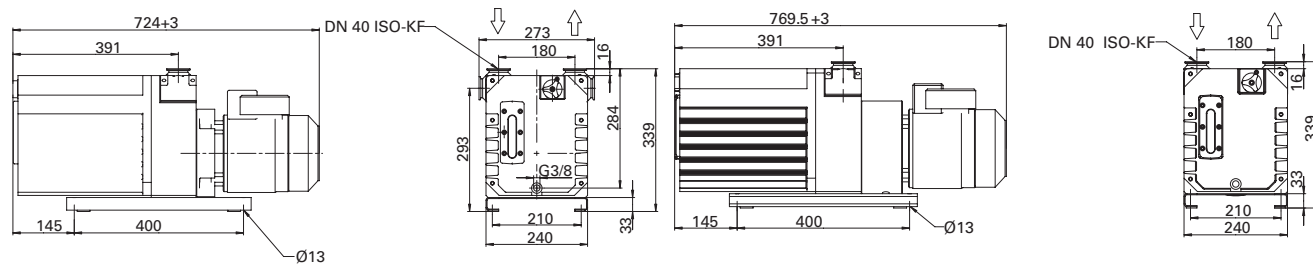
Two-stage rotary vane pump with a pumping speed of 65 m³/h

DUO 65



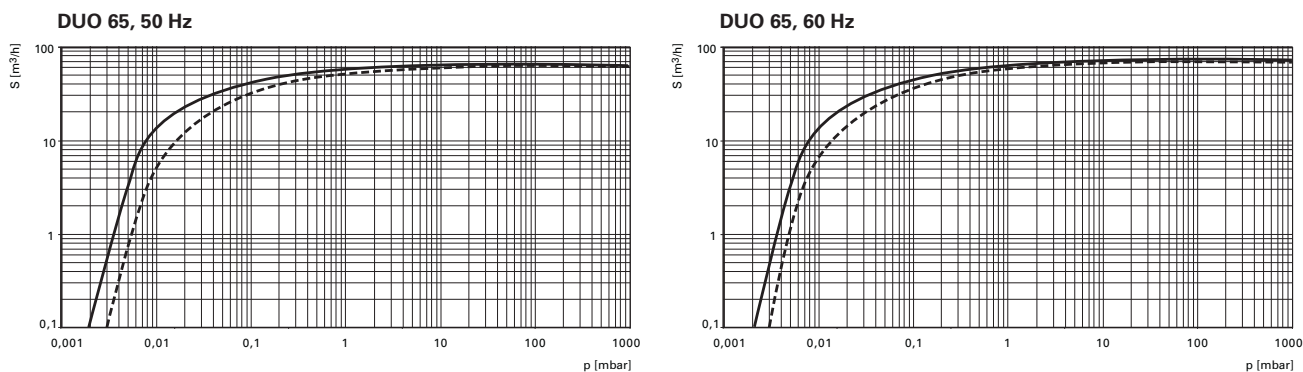
- ▶ Magnetically coupled - safe, clean, low maintenance (M types)
- ▶ Versions for handling corrosive gases are available (C types)
- ▶ Integrated safety and gas ballast valve
- ▶ Free of nonferrous metals
- ▶ Different motor voltages allow worldwide use

Dimensions (in mm)



PK D46 202 / PK D46 242 / PK D46 305 / PK D46 602 / PK D46 642 PK D46 013

Pumping speed



— without gas ballast - - - - with gas ballast



Technical data

	DUO 65	DUO 65 M	DUO 65 C
Pumping speed at 50 Hz	62 m ³ /h	62 m ³ /h	62 m ³ /h
Pumping speed at 60 Hz	70 m ³ /h	70 m ³ /h	70 m ³ /h
Ultimate pressure: Total with gas ballast	5·10 ⁻³ mbar	5·10 ⁻³ mbar	5·10 ⁻³ mbar
Ultimate pressure: Total without gas ballast	3·10 ⁻³ mbar	3·10 ⁻³ mbar	3·10 ⁻³ mbar
Flange (in)	DN 40 ISO-KF	DN 40 ISO-KF	DN 40 ISO-KF
Flange (out)	DN 40 ISO-KF	DN 40 ISO-KF	DN 40 ISO-KF
Rated power 50 Hz	1.5 kW	1.5 kW	1.5 kW
Rated power 60 Hz	1.7 kW	1.8 kW	1.7 kW
Water vapor tolerance at 50 Hz	20 mbar	20 mbar	20 mbar
Water vapor tolerance at 60 Hz	20 mbar	20 mbar	20 mbar
Water vapor capacity 50 Hz	1000 g/h	1000 g/h	1000 g/h
Water vapor capacity 60 Hz	1120 g/h	1120 g/h	1120 g/h
Emission sound pressure level	61 dB (A)	61 dB (A)	61 dB (A)
Pump fluid filling	4.2 l	4.2 l	4.2 l
Weight	65 kg	65 kg	65 kg

Ordering Number

400 V, 50 Hz	PK D46 305	-	-
230/400 V, 50 Hz; 265/460 V, 60 Hz	PK D46 602	-	PK D46 202
200/346 V, 50 Hz; 220/380 V, 60 Hz	PK D46 642	-	PK D46 242
230/400 V, 50 Hz; 250/440 V, 60 Hz	-	PK D46 013	-

Accessories

Oil mist separator ONF 35/65	PK Z40 150	PK Z40 150	PK Z40 152
Oil mist separator ONFR	PK Z40 151	PK Z40 151	PK Z40 153
Oil return device from oil mist separator ONF	PK 005 710-T	PK 005 710-T	PK 005 710-T
Condensate separator KAS 40	PK Z10 008	PK Z10 008	PK Z10 408
Dust separator STZ 040	PK Z60 008	PK Z60 008	-
Dust separator STR 040	PK Z60 108	PK Z60 108	-
Dust separator STP 040	PK Z60 208	PK Z60 208	-
Mechanical oil filter OFM	PK Z90 321	PK Z90 321	-
Chemical oil filter OFC	PK Z90 320	PK Z90 320	-
PTC resistor tripping unit	P4 768 051 FQ	P4 768 051 FQ	P4 768 051 FQ
Operation fluid level control	PK 223 718-U	PK 223 718-U	PK 223 718-U
Operation control unit: fluid level, temperature, exhaust pressure	PK 223 739-U	PK 223 739-U	PK 223 739-U
Operating control: pump is running	PK 223 720-U	PK 223 720-U	PK 223 720-U
Operating control when using OFM/OFC: pump is running	PK 223 741-U	PK 223 741-U	PK 223 741-U

Adsorption filter

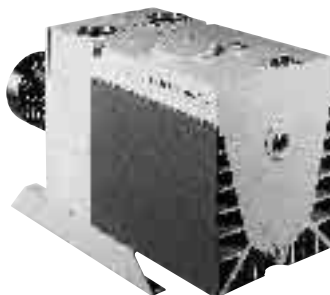
Activated carbon filter FAK 040	PK Z30 008	PK Z30 008	-
Bleaching earth filter FBL 040	PK Z30 108	PK Z30 108	-
Zeoline trap ZFO 040	PK Z70 008	PK Z70 008	-
Catalytic trap URB 040, 230 V	PT U10 260	PT U10 260	-
Catalytic trap URB 040, 115 V	PT U10 261	PT U10 261	-

Operating fluid

Mineral oil P3, 1 l	PK 001 106-T	PK 001 106-T	-
Mineral oil P3, 5 l	PK 001 107-T	PK 001 107-T	-
Mineral oil P3, 20 l	PK 001 108-T	PK 001 108-T	-
Perfluoropolyether F5, 1 l	-	-	PK 001 852-T
Perfluoropolyether F5, 5 l	-	-	PK 001 853-T
Perfluoropolyether F5, 20 l	-	-	PK 001 854-T

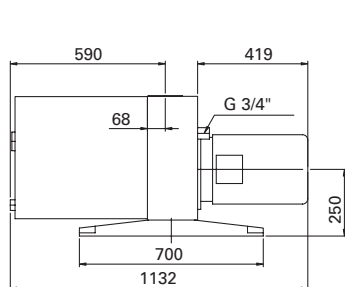
Two-stage rotary vane pump with a pumping speed of 120 m³/h

DUO 120

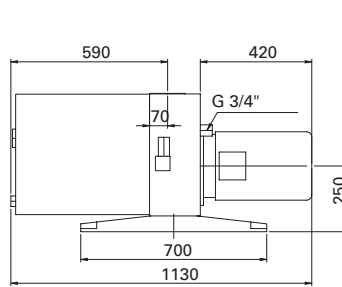
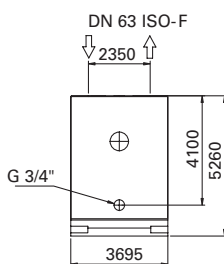


- For industrial applications - high-performance
- Versions for handling corrosive gases are available (C types)
- Integrated safety and gas ballast valve
- Different motor voltages allow worldwide use

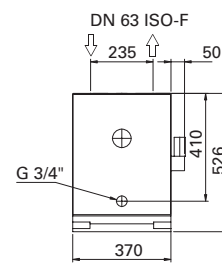
Dimensions (in mm)



PK D26 602 / PK D26 652

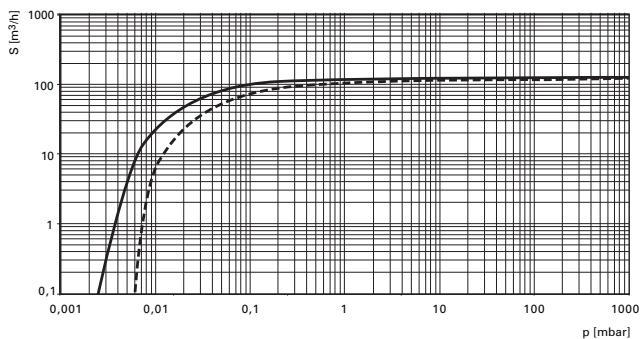


PK D26 202

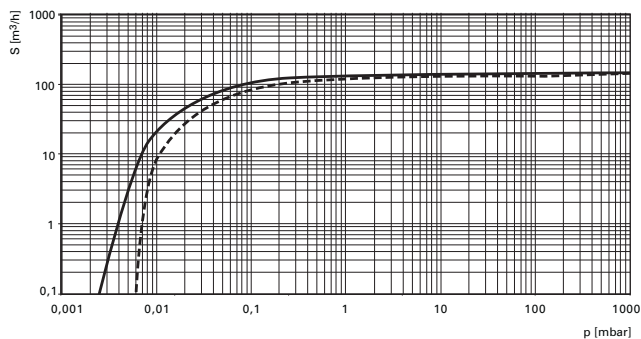


Pumping speed

DUO 120, 50 Hz



DUO 120, 60 Hz



— without gas ballast - - - - with gas ballast



Technical data

	DUO 120	DUO 120 C
Pumping speed at 50 Hz	120 m ³ /h	120 m ³ /h
Pumping speed at 60 Hz	144 m ³ /h	144 m ³ /h
Ultimate pressure: Total with gas ballast	6·10 ⁻³ mbar	6·10 ⁻³ mbar
Ultimate pressure: Total without gas ballast	3·10 ⁻³ mbar	3·10 ⁻³ mbar
Flange (in)	DN 63 ISO-F	DN 63 ISO-F
Flange (out)	DN 63 ISO-F	DN 63 ISO-F
Rated power 50 Hz	4 kW	4 kW
Rated power 60 Hz	4 kW	4 kW
Water vapor tolerance at 50 Hz	20 mbar	20 mbar
Water vapor tolerance at 60 Hz	20 mbar	20 mbar
Water vapor capacity 50 Hz	1800 g/h	1800 g/h
Water vapor capacity 60 Hz	2150 g/h	2150 g/h
Emission sound pressure level	60 dB (A)	60 dB (A)
Pump fluid filling	13 l	13 l
Weight	215 kg	215 kg

Ordering Number

230/400 V, 50 Hz; 265/460 V, 60 Hz	PK D26 602	PK D26 202
200/346 V, 50 Hz; 220/380 V, 60 Hz	PK D26 652	-

Accessories

Oil mist separator ONF 63	PK Z40 010	PK Z40 410
Oil return device from oil mist separator ONF	PK Z90 041A	PK Z90 084
Condensate separator KAS 63	PK Z10 010	PK Z10 410
Dust separator STZ 063	PK Z60 009	-
Dust separator STR 063	PK Z60 110	-
Dust separator STP 063	PK Z60 210	-
PTC resistor tripping unit	P4 768 051 FQ	P4 768 051 FQ
Operation fluid level control, 24 V DC	PK 005 639-U	PK 005 639-U
Operation fluid level control, 20-250 V AC	PK 004 930-U	PK 004 930-U

Adsorption filter

Activated carbon filter FAK 063	PK Z30 010	-
Bleaching earth filter FBL 063	PK Z30 110	-
Zeoline trap ZFO 063	PK Z70 010	-

Operating fluid

Mineral oil P3, 1 l	PK 001 106-T	-
Mineral oil P3, 5 l	PK 001 107-T	-
Mineral oil P3, 20 l	PK 001 108-T	-
Perfluoropolyether F5, 1 l	-	PK 001 852-T
Perfluoropolyether F5, 5 l	-	PK 001 853-T
Perfluoropolyether F5, 20 l	-	PK 001 854-T

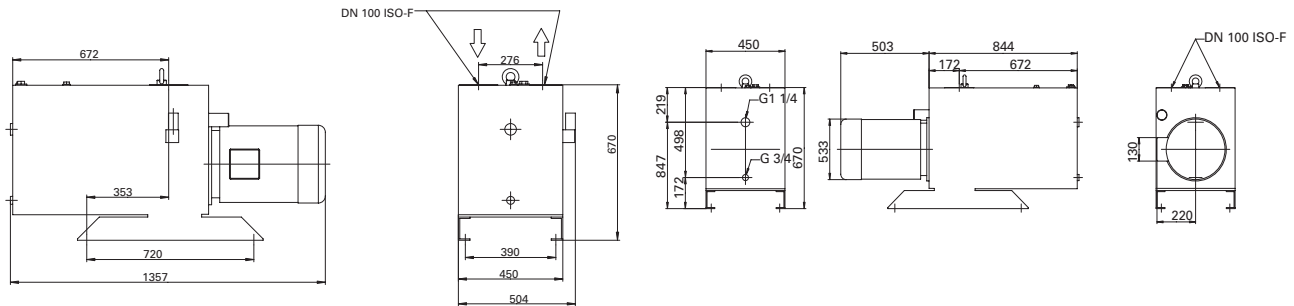
Two-stage rotary vane pump with a pumping speed of 250 m³/h

DUO 250



- For industrial applications - high-performance
- Versions for handling corrosive gases are available (C types)
- Integrated safety and gas ballast valve
- Different motor voltages allow worldwide use

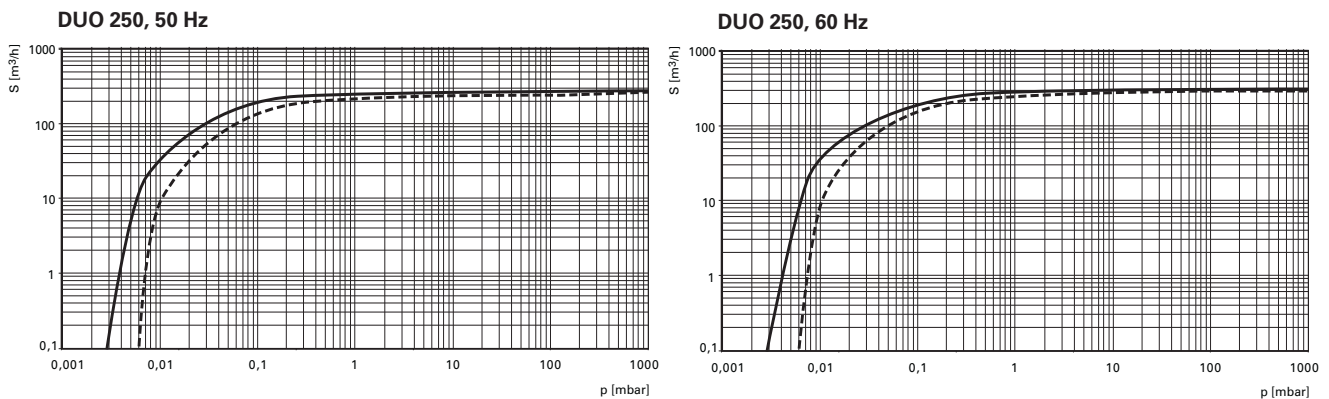
Dimensions (in mm)



PK D27 202

PK D27 602 / PK D27 652

Pumping speed



— without gas ballast ----- with gas ballast



Technical data

	DUO 250	DUO 250 C
Pumping speed at 50 Hz	250 m ³ /h	250 m ³ /h
Pumping speed at 60 Hz	300 m ³ /h	300 m ³ /h
Ultimate pressure: Total with gas ballast	6·10 ⁻³ mbar	6·10 ⁻³ mbar
Ultimate pressure: Total without gas ballast	3·10 ⁻³ mbar	3·10 ⁻³ mbar
Flange (in)	DN 100 ISO-F	DN 100 ISO-F
Flange (out)	DN 100 ISO-F	DN 100 ISO-F
Rated power 50 Hz	7.5 kW	7.5 kW
Rated power 60 Hz	7.5 kW	7.5 kW
Water vapor tolerance at 50 Hz	25 mbar	25 mbar
Water vapor tolerance at 60 Hz	25 mbar	25 mbar
Water vapor capacity 50 Hz	4350 g/h	4350 g/h
Water vapor capacity 60 Hz	5200 g/h	5200 g/h
Emission sound pressure level	62 dB (A)	62 dB (A)
Pump fluid filling	23 l	23 l
Weight	410 kg	410 kg

Ordering Number

230/400 V, 50 Hz; 265/460 V, 60 Hz	PK D27 602	PK D27 202
200/346 V, 50 Hz; 220/380 V, 60 Hz	PK D27 652	-

Accessories

Oil mist separator ONF 100	PK Z40 012	PK Z40 412
Oil return device from oil mist separator ONF	PK Z90 041A	PK Z90 084
Condensate separator KAS 100	PK Z10 012	PK Z10 412
Dust separator STR 100	PK Z60 112	-
Dust separator STP 100	PK Z60 212	-
PTC resistor tripping unit	P4 768 051 FQ	P4 768 051 FQ
Operation fluid level control, 24 V DC	PK 005 639-U	PK 005 639-U
Operation fluid level control, 20-250 V AC	PK 004 930-U	PK 004 930-U

Adsorption filter

Activated carbon filter FAK 100	PK Z30 012	-
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Operating fluid

Mineral oil P3, 1 l	PK 001 106-T	-
Mineral oil P3, 5 l	PK 001 107-T	-
Mineral oil P3, 20 l	PK 001 108-T	-
Mineral oil P3, 50 l	PK 001 108-T	-
Perfluoropolyether F5, 1 l	-	PK 001 852-T
Perfluoropolyether F5, 5 l	-	PK 001 853-T
Perfluoropolyether F5, 20 l	-	PK 001 854-T
Perfluoropolyether F5, 50 l	-	PK 001 854-T

Accessories overview



Inlet

Application: For protecting the pump and the operating fluid

Dust separator STP, STR, STZ

- Prevents the ingress of dust into the pump
- Prevents oil from backstreaming
- STP – single-stage filter with paper insert, for slight contamination
- STR – two-stage filter with cyclone and oil wetted packing, for medium contamination
- STZ – two-stage filter with cyclone and paper insert, for severe contamination

Catalyser trap URB

- Prevents pump oil from streaming back into the vacuum chamber
- Operation based on catalytic combustion

Zeolite trap ZFO

- Zeolite materials bind backflowing pump oil
- Suitable for regeneration through optional heating rod

Condensate separator KAS

- At the inlet and the outlet: Prevents the ingress of condensate into the pump
- Separator for condensed vapors
- Sight glass for determining the filling level
- Drain screw for draining out the condensate

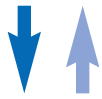
Oil filter: Mechanical oil filter OFM 35/65, Chemical oil filter OFC 35/65

- For pumping speeds from 35 – 65 m³/h
- For use within the oil circuit of the pump
- Filters dust and particles from the pump oil
- Reduces pump wear

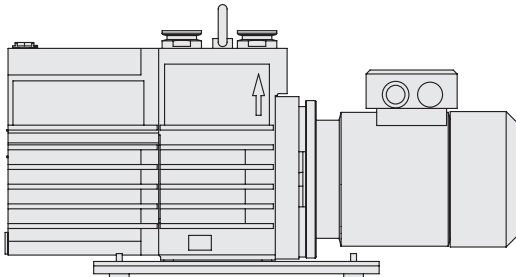
Rotary vane pumps		DUO 2.5	DUO 5 M	DUO 10 M	DUO 20 M
Dust separator*	STP	STP 016	STP 016	STP 025	STP 025
	Order.-No.	PK Z60 203	PK Z60 203	PK Z60 206	PK Z60 206
Dust separator*	STR	-	-	STR 025	STR 025
	Order.-No.	-	-	PK Z60 106	PK Z60 106
Dust separator*	STZ	-	-	STZ 025	STZ 025
	Order.-No.	-	-	PK Z60 006	PK Z60 006
Condensate separator	KAS	KAS 16	KAS 16	KAS 25	KAS 25 L
	Order.-No.	PK Z10 003	PK Z10 003	PK Z10 032	PK Z10 033
Oil mist separator	ONF	ONF 16	ONF 16	ONF 25	ONF 25 L
	Order.-No.	PK Z40 003	PK Z40 003	PK Z40 157	PK Z40 158
Oil return unit from Oil mist separator	Order.-No.	PK 194 315-T	PK 196 172-T	PK 196 172-T	PK 196 172-T
Oil mist separator with return unit	ONFR	-	-	-	-
	Order.-No.	-	-	-	-
Chemical oil filter	OFC	-	-	-	-
	Order.-No.	-	-	-	-
Mechanical oil filter	OFM	-	-	-	-
	Order.-No.	-	-	-	-
Zeolite trap	ZFO	ZFO 016	ZFO 016	ZFO 025	ZFO 025
	Order.-No.	PK Z70 003	PK Z70 003	PK Z70 006	PK Z70 006
Activated carbon filter	FAK	-	-	FAK 025	FAK 025
	Order.-No.	-	-	PK Z30 006	PK Z30 006
Fuller's earth filter	FBL	-	-	FBL 025	FBL 025
	Order.-No.	-	-	PK Z30 106	PK Z30 106
Catalyser trap 230 V	URB	-	-	URB 025	URB 025
	Order.-No.	-	-	PT U10 760	PT U10 760
Catalyser trap 115 V	URB	-	-	URB 025	URB 025
	Order.-No.	-	-	PT U10 761	PT U10 761
Operation fluid monitoring - oil pressure switch	Standard	-	PK 196 449	PK 196 449	PK 196 449
	Connection with oil filter 35/65	-	-	-	-
Operation fluid monitoring - Operation fluid temperature, Operation fluid level output pressure	Order.-No.	-	PK 196 141-T	PK 196 141-T	PK 196 141-T
Operation fluid level monitoring	24 V DC	-	PK 196 157-T	PK 196 157-T	PK 196 157-T
	20-250 V AC	-	-	-	-

* STP: single-stage for slight contamination; STR: two-stage for medium contamination; STZ: two-stage for severe contamination
Accessories for pumps in corrosive version are depend on the process conditions

Inlet



Outlet



Outlet

Application: Prevents oil mists from the pump escaping into the environment

Oil mist filter ONF

- Prevents oil vapors from escaping to the atmosphere
- Degree of separation with a clean filter > 99.98 %

Oil return unit ORF

- Returns oil from the oil mist filter ONF back to the pump



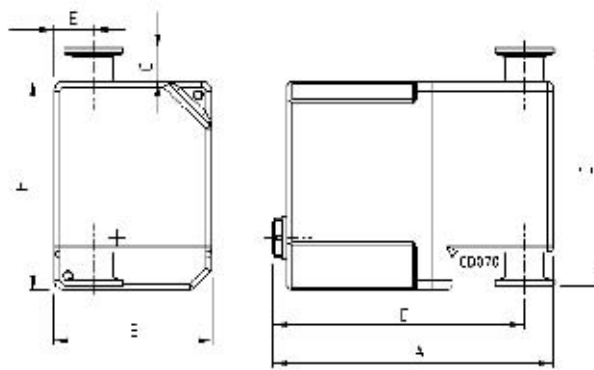
DUO 35/35 M	DUO 65/65 M	DUO 120	DUO 250
STP 040	STP 040	STP 063	STP 100
PK Z60 208	PK Z60 208	PK Z60 210	PK Z60 212
STR 040	STR 040	STR 063	STR 100
PK Z60 108	PK Z60 108	PK Z60 110	PK Z60 112
STZ 040	STZ 040	STZ 063	-
PK Z60 008	PK Z60 008	PK Z60 009	-
KAS 40	KAS 40	KAS 63	KAS 100
PK Z10 008	PK Z10 008	PK Z10 010	PK Z10 012
ONF 35/65	ONF 35/65	ONF 63	ONF 100
PK Z40 150	PK Z40 150	PK Z40 010	PK Z40 012
PK 005 710-T	PK 005 710-T	PK Z90 041A	PK Z90 041A
ONFR 35/65	ONFR 35/65	-	-
PK Z40 151	PK Z40 151	-	-
OFC 35/65	OFC 35/65	-	-
PK Z90 320	PK Z90 320	-	-
OFM 35/65	OFM 35/65	-	-
PK Z90 321	PK Z90 321	-	-
ZFO 040	ZFO 040	ZFO 063	-
PK Z70 008	PK Z70 008	PK Z70 010	-
FAK 040	FAK 040	FAK 063	FAK 100
PK Z30 008	PK Z30 008	PK Z30 010	PK Z30 012
FBL 040	FBL 040	FBL 063	-
PK Z30 108	PK Z30 108	PK Z30 110	-
URB 040	URB 040	-	-
PT U10 260	PT U10 260	-	-
URB 040	URB 040	-	-
PT U10 261	PT U10 261	-	-
PK 223 720-U	PK 223 720-U	-	-
PK 223 741-U	PK 223 741-U	-	-
PK 223 749-U	PK 223 749-U	-	-
PK 223 718-U	PK 223 718-U	PK 005 639-U	PK 005 639-U
-	-	PK 004 930-U	PK 004 930-U

Condensate separator 2.5 - 20 m³/h



- For separating condensate
- For the intake and exhaust port
- For protecting the rotary vane pump against backflowing condensate

Dimensions



Technical data

	KAS 16	KAS 25	KAS 25 L
A:	142 mm	147 mm	202 mm
B:	80 mm	80 mm	80 mm
C:	120 mm	132 mm	132 mm
D:	127 mm	127 mm	182 mm
E:	20 mm	20 mm	20 mm
F:	105 mm	105 mm	105 mm
G:	17 mm	23 mm	23 mm
Flange (out)	DN 16 ISO-KF	DN 25 ISO-KF	DN 25 ISO-KF
Flange (in)	DN 16 ISO-KF	DN 25 ISO-KF	DN 25 ISO-KF
Capacity	0.2 l	0.2 l	0.3 l
For pumping speed	2.5 - 5 m³/h	10 m³/h	20 m³/h
Weight	1.1 kg	1.2 kg	1.6 kg

Ordering Number

Condensate separator	PK Z10 003	PK Z10 032	PK Z10 033
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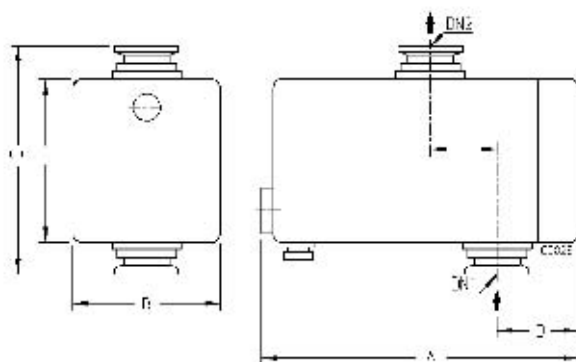
Condensate separator 35 - 250 m³/h



- For protecting the rotary vane pump against backflowing condensate
- For separating condensate
- For the intake and exhaust port



Dimensions



Technical data

	KAS 40	KAS 40 C
A:	338 mm	338 mm
B:	160 mm	160 mm
C:	230 mm	230 mm
D:	100 mm	100 mm
E:	60 mm	60 mm
F:	166 mm	166 mm
Flange (out)	DN 40 ISO-KF	DN 40 ISO-KF
Flange (in)	DN 40 ISO-KF	DN 40 ISO-KF
Capacity	3 l	3 l
For pumping speed	35 - 65 m ³ /h	35 - 65 m ³ /h
Weight	6.1 kg	6.1 kg

Ordering Number

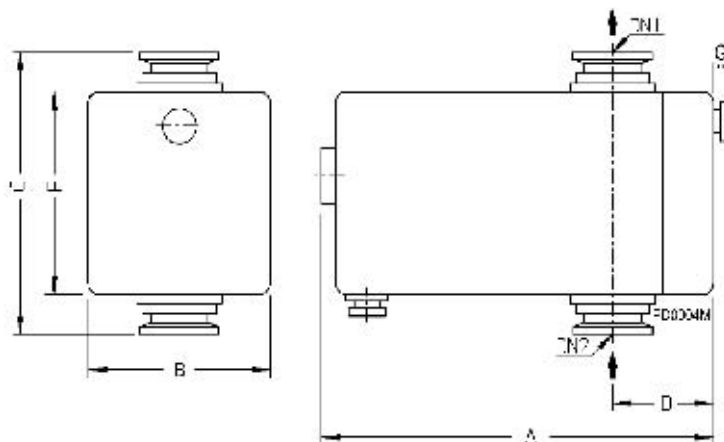
Condensate separator	PK Z10 008	PK Z10 408
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Condensate separator 35 - 250 m³/h



- For protecting the rotary vane pump against backflowing condensate
- For separating condensate
- For the intake and exhaust port

Dimensions



Technical data

	KAS 63	KAS 63 C	KAS 100	KAS 100 C
A:	440 mm	440 mm	460 mm	460 mm
B:	196 mm	196 mm	260 mm	260 mm
C:	366 mm	366 mm	494 mm	494 mm
D:	146 mm	146 mm	150 mm	150 mm
F:	260 mm	260 mm	400 mm	400 mm
G:	8 mm	8 mm	8 mm	8 mm
Flange (out)	DN 63 ISO-K	DN 63 ISO-K	DN 100 ISO-K	DN 100 ISO-K
Flange (in)	DN 63 ISO-K	DN 63 ISO-K	DN 100 ISO-K	DN 100 ISO-K
Capacity	12 l	12 l	19 l	19 l
For pumping speed	120 m³/h	120 m³/h	250 m³/h	250 m³/h
Weight	13.2 kg	13.2 kg	25 kg	25 kg

Ordering Number

Condensate separator	PK Z10 010	PK Z10 410	PK Z10 012	PK Z10 412
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Oil mist separator ONF 4-20

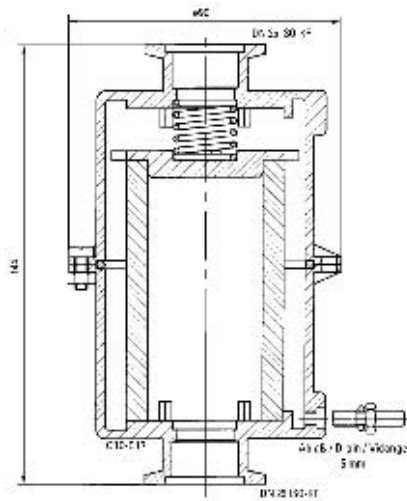


- For separating oil mists
- Is fitted to the exhaust port
- Prevents the air from being contaminated with oil mist

The limit values established by the German Clean Air Act for control of clean air are complied with by using a clean filter (degree of separation > 99.98%).



Dimensions (in mm)



Technical data

ONF 4-20

Degree of separation	99.98 %
Flange (out)	DN 25 ISO-KF
Flange (in)	DN 25 ISO-KF
Capacity	0.04 l
Weight	0.2 kg

Ordering Number

Oil mist separator	PK Z40 145
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Accessories

Order.-No.

Oil return unit from ONF 4-20 to DUO 5	PK 196 173-T
Oil return unit from ONF 4-20 to DUO 10	
Oil return unit from ONF 4-20 to DUO 20	

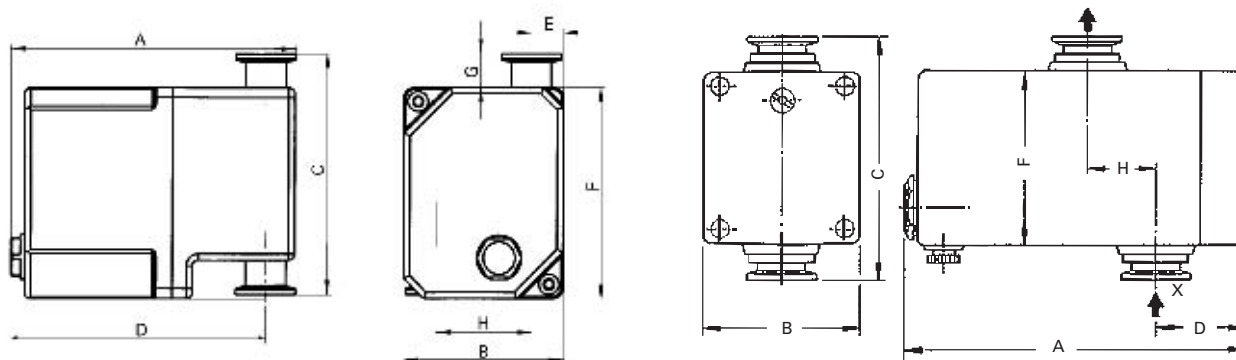
Oil mist separator ONF 2.5 - 20 m³/h



- For separating oil mists
- Is fitted to the exhaust port
- Prevents the air from being contaminated with oil mist

The limit values established by the German Clean Air Act for control of clean air are complied with by using a clean filter (degree of separation > 99.98%).

Dimensions



ONF 16, 25, 25 L

ONF 25 C

	ONF 16	ONF 25	ONF 25 L	ONF 25 C
A:	142 mm	147 mm	218 mm	195 mm
B:	80 mm	80 mm	80 mm	90 mm
C:	120 mm	132 mm	134 mm	140 mm
D:	127 mm	127 mm	182 mm	55 mm
E:	16 mm	16 mm	25 mm	-
F:	105 mm	105 mm	105 mm	100 mm
G:	17 mm	23 mm	27 mm	-
H:	48 mm	48 mm	-	40 mm



Technical data

	ONF 16	ONF 25	ONF 25 L	ONF 25 C
Degree of separation	99.98 %	99.98 %	99.98 %	99.98 %
Flange (out)	DN 16 ISO-KF	DN 25 ISO-KF	DN 25 ISO-KF	DN 25 ISO-K
Flange (in)	DN 16 ISO-KF	DN 25 ISO-KF	DN 25 ISO-KF	DN 25 ISO-K
Capacity	0.15 l	0.15 l	0.25 l	2.3 l
For pumping speed	2.5-5 m ³ /h	10 m ³ /h	30 m ³ /h	10-20 m ³ /h
Weight	1.35 kg	1.4 kg	1.6 kg	1.8 kg

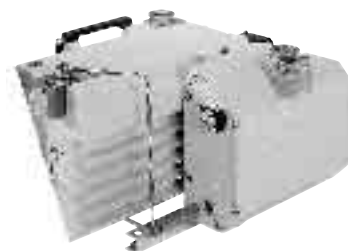
Ordering Number

Oil mist separator	PK Z40 003	PK Z40 157	PK Z40 158	PK Z40 406
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Accessories

Oil return unit from ONF 16 to DUO 5	PK 196 172-T	PK 196 172-T	PK 196 172-T	-
Oil return unit from ONF 25 to DUO 10				
Oil return unit from ONF 25 l to DUO 20				
Oil return unit from ONF 16 to DUO 2,5	PK 194 315-T	-	-	-
Oil return unit from ONF 25 C to DUO 5 C	-	-	-	PK 196 177-T
Oil return unit from ONF 25 C to DUO 10 C				
Oil return unit from ONF 25 C to DUO 20 C				

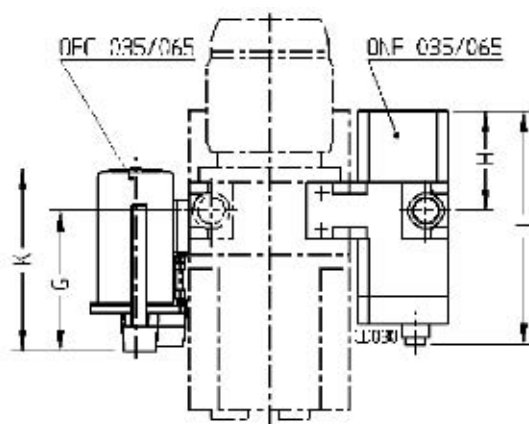
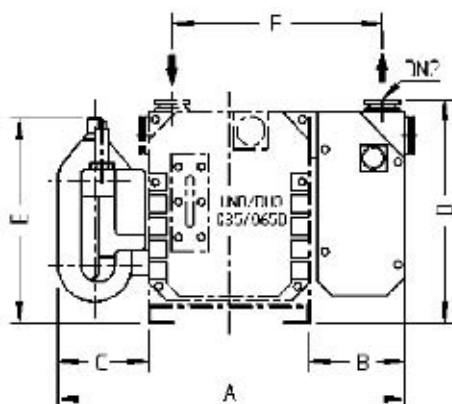
Oil mist separator ONF 35-65 m³/h



- For separating oil mists
- Is fitted to the exhaust port
- Prevents the air from being contaminated with oil mist

The limit values established by the German Clean Air Act for control of clean air are complied with by using a clean filter (degree of separation > 99.98%).

Dimensions



	ONF 35/65	ONFR 35/65	ONF 35/65 C	ONFR 35/65 C
A:	517 mm	517 mm	517 mm	517 mm
B:	142 mm	142 mm	142 mm	142 mm
C:	135 mm	135 mm	135 mm	135 mm
D:	340 mm	340 mm	340 mm	340 mm
E:	308 mm	308 mm	308 mm	308 mm
F:	322 mm	322 mm	322 mm	322 mm
G:	207 mm	207 mm	207 mm	207 mm
H:	160 mm	160 mm	160 mm	160 mm
J:	350 mm	350 mm	350 mm	350 mm
K:	277 mm	277 mm	277 mm	277 mm



Technical data

	ONF 35/65	ONFR 35/65	ONF 35/65 C	ONFR 35/65 C
Degree of separation	99.98 %	99.98 %	99.98 %	99.98 %
Flange (out)	DN 40 ISO-KF	DN 40 ISO-KF	DN 40 ISO-KF	DN 40 ISO-KF
Flange (in)	DN 40 ISO-KF	DN 40 ISO-KF	DN 40 ISO-KF	DN 40 ISO-KF
Capacity	0.7 l	0.7 l	0.7 l	0.7 l
For pumping speed	35-65 m ³ /h	35-65 m ³ /h	35-65 m ³ /h	35-65 m ³ /h
Weight	11 kg	11 kg	11 kg	11 kg

Ordering Number

Oil mist separator	PK Z40 150	PK Z40 151	PK Z40 152	PK Z40 153
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Accessories

Oil return unit from ONF 35/65 to DUO 35 and DUO 65	PK 005 710-T	-	PK 005 710-T	-
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Oil mist separator ONF 120-250 m³/h

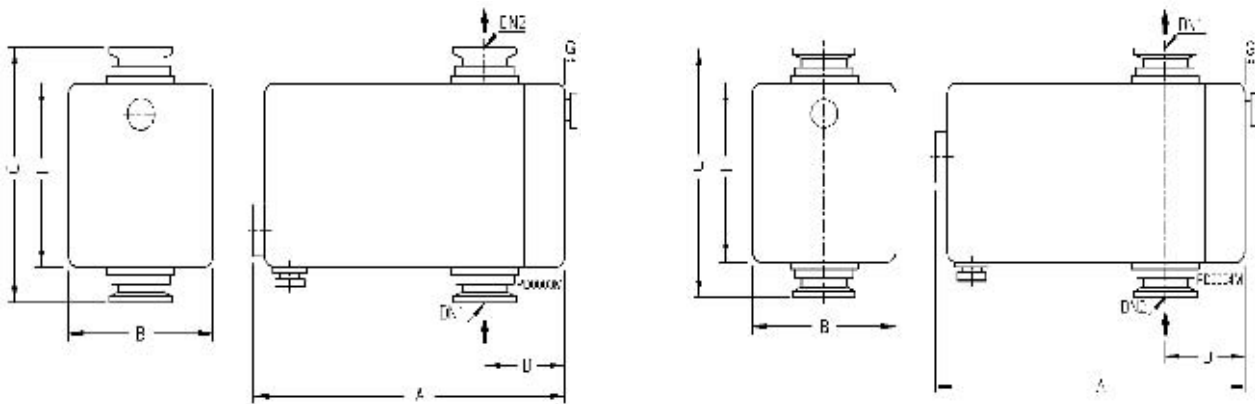


- For separating oil mists
- Is fitted to the exhaust port
- Prevents the air from being contaminated with oil mist

The limit values established by the German Clean Air Act for control of clean air are complied with by using a clean filter (degree of separation > 99.98%).



Dimensions



ONF 63

ONF 100

Technical data

	ONF 63	ONF 63 C	ONF 100	ONF 100 C
A:	440 mm	440 mm	460 mm	460 mm
B:	196 mm	196 mm	260 mm	260 mm
C:	366 mm	366 mm	494 mm	494 mm
D:	146 mm	146 mm	150 mm	150 mm
F:	260 mm	260 mm	400 mm	400 mm
G:	22 mm	22 mm	22 mm	22 mm
Degree of separation	99.98 %	99.98 %	99.98 %	99.98 %
Flange (out)	DN 63 ISO-K	DN 63 ISO-K	DN 100 ISO-K	DN 100 ISO-K
Flange (in)	DN 63 ISO-K	DN 63 ISO-K	DN 100 ISO-K	DN 100 ISO-K
Capacity	1.7 l	1.7 l	2.3 l	2.3 l
For pumping speed	120 m³/h	120 m³/h	250 m³/h	250 m³/h
Weight	13.5 kg	13.5 kg	27 kg	27 kg

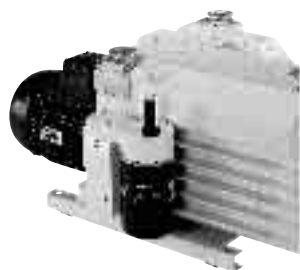
Ordering Number

Oil mist separator	PK Z40 010	PK Z40 410	PK Z40 012	PK Z40 412
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Accessories

Oil return feature, ORF 004, standard version	PK Z90 041A	-	PK Z90 041A	-
Oil return unit, ORF 004, corrosive version	-	PK Z90 084	-	PK Z90 084

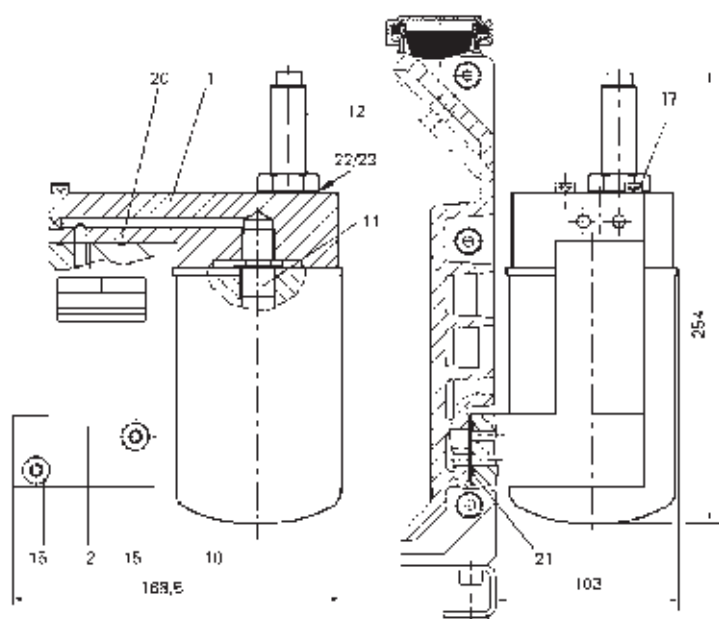
Mechanical oil filter OFM 35/65



- Is inserted in the oil circuit of the rotary vane pump
- For filtering of dust and particles from the operating fluid
- Reduces pump wear



Dimensions (in mm)



Technical data

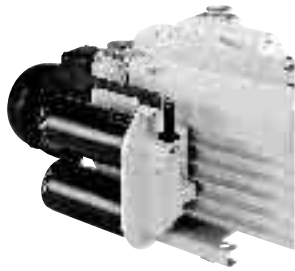
OFM 35/65

Capacity	0.8 l
Filter poresize	12 µm
For pumping speed	35 - 65 m³/h
Weight	3.2 kg

Ordering Number

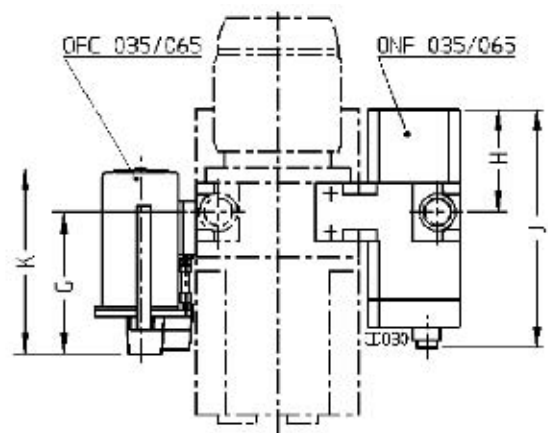
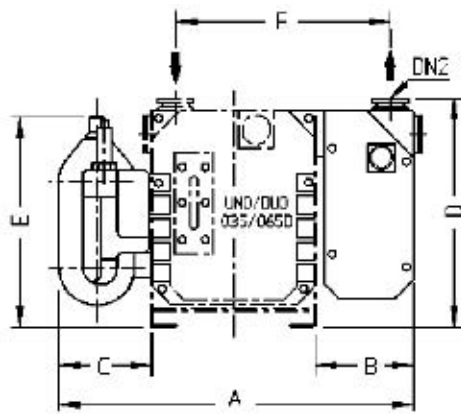
Mechanical oil filter	PK Z90 321
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Chemical oil filter OFC 35/65



- ▶ Is inserted in the oil circuit of the rotary vane pump
- ▶ For filtering of dust and particles from the operating fluid
- ▶ Absorbs corrosive substances from the operating fluid
- ▶ Reduces pump wear

Dimensions



Technical data

	OFC 35/65
A:	517 mm
B:	142 mm
C:	135 mm
D:	340 mm
E:	308 mm
F:	322 mm
G:	207 mm
H:	160 mm
J:	350 mm
K:	277 mm
Capacity chem. filter	0.8 l
Capacity mech. filter	1.2 l
For pumping speed	35 - 65 m ³ /h
Weight	8 kg

Ordering Number

Chemical oil filter	PK Z90 320
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Dust separator

- Prevents dust from entering the pump
- STP single stage filter with paper insert
- STR two-stage filter with a cyclone and oil wetted packing
- STZ two-stage filter with a cyclone and paper insert



Technical data	STZ 025	STZ 040	STZ 063
Flange (out)	DN 25 ISO-KF	DN 40 ISO-KF	DN 63 ISO-K
Flange (in)	DN 25 ISO-KF	DN 40 ISO-KF	DN 63 ISO-K
For pumping speed up to	30 m ³ /h	65 m ³ /h	120 m ³ /h
Mounting orientation	vertical	vertical	vertical
Conductance	1·10 ⁻² mbar: 11 l/s 1 mbar: 25 l/s 100 mbar: 900 l/s	1·10 ⁻² mbar: 20 l/s 1 mbar: 50 l/s 100 mbar: 1300 l/s	1·10 ⁻² mbar: 45 l/s 1 mbar: 750 l/s 100 mbar: 2500 l/s
Grain size limit (separable)	1 µm	1 µm	1 µm
Contamination quantity max.	1000 mg/m ³	1000 mg/m ³	1000 mg/m ³
Weight	3.5 kg	5.7 kg	15.8 kg
Ordering number	PK Z60 006	PK Z60 008	PK Z60 009

Technical data	STR 025	STR 040	STR 063	STR 100
Flange (out)	DN 25 ISO-KF	DN 40 ISO-KF	DN 63 ISO-K	DN 100 ISO-K
Flange (in)	DN 25 ISO-KF	DN 40 ISO-KF	DN 63 ISO-K	DN 100 ISO-K
For pumping speed up to	30 m ³ /h	65 m ³ /h	120 m ³ /h	250 m ³ /h
Mounting orientation	vertical	vertical	vertical	vertical
Conductance	1·10 ⁻² mbar: 11 l/s 1 mbar: 25 l/s 100 mbar: 900 l/s	1·10 ⁻² mbar: 20 l/s 1 mbar: 50 l/s 100 mbar: 1300 l/s	1·10 ⁻² mbar: 25 l/s 1 mbar: 250 l/s 100 mbar: 4000 l/s	1·10 ⁻² mbar: 60 l/s 1 mbar: 400 l/s 100 mbar: 1000 l/s
Grain size limit (separable)	2.5 µm	2.5 µm	2.5 µm	2.5 µm
Contamination quantity max.	100 mg/m ³	100 mg/m ³	100 mg/m ³	100 mg/m ³
Weight	3.7 kg	6.2 kg	20.3 kg	32 kg
Ordering number	PK Z60 106	PK Z60 108	PK Z60 110	PK Z60 112

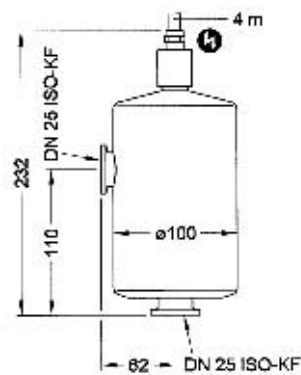
Technical data	STP 016	STP 025	STP 040	STP 063	STP 100
Flange (out)	DN 16 ISO-KF	DN 25 ISO-KF	DN 40 ISO-KF	DN 63 ISO-K	DN 100 ISO-K
Flange (in)	DN 16 ISO-KF	DN 25 ISO-KF	DN 40 ISO-KF	DN 63 ISO-K	DN 100 ISO-K
For pumping speed up to	5 m ³ /h	30 m ³ /h	65 m ³ /h	120 m ³ /h	250 m ³ /h
Mounting orientation	optional	optional	optional	optional	optional
Conductance	1·10 ⁻² mbar: 1.5 l/s 1 mbar: 7 l/s 100 mbar: 70 l/s	1·10 ⁻² mbar: 15 l/s 1 mbar: 80 l/s 100 mbar: 1000 l/s	1·10 ⁻² mbar: 25 l/s 1 mbar: 140 l/s 100 mbar: 1500 l/s	1·10 ⁻² mbar: 30 l/s 1 mbar: 700 l/s 100 mbar: 4200 l/s	1·10 ⁻² mbar: 60 l/s 1 mbar: 3000 l/s 100 mbar: 10000 l/s
Grain size limit (separable)	5 µm	5 µm	5 µm	5 µm	5 µm
Contamination quantity max.	50 mg/m ³	50 mg/m ³	50 mg/m ³	50 mg/m ³	50 mg/m ³
Weight	0.7 kg	1.7 kg	2.8 kg	15 kg	25 kg
Ordering number	PK Z60 203	PK Z60 206	PK Z60 208	PK Z60 210	PK Z60 212

Catalyzer trap URB

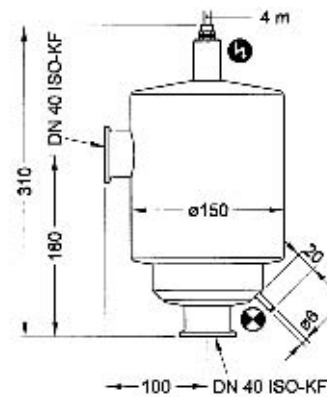


- Prevents pump oil from flowing into the vacuum chamber
- Operation is based on catalytic combustion

Dimensions (in mm)



URB 025



URB 040

Technical data

	URB 025	URB 025	URB 040	URB 040
Connector	DN 25 ISO-KF	DN 25 ISO-KF	DN 40 ISO-KF	DN 40 ISO-KF
Voltage	230 V	115 V	230 V	115 V
Cooling	-	-	Water	Water
Mounting orientation	any	any	Normal operation: any/ with water cooling: vertical	Normal operation: any/ with water cooling: vertical
Conductance	at 1·10 ⁻² mbar: 3 l/s 1 mbar: 9 l/s	at 1·10 ⁻² mbar: 3 l/s 1 mbar: 9 l/s	at 1·10 ⁻² mbar: 9 l/s 1 mbar: 45 l/s	at 1·10 ⁻² mbar: 9 l/s 1 mbar: 45 l/s
Power consumption	25 W	25 W	50 W	50 W
Service life	2 cycles	2 cycles	2 cycles	2 cycles
Filling	180 g	180 g	480 g	480 g
Weight with contents	1.8 kg	1.8 kg	3.6 kg	3,6 kg

Ordering Number

Catalyzer trap	PT U10 760	PT U10 761	PT U10 260	PT U10 261
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Zeolite trap ZFO

- Zeolite binds backflowing pump oil
- Optional heating rod for regeneration



Technical data	ZFO 016	ZFO 025	ZFO 040	ZFO 063
Flange (out)	DN 16 ISO-KF	DN 25 ISO-KF	DN 40 ISO-KF	DN 63 ISO-K
Flange (in)	DN 16 ISO-KF	DN 25 ISO-KF	DN 40 ISO-KF	DN 63 ISO-K
For pumping speed up to	5 m ³ /h	30 m ³ /h	65 m ³ /h	120 m ³ /h
Mounting orientation	horizontal	vertical	vertical	vertical
Conductance	1·10 ⁻² mbar: 0.3 l/s 1 mbar: 0.7 l/s 100 mbar: 31 l/s	1·10 ⁻² mbar: 4 l/s 1 mbar: 40 l/s 100 mbar: 900 l/s	1·10 ⁻² mbar: 7 l/s 1 mbar: 80 l/s 100 mbar: 1300 l/s	1·10 ⁻² mbar: 22 l/s 1 mbar: 600 l/s 100 mbar: 4000 l/s
Filling	0.5 l	2 l	2.3 l	4.3 l
Weight with contents	1.5 kg	7 kg	13 kg	17 kg

Ordering Number

Zeolite trap	PK Z70 003	PK Z70 006	PK Z70 008	PK Z70 010
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Accessories

		Heating rod for ZFO 025	Heating rod for ZFO 040	Heating rod for ZFO 063
Power consumption	-	200 W	300 W	400 W
Mains requirement	-	220 V, 50/60 Hz	220 V, 50/60 Hz	220 V, 50/60 Hz
Ordering number	-	PK Z90 012A	PK Z90 020A	PK Z90 030A

Activated carbon filter FAK

- Filter with activated carbon fillin
- For use in connection with nitrous gases, acids and caustic solutions



Technical data

	FAK 025	FAK 040	FAK 063	FAK 100
Flange (out)	DN 25 ISO-KF	DN 40 ISO-KF	DN 63 ISO-K	DN 100 ISO-K
Flange (in)	DN 25 ISO-KF	DN 40 ISO-KF	DN 63 ISO-K	DN 100 ISO-K
For pumping speed up to	30 m³/h	65 m³/h	120 m³/h	500 m³/h
Mounting orientation	vertical	vertical	vertical	vertical
Conductance	1·10 ⁻² mbar: 2 l/s 1 mbar: 10 l/s 100 mbar: 500 l/s	1·10 ⁻² mbar: 16 l/s 1 mbar: 150 l/s 100 mbar: 1000 l/s	1·10 ⁻² mbar: 5 l/s 1 mbar: 9 l/s 100 mbar: 400 l/s	1 E-2mbar: 5 l/s 1 mbar: 6 l/s 100 mbar: 100 l/s
Filling	1 l	2 l	7.5 l	20 l
Weight with contents	4 kg	5.5 kg	16 kg	40 kg

Ordering Number

Activated carbon filter	PK Z30 006	PK Z30 008	PK Z30 010	PK Z30 012
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Fuller's earth filter FBL

- Filter with Fuller's earth filling
- Adsorbs organic vapors
- For use in connection with peroxides, hydroperoxides and polycondensates

Technical data

	FBL 025	FBL 040	FBL 063
Flange (out)	DN 25 ISO-KF	DN 40 ISO-KF	DN 63 ISO-K
Flange (in)	DN 25 ISO-KF	DN 40 ISO-KF	DN 63 ISO-K
For pumping speed up to	30 m³/h	65 m³/h	120 m³/h
Mounting orientation	vertical	vertical	vertical
Conductance	1·10 ⁻² mbar: 2 l/s 1 mbar: 10 l/s 100 mbar: 500 l/s	1·10 ⁻² mbar: 5 l/s 1 mbar: 25 l/s 100 mbar: 700 l/s	1·10 ⁻² mbar: 5 l/s 1 mbar: 9 l/s 100 mbar: 400 l/s
Filling	1 l	2 l	7.5 l
Weight with contents	4.5 kg	6 kg	17 kg

Ordering Number

Fuller's earth filter	PK Z30 106	PK Z30 108	PK Z30 110
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Lubricants (operating fluids)

P3

Mineral oil for standard applications

- ▶ Attainable final pressure
 $< 1 \cdot 10^{-3}$ mbar
- ▶ Operating temperature 95 °C max.

For pumping of:

- ▶ Air, inert gases, noble gases



P3	Archivable ultimate pressure	Order.-No.
0.5 l Mineral oil P3	$< 1 \cdot 10^{-3}$ mbar	PK 001 136-T
1 l Mineral oil P3	$< 1 \cdot 10^{-3}$ mbar	PK 001 106-T
5 l Mineral oil P3	$< 1 \cdot 10^{-3}$ mbar	PK 001 107-T
20 l Mineral oil P3	$< 1 \cdot 10^{-3}$ mbar	PK 001 108-T
50 l Mineral oil P3	$< 1 \cdot 10^{-3}$ mbar	PK 001 109-T
200 l Mineral oil P3	$< 1 \cdot 10^{-3}$ mbar	PK 001 110-T

F4/F5

Perfluoropolyether for special applications:

- ▶ Attainable final pressure
 $< 1 \cdot 10^{-3}$ mbar
- ▶ Operating temperature 120 °C max.
- ▶ F4 for pumps
2.5 m³/h - 20 m³/h
- ▶ F5 for pumps > 20 m³/h

For pumping of:

- ▶ Oxygen, ozone, halogens
- ▶ Organic and inorganic solvents
- ▶ HCL, BF₃, HF, PO₃, fluorine

F4	Archivable ultimate pressure	Order.-No.
0,25 l Perfluoropolyether F4	$< 1 \cdot 10^{-3}$ mbar	PK 005 885-T
0,5 l Perfluoropolyether F4	$< 1 \cdot 10^{-3}$ mbar	PK 005 886-T
1 l Perfluoropolyether F4	$< 1 \cdot 10^{-3}$ mbar	PK 005 887-T
5 l Perfluoropolyether F4	$< 1 \cdot 10^{-3}$ mbar	PK 005 888-T
20 l Perfluoropolyether F4	$< 1 \cdot 10^{-3}$ mbar	PK 005 889-T
50 l Perfluoropolyether F4	$< 1 \cdot 10^{-3}$ mbar	PK 005 890-T

F5	Archivable ultimate pressure	Order.-No.
0.5 l Perfluoropolyether F5	$< 1 \cdot 10^{-3}$ mbar	PK 001 851-T
1 l Perfluoropolyether F5	$< 1 \cdot 10^{-3}$ mbar	PK 001 852-T
5 l Perfluoropolyether F5	$< 1 \cdot 10^{-3}$ mbar	PK 001 853-T
20 l Perfluoropolyether F5	$< 1 \cdot 10^{-3}$ mbar	PK 001 854-T
50 l Perfluoropolyether F5	$< 1 \cdot 10^{-3}$ mbar	PK 001 855-T

Lubricants (operating fluids)

D1

Oil for standard and custom applications

- ▶ Attainable final pressure $5 \cdot 10^{-2}$ mbar
- ▶ Operating temperature 120 °C max.

For pumping of:

- ▶ Air, inert gases, noble gases
- ▶ Oxygen, ozone
- ▶ Moderately corrosive and organic solvents

D1	Archivable ultimate pressure	Order.-No.
0.25 l oil D1	$< 5 \cdot 10^{-2}$ mbar	PK 005 870-T
0.5 l oil D1	$< 5 \cdot 10^{-2}$ mbar	PK 005 881-T
1 l oil D1	$< 5 \cdot 10^{-2}$ mbar	PK 005 875-T
5 l oil D1	$< 5 \cdot 10^{-2}$ mbar	PK 005 876-T
20 l oil D1	$< 5 \cdot 10^{-2}$ mbar	PK 005 877-T
50 l oil D1	$< 5 \cdot 10^{-2}$ mbar	PK 005 878-T
200 l oil D1	$< 5 \cdot 10^{-2}$ mbar	PK 005 879-T





The full line of Roots pumps for rough and medium vacuum applications

Contents

	Seite
Operating principle/Applications	90
Series	91
Selection aid	94
Scope of delivery/Accessories	95
Important information relating to the technical data	96
 Roots pumps	
WKP 250	98
WKP 500	100
WKP 1000	102
WKP 2000	104
WKP 4000	106
WKP 6000	108
WKP 8000	110
WKP 18000	112
Accessories for all Roots pumps	114
Miscellaneous available products	115
 Roots pumping stations	116
Selection chart WOD series	117
Selection chart WPC series	117
Customized pumping stations	118
Scope of delivery	119
Note on explosion-protection measures for vacuum pumps	119



Operating principle

Pfeiffer Vacuum Roots pumps are positive displacement pumps operating according to the Roots principle

whereby these pumps have been specifically designed for vacuum engineering applications. Pumping

occurs via two figure-eight shaped, synchronous rotors. The rotors counter rotate without making contact.

Applications

In the production of many everyday products, vacuum engineering plays a decisive role. The Roots vacuum pump excels by its optimum relationship between pumping speed and size. It is the ideal pump for implementing high pumping speeds in a cost-effective manner.

- Chemical and process engineering (drying, distillation, rectification)
- Thin-film technology (CVD, PECVD, plasma treatments)
- Semiconductor process engineering (epitaxy, CVD, etching, thermal processes)
- Research and development (simulation chambers, laboratory units)

- Mechanical engineering (electron beam welding)
- Vacuum metallurgy (soldering, sintering, degassing, nitriding, annealing)
- Packaging (central vacuum supply)
- Life Science (freeze-drying, biochemistry)



Roots pumping station for removing zinc from molten steel



Load lock pumping station



Roots pumping station

Series

Depending on the type of application, five series may be considered. For processes which are undemanding pumps in the **A and AD series** may be used. The variant AD is equipped with a DIN flange in connection with a tested pressure surge rating of 16 bar.

A series, 250 – 25000 m³/h
Roots pump, standard (1 bar)
► With shaft sealing ring
► Gray cast iron GG
► Flange in accordance with ISO-F

AD series, 500 – 6000 m³/h
Roots pump, pressure surge resistant (16 bar)
► With shaft sealing ring
► Spherulitic cast iron GGG 40.3
► Flange in accordance with DIN PN 16

For processes which are more demanding in regards to leak tightness and longer service intervals, the **AM and ADM series** are the best choice. These series offer a full static seal on the outside, therefore, no shaft feedthrough is implemented by way of a magnetic coupling. Therefore all IEC standard motors can be used.

AM series, 250 – 6000 m³/h
Roots pump, standard (1 bar)
► Hermetically sealed
► Gray cast iron GG
► Flange in accordance with ISO-F

ADM series, 500 – 6000 m³/h
Roots pump, pressure surge resistant (16 bar)
► Hermetically sealed
► Spherulitic cast iron GGG 40.3
► Flange in accordance with DIN PN 16

The directive 94/9 EC (Atex) requirements are fulfilled by the pumps in the **ADEx series**. This series is certified for applications of equipment class II, equipment group 2G for materials belonging to explosion group IIB in the temperature class T3.

ADEx series, 500 – 4000 m³/h
Roots pump without motor
► PTFE sealed
► Explosion hazard protected



Roots pump WKP 500 A



Roots pump WKP 1000 ADEx



Roots pump WKP 500 AM

Features of the A/AD series

Common to all series is the integrated bypass line, which permits switching on the pump beginning at atmospheric pressure (note the cut-in criteria for the ADEx variants). Thus, the pump is automatically protected against thermal overload. The additional gain in pumping speed allows for short cycle times in the case of load lock applications and time critical processes. Monitoring by means of failure prone pressure switches is a thing of the past.

The precision manufacturing technology allows for highest compression values allowing for a maximum pumping speed at lowest gas discharge temperatures. For service, pairing up of the rotors is not necessary.

Pfeiffer Vacuum Roots pumps offer the lowest cost of ownership since exclusively electrical energy and – providing the process requires this – a gaseous sealing medium (air, for example) is required. Therefore, costly water cooling arrangements are not required.

Vertical pumping action

Unaffected by dust and liquids

Measurement connections on the intake and delivery sides

The connection of pressure and temperature measuring instruments is possible

Helical gear

Quiet operation

Sealing gas bores at the bearing brackets

If required, simple retrofitting of sealing gas is possible

Material

High-quality cast iron materials, Viton® O-ring seal (chambered)

- Designed for 50 Hz and 60 Hz operation
(frequency converter operation for matching to the process is available on request)
- 100 % final testing with $K_{0 \max}$ value measurement (leak test, load test)

Additional features of the AM/ADM series

- No dynamic seal, only statically sealed against the atmosphere – no wear
- Integral leak rate of the pump $< 1 \cdot 10^{-5}$ mbar l/s
- Magnetic coupling protected against corrosion

Safe operation

- Environmentally friendly
- No oil leaks
- No exchange between process gas and the environment

Low operating costs

- Shaft seal maintenance not necessary

Increased uptime

- No unexpected interruptions to process due to oil leaks

Simple integration

- Full compatibility with the Pfeiffer Vacuum Roots pump line and accessories
- All IEC motors can be used

Additional features of the ADEx series

For safe operation of the pumps, compliance with additional components like starting up and shutting down regulations, backing pumps, flame arresters and pressure sensors is mandatory. This list, by no means, claims to be complete.

The prementioned components and additional equipment will depend on the specific vacuum design, the way in which the process is run as well as the pressure resistance of the vacuum and exhaust air system.

Before ordering please discuss your particular application with Pfeiffer Vacuum.

External area:

The pumps are suited for applications within equipment class II, equipment category 2G for gases and vapors of explosion group IIB in the temperature classes T1 to T3 corresponding to the stipulations of the directive 94/9/EC.

Internal area:

I) Application within equipment class II, equipment category 2G application (Zone 1).

The pumps are suited for pumping of explosive mixtures belonging to explosion group IIB from Zone 1 (equipment category 2G) in the temperature classes from T1 to T3 corresponding to the directive 94/9/EC.

For such application, a backing pump is required which basically needs to provide at least 10 % of the pumping speed of the Roots pump. The selected backing pump must, for pumping of explosive atmospheres of Zone 1, have a Declaration of Conformity for group II, category 2 in accordance with directive 94/9/EC for the intended utilization (explosion group, temperature class).

The start-up pressure of the Roots pump depends on the pressure rating of the entire vacuum system and additional equipment with flame arresters.

II) Application within equipment class II, equipment category 1G application (Zone 0)

The Roots pump must only be started up at an absolute pressure below 800 mbar. Therefore, the interior of the pump does not fall under the directive 94/9/EC.

For such application, a backing pump is required which basically needs to provide at least 10 % of the pumping speed of the Roots pump. The selected backing pump must, for pumping of explosive atmospheres of Zone 0, have an EC type approval certificate for the equipment group II, equipment category 1G in accordance with directive 94/9/EC for the intended utilization (explosion group, temperature class).

The switch-on pressure for the Roots pump must be < 800 mbar absolute. However, this is dependent on the pressure rating of the entire vacuum system and the additional equipment with flame arresters.

General information:

Before defining the suitable start-up pressures for the Roots pumps, it is urgently recommended to discuss the application with Pfeiffer Vacuum.



Selection aid

	Roots pumps sealed with a shaft sealing ring		Roots pumps, hermetically sealed		Roots pumps, Atex series
	WKP standard (1 bar), gray cast iron GG, flange according to ISO-F; A series	WKP pressure surge resistant (16 bar), spherulitic cast iron GGG 40.3, flange according to DIN PN 16; AD series	WKP standard (1 bar), gray cast iron GG, flange according to ISO-F; AM series	WKP pressure surge resistant (16 bar), spherulitic cast iron GGG 40.3, flange according to DIN PN 16; ADM series	WKP without motor, PTFE sealed, explosion hazard protected, ADEx series
Semiconductor industry					
EUV lithography			●	●	
CVD			●	●	
PVD			●	●	
Ion implantation			●	●	
Load lock/transfer chambers			●	●	
Flat screens			●	●	
Research and development					
Fusion reactors	▲	●	▲	●	
Space simulation chambers	●	▲	▲	▲	
Accelerators	●	▲	▲	▲	
High purity gas applications			●	▲	
Coating industry					
Ophtalmic	●	▲	▲	▲	▲
Wear protection	●	▲	▲	▲	▲
Coating of large surfaces	●	▲	▲	▲	▲
Decorative coatings	●	▲	▲	▲	▲
Photovoltaic	●	▲	▲	▲	
Industry/chemistry					
Processes with toxic gases			●	●	*
Processes with aggressive gases		●		●	*
Processes in explosion hazard environments/with explosive gases					●
Electron beam welding	●	▲	▲	▲	
Packaging industry	●	▲	▲	▲	
Central vacuum supply systems	●	▲	▲	▲	
Drinks industry, filling systems	●	▲	▲	▲	
Metallurgy	●	▲	●	▲	▲
Leak detection systems	●	▲	●	▲	
Lamps/tubes manufacture	●	▲	▲	▲	
Freeze drying systems	●	▲	▲	▲	
Metal melt degassing	●	▲	▲	▲	
Transformer drying	●	▲	▲	▲	
Oil regeneration	●	▲	▲	▲	▲

● Recommended ▲ Possible * Upon request

Scope of delivery

Delivery includes the connection kits and seals for the connection flanges.

If the pumps are delivered without a motor, the motor lantern and the coupling as well as the connection

kit for mounting the motor are included. For pumps which are operated with P3 pump fluid, the initial filling is included with delivery. For shipping reasons, the pump fluid is shipped separately. For pumps in which a

special pump fluid is required (F5, D1), the pump fluid must be ordered separately. If necessary, the pumps are assembled and tested using the special pump fluid.

Accessories

Pump fluid/lubricant for Roots pumps

The pump fluid for the Roots pumps with a dry suction chamber serves only to lubricate the gears and bearings. Through the labyrinth seal between the suction chamber and oil chambers, it may, come into direct contact with pumped gases and vapors. This means that the oil requirements are similar to those of the rotary vane pump and therefore the same oil can be used in both pumps.

Sealing gas supply kit

For protecting the pump fluid and the components in the oil chambers. This kit consists of:

- ▶ Connection components
- ▶ Seals
- ▶ 4 orifices at the inlet openings of the bearing plates

In addition the following is required:

- ▶ One flow meter with needle valve for adjusting the flowing volume
- ▶ Shutoff valve (ball valve)
- ▶ Pressure reducer (reduction to max. 1.5 bar absolute)

Gear chamber suction kit

For shorter evacuating time less than one minute

This kit consists of:

- ▶ Connection material made of PVC hose DN 15/small flange components
- ▶ Oil mist separator DN 10 KF

Flushing kit

Used where deposits tend to form in the suction chambers. The implementation of this kit should be determined based on the specific application. Flushing quantities are defined in the respective pump manuals.

With standard pumps, flushing always requires the use of a sealing gas in order to prevent transfer of liquid into the oil chambers.

Sealing material PTFE

Resistant against aggressive media. PTFE coated Viton® O-rings are used as static seals. The radial shaft sealing ring at the motor is made of PTFE.

Coating of the suction chamber of the pump (suction chamber/corrosion protection)

The inside of standard pumps are wetted with the vacuum oil (P3 or the special pump fluid), providing a suitable surface protection can be attained. Pumps where the suction chamber must not be wetted with the pump fluid may, upon request, be phosphated, sealed off with flanges and vented with nitrogen.



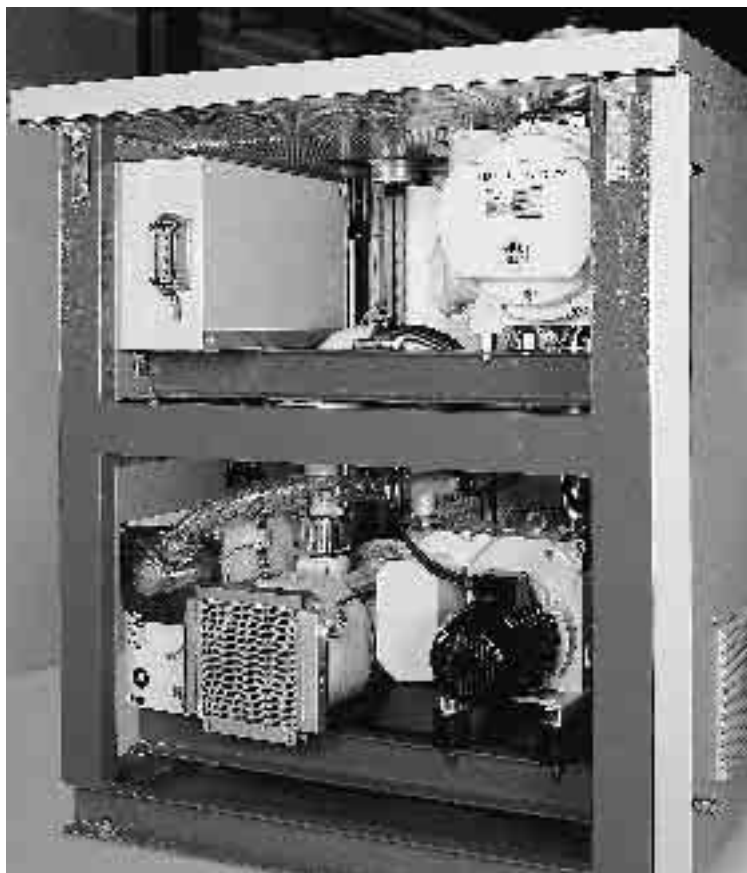
Important information relating to the technical data

The effective pumping speed of the Roots pump depends directly on the characteristics of the backing pump used. The values of the effective pumping speed and final pressure provide useful information only when stating the type of backing pump used in this case.

The effective pumping speed of a Roots pump with backing pump usually calculates, within the operating pressure range, to a multiple of the backing pump's pumping speed.

The final pressure attained with a Roots pump is lower than the final pressure of the backing pump by a factor of the compression ratio.

Depending on the manufacturer of the motor, the overall length of the pump may deviate by up to 50 mm.



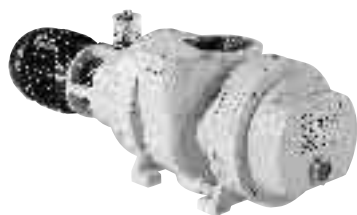
Roots pump in a helium leak detection system



Roots pumps

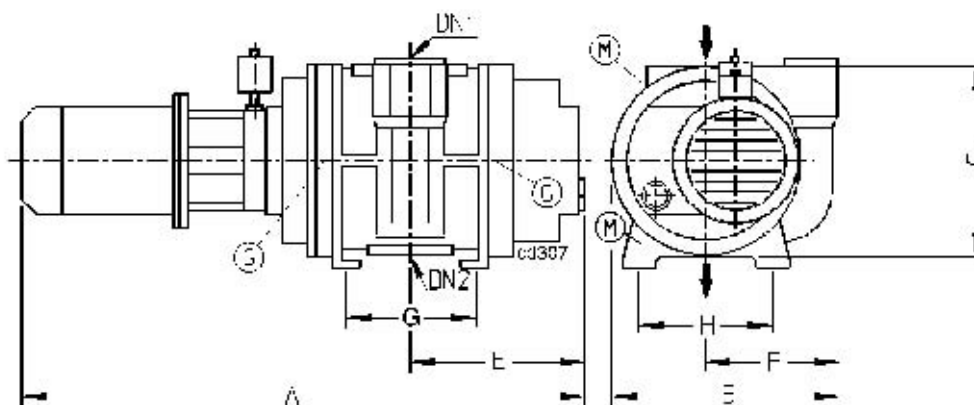
Roots pumps with pumping speed up to 330 m³/h

WKP 250



- ▶ Highest compression levels of all vendors
- ▶ Integrated bypass valve
- ▶ No cooling water consumption
- ▶ Only vendor of Roots pumps with magnetic coupling (AM types)

Dimensions



	WKP 250 A	WKP 250 AM
A	770 mm	800 mm
B	324 mm	324 mm
C	280 mm	280 mm
E	220 mm	220 mm
F	184 mm	184 mm
G	170 mm	170 mm
H	220 mm	220 mm
Connection		
DN1	DN 63 ISO-F	DN 63 ISO-F
DN2	DN 63 ISO-F	DN 63 ISO-F

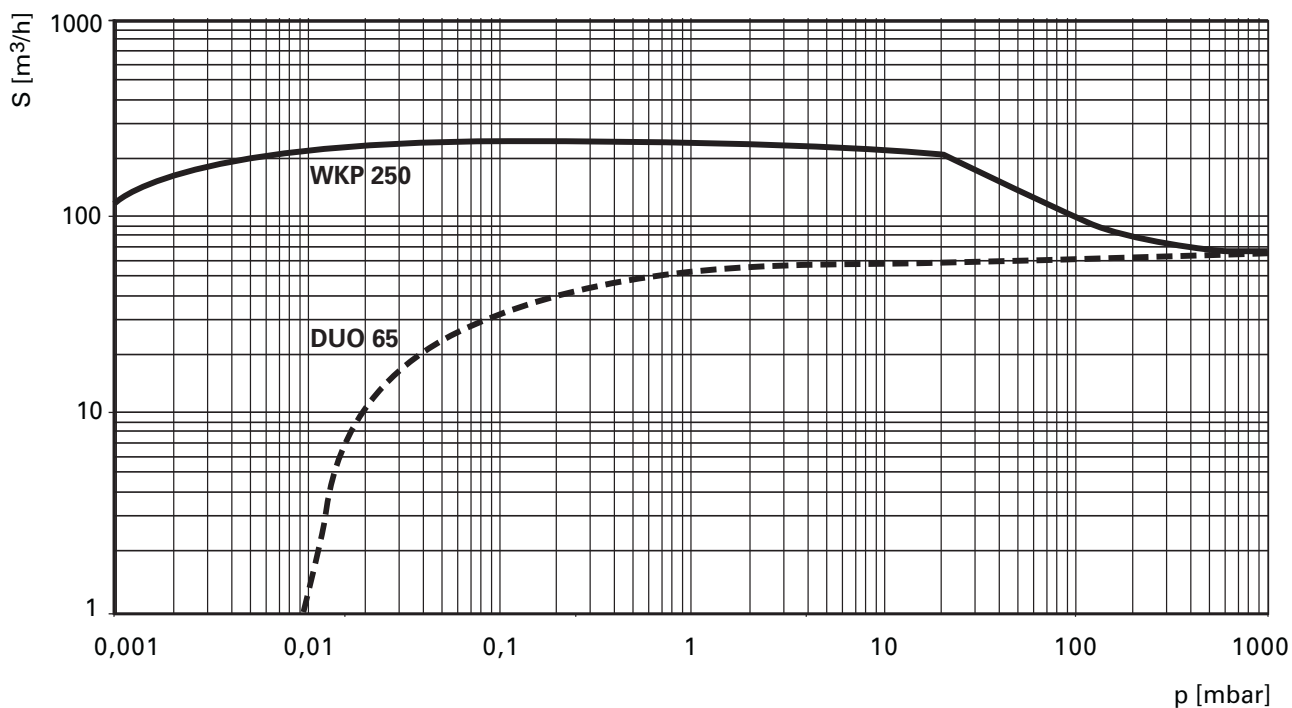
Technical data

	Motor with 50 Hz	Motor with 60 Hz	without motor
Nominal pumping speed	270 m ³ /h	324 m ³ /h	-
Differential pressure at the overflow valve	75 mbar	75 mbar	75 mbar
Emission sound pressure level (EN ISO 2151) at intake pressure 1 mbar	70 dB(A)	70 dB(A)	70 dB(A)
Emission sound pressure level (EN ISO 2151) at intake pressure 10 mbar	75 dB(A)	75 dB(A)	75 dB(A)
Leak rate: Pumps with shaft sealings	1·10 ⁻² mbar l/s	1·10 ⁻² mbar l/s	1·10 ⁻² mbar l/s
Leak rate: Magnetic coupled pumps	1·10 ⁻⁵ mbar l/s	1·10 ⁻⁵ mbar l/s	1·10 ⁻⁵ mbar l/s
Pump fluid filling	1.5 l	1.5 l	1.5 l
Motor rating	0.75 kW	1.1 kW	-
Rotational speed	3000 rpm	3600 rpm	-
Mains requirement: voltage (selectable)	230/400 V, 50 Hz	230/400 V, 60 Hz	-
Weight	95 kg	95 kg	85 kg

Ordering Number

WKP 250 A	PP W21 000	PP W21 002	PP W21 001
WKP 250 AM	PP W22 000	PP W22 002	-

Pumping speed

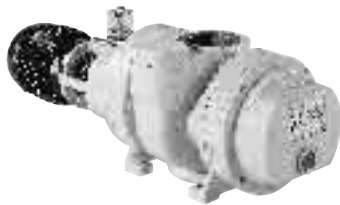


Pumping speed of WKP 250 A with dual stage backing pump DUO 65 at 50 Hz.

Roots pumps

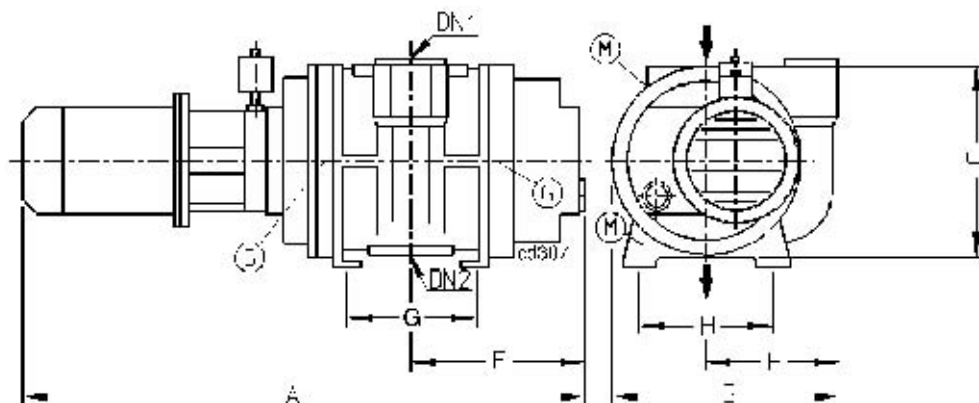
Roots pumps with pumping speed up to 590 m³/h

WKP 500



- ▶ Highest compression levels of all vendors
 - ▶ Integrated bypass valve
 - ▶ No cooling water consumption
 - ▶ Pressure surge resistant version available (AD types)
 - ▶ Only vendor of Roots pumps with magnetic coupling (AM types)
- ▶ Pumps in accordance with directive 94/9/EC (ATEX) are available (ADEx types)

Dimensions



	WKP 500 A	WKP 500 AD	WKP 500 AM	WKP 500 ADM	WKP 500 ADEx
A	920 mm	920 mm	950 mm	950 mm	920 mm
B	324 mm	346 mm	324 mm	346 mm	346 mm
C	280 mm	280 mm	280 mm	280 mm	280 mm
E	275 mm	275 mm	275 mm	275 mm	275 mm
F	184 mm	206 mm	184 mm	206 mm	206 mm
G	170 mm	170 mm	170 mm	170 mm	170 mm
H	220 mm	220 mm	220 mm	220 mm	220 mm
Connection					
DN1	DN 100 ISO-F	DN 100 PN 16	DN 100 ISO-F	DN 100 PN 16	DN 100 PN 16
DN2	DN 100 ISO-F	DN 100 PN 16	DN 100 ISO-F	DN 100 PN 16	DN 100 PN 16

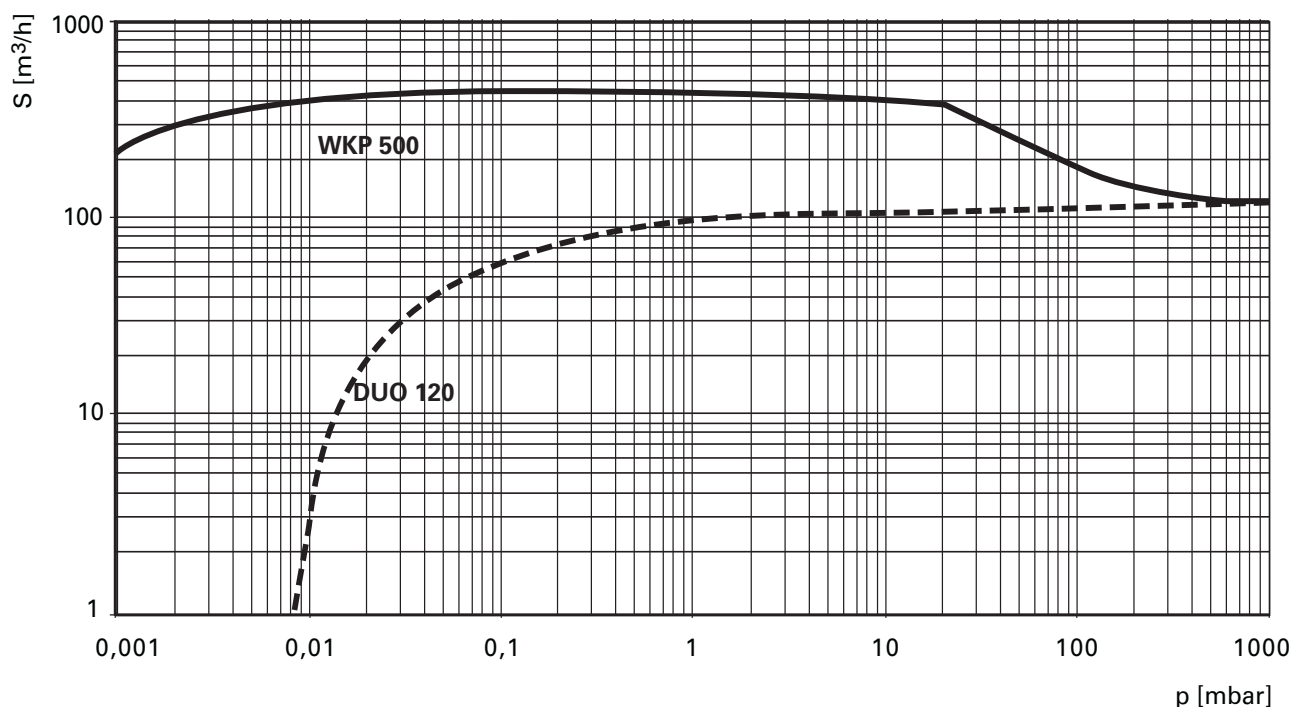
Technical data

	Motor with 50 Hz	Motor with 60 Hz	without motor
Nominal pumping speed	490 m ³ /h	588 m ³ /h	-
Differential pressure at the overflow valve	75 mbar	75 mbar	75 mbar
Differential pressure at the overflow valve ADEx	-	-	53 mbar
Emission sound pressure level (EN ISO 2151) at intake pressure 1 mbar	70 dB(A)	70 dB(A)	70 dB(A)
Emission sound pressure level (EN ISO 2151) at intake pressure 10 mbar	75 dB(A)	75 dB(A)	75 dB(A)
Leak rate: Pumps with shaft sealings	1·10 ⁻² mbar l/s	1·10 ⁻² mbar l/s	1·10 ⁻² mbar l/s
Leak rate: Magnetic coupled pumps	1·10 ⁻⁵ mbar l/s	1·10 ⁻⁵ mbar l/s	1·10 ⁻⁵ mbar l/s
Pump fluid filling	1.5 l	1.5 l	1.5 l
Motor rating	1.5 kW	2.2 kW	-
Rotational speed	3000 rpm	3600 rpm	-
Mains requirement: voltage (selectable)	230/400 V, 50 Hz	230/400 V, 60 Hz	-
Weight	125 kg	125 kg	100 kg

Ordering Number

WKP 500 A	PP W31 000	PP W31 002	PP W31 001
WKP 500 AD	PP W31 700	PP W31 702	PP W31 701
WKP 500 AM	PP W32 000	PP W32 002	-
WKP 500 ADM	PP W32 700	PP W32 702	-
WKP 500 ADEx	-	-	PP W31 840

Pumping speed



Pumping speed of WKP 500 A with dual stage backing pump DUO 120 at 50 Hz.

Roots pumps

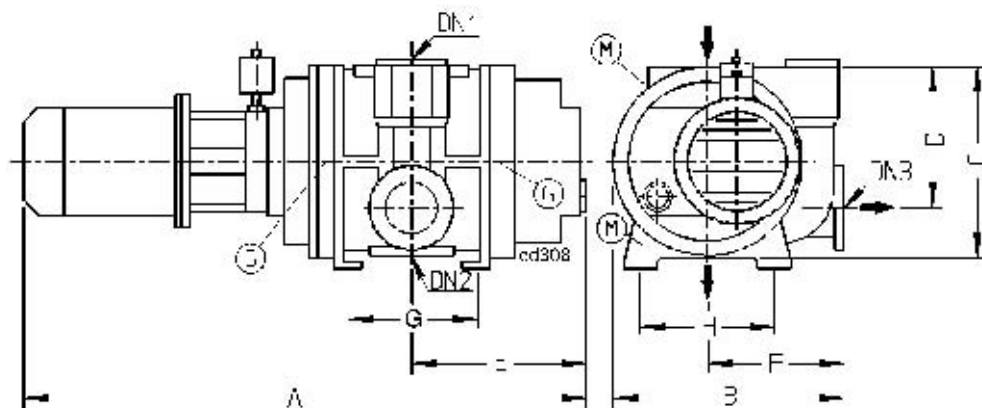
Roots pumps with pumping speed up to 1,300 m³/h

WKP 1000



- ▶ Highest compression levels of all vendors
 - ▶ Integrated bypass valve
 - ▶ No cooling water consumption
 - ▶ Pressure surge resistant version available (AD types)
 - ▶ Only vendor of Roots pumps with magnetic coupling (AM types)
- ▶ Pumps in accordance with directive 94/9/EC (ATEX) are available (ADEx types)

Dimensions



	WKP 1000 A	WKP 1000 AD	WKP 1000 AM	WKP 1000 ADM	WKP 1000 ADEx
A	1125 mm	1125 mm	1140 mm	1140 mm	1125 mm
B	446 mm	446 mm	446 mm	446 mm	446 mm
C	360 mm	360 mm	360 mm	360 mm	360 mm
D	270 mm	270 mm	270 mm	270 mm	270 mm
E	337 mm	337 mm	337 mm	337 mm	337 mm
F	266 mm	266 mm	266 mm	266 mm	266 mm
G	230 mm	230 mm	230 mm	230 mm	230 mm
H	280 mm	280 mm	280 mm	280 mm	280 mm
Connection					
DN1	DN 160 ISO-F	DN 150 PN 16	DN 160 ISO-F	DN 150 PN 16	DN 150 PN 16
DN2	DN 100 ISO-F	DN 100 PN 16	DN 100 ISO-F	DN 100 PN 16	DN 100 PN 16
DN3	DN 100 ISO-F	DN 100 PN 16	DN 100 ISO-F	DN 100 PN 16	DN 100 PN 16

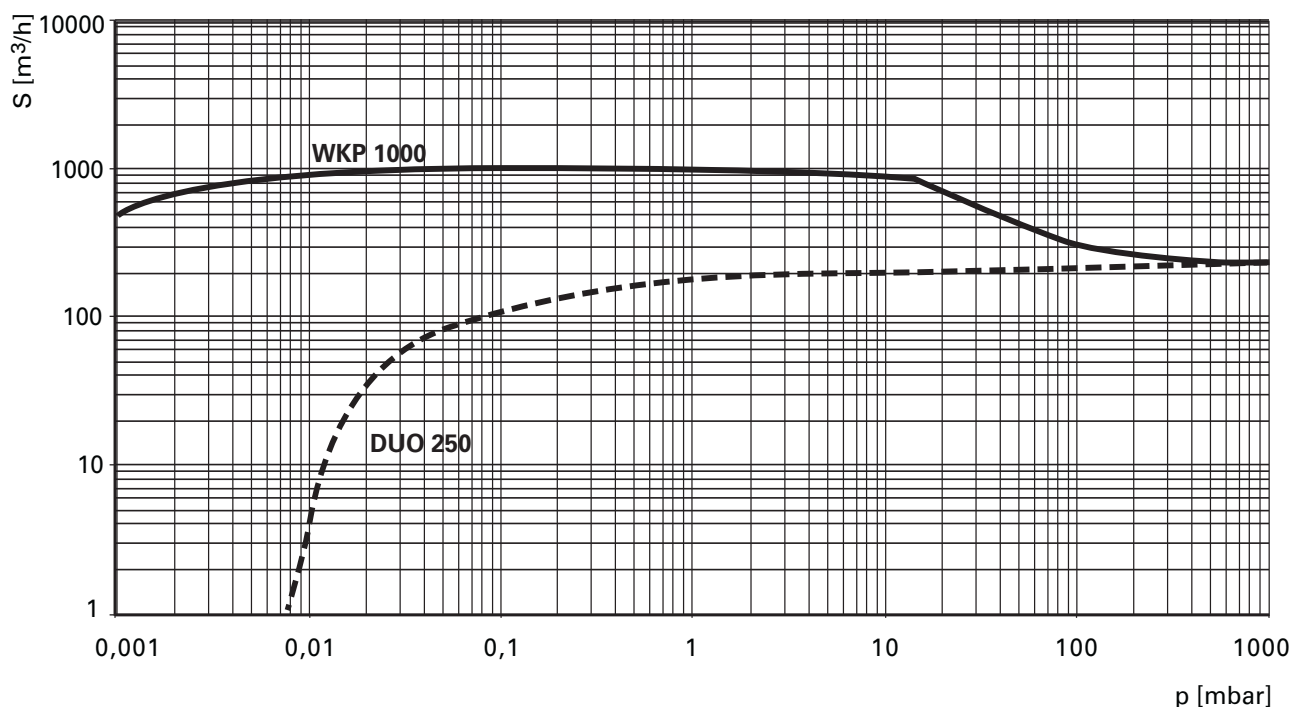
Technical data

	Motor with 50 Hz	Motor with 60 Hz	without motor
Nominal pumping speed	1070 m ³ /h	1284 m ³ /h	-
Differential pressure at the overflow valve	45 mbar	45 mbar	45 mbar
Differential pressure at the overflow valve ADEx	-	-	30 mbar
Emission sound pressure level (EN ISO 2151) at intake pressure 1 mbar	72 dB(A)	72 dB(A)	72 dB(A)
Emission sound pressure level (EN ISO 2151) at intake pressure 10 mbar	75 dB(A)	75 dB(A)	75 dB(A)
Leak rate: Pumps with shaft sealings	1·10 ⁻² mbar l/s	1·10 ⁻² mbar l/s	1·10 ⁻² mbar l/s
Leak rate: Magnetic coupled pumps	1·10 ⁻⁵ mbar l/s	1·10 ⁻⁵ mbar l/s	1·10 ⁻⁵ mbar l/s
Pump fluid filling	2.9 l	2.9 l	2.9 l
Motor rating	3 kW	4 kW	-
Rotational speed	3000 rpm	3600 rpm	-
Mains requirement: voltage (selectable)	230/400 V, 50 Hz	230/400 V, 60 Hz	-
Weight	250 kg	250 kg	220 kg

Ordering Number

WKP 1000 A	PP W41 000	PP W41 002	PP W41 001
WKP 1000 AD	PP W41 700	PP W41 702	PP W41 701
WKP 1000 AM	PP W42 000	PP W42 002	-
WKP 1000 ADM	PP W42 700	PP W42 702	-
WKP 1000 ADEx	-	-	PP W41 950

Pumping speed



Pumping speed of WKP 1000 A with dual stage backing pump DUO 250 at 50 Hz.

Roots pumps

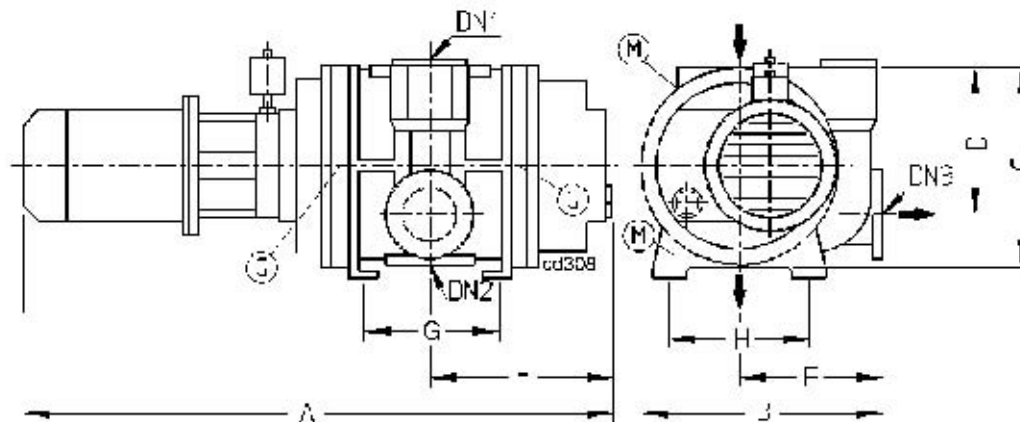
Roots pumps with pumping speed up to 2,500 m³/h

WKP 2000



- ▶ Highest compression levels of all vendors
 - ▶ Integrated bypass valve
 - ▶ No cooling water consumption
 - ▶ Pressure surge resistant version available (AD types)
 - ▶ Only vendor of Roots pumps with magnetic coupling (AM types)
- ▶ Pumps in accordance with directive 94/9/EC (ATEX) are available (ADEx types)

Dimensions



	WKP 2000 A	WKP 2000 AD	WKP 2000 AM	WKP 2000 ADM	WKP 2000 ADEx
A	1310 mm	1310 mm	1330 mm	1330 mm	1310 mm
B	502 mm	502 mm	502 mm	502 mm	502 mm
C	420 mm	420 mm	420 mm	420 mm	420 mm
D	325 mm	325 mm	325 mm	325 mm	325 mm
E	373 mm	373 mm	373 mm	373 mm	373 mm
F	292 mm	292 mm	292 mm	292 mm	292 mm
G	250 mm	250 mm	250 mm	250 mm	250 mm
H	360 mm	360 mm	360 mm	360 mm	360 mm
Connection					
DN1	DN 160 ISO-F	DN 150 PN 16	DN 160 ISO-F	DN 150 PN 16	DN 150 PN 16
DN2	DN 100 ISO-F	DN 100 PN 16	DN 100 ISO-F	DN 100 PN 16	DN 100 PN 16
DN3	DN 100 ISO-F	DN 100 PN 16	DN 100 ISO-F	DN 100 PN 16	DN 100 PN 16

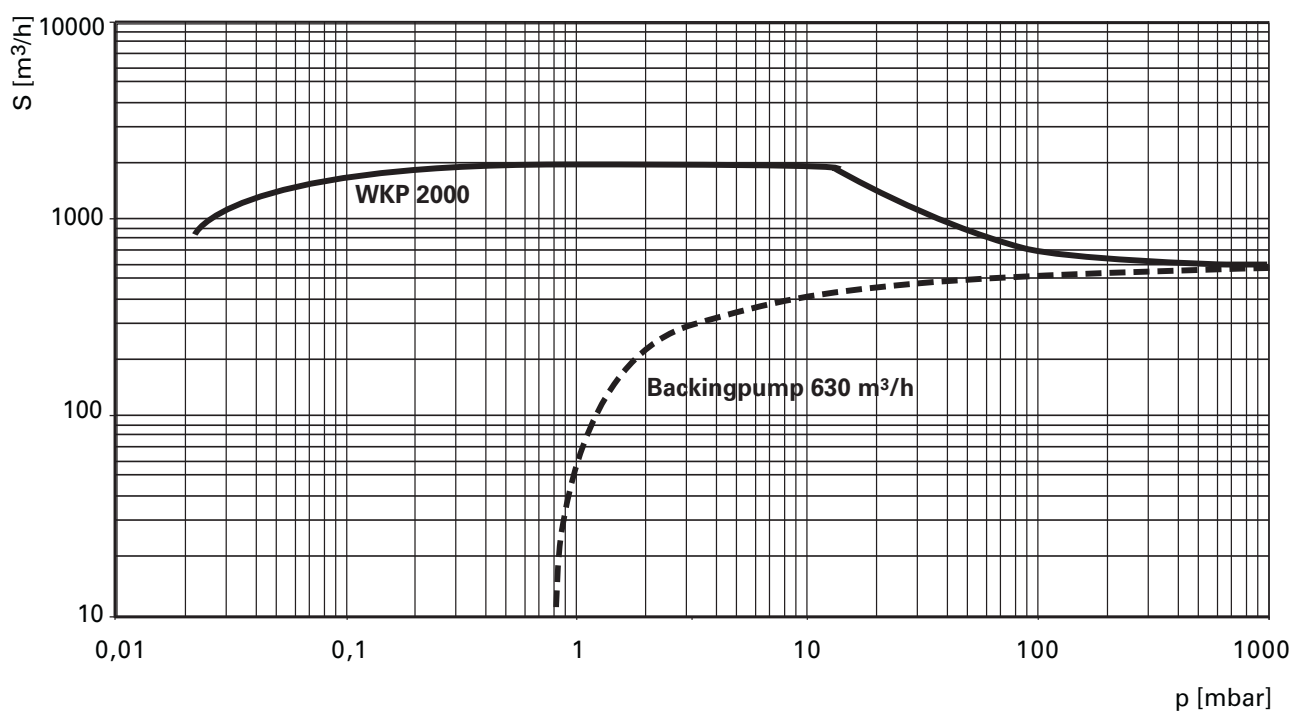
Technical data

	Motor with 50 Hz	Motor with 60 Hz	without motor
Nominal pumping speed	2065 m ³ /h	2478 m ³ /h	-
Differential pressure at the overflow valve	35 mbar	35 mbar	35 mbar
Differential pressure at the overflow valve ADEx	-	-	20 mbar
Emission sound pressure level (EN ISO 2151) at intake pressure 1 mbar	72 dB(A)	72 dB(A)	72 dB(A)
Emission sound pressure level (EN ISO 2151) at intake pressure 10 mbar	75 dB(A)	75 dB(A)	75 dB(A)
Leak rate: Pumps with shaft sealings	1·10 ⁻² mbar l/s	1·10 ⁻² mbar l/s	1·10 ⁻² mbar l/s
Leak rate: Magnetic coupled pumps	1·10 ⁻⁵ mbar l/s	1·10 ⁻⁵ mbar l/s	1·10 ⁻⁵ mbar l/s
Pump fluid filling	5 l	5 l	5 l
Motor rating	5.5 kW	7.5 kW	-
Rotational speed	3000 rpm	3600 rpm	-
Mains requirement: voltage (selectable)	230/400 V, 50 Hz	230/400 V, 60 Hz	-
Weight	370 kg	370 kg	310 kg

Ordering Number

WKP 2000 A	PP W61 000	PP W61 002	PP W61 001
WKP 2000 AD	PP W61 700	PP W61 702	PP W61 701
WKP 2000 AM	PP W62 000	PP W62 002	-
WKP 2000 ADM	PP W62 700	PP W62 702	-
WKP 2000 ADEx	-	-	PP W61 800

Pumping speed



Pumping speed of WKP 2000 A with backing pump (single stage) of 630 m³/h at 50 Hz.

Roots pumps

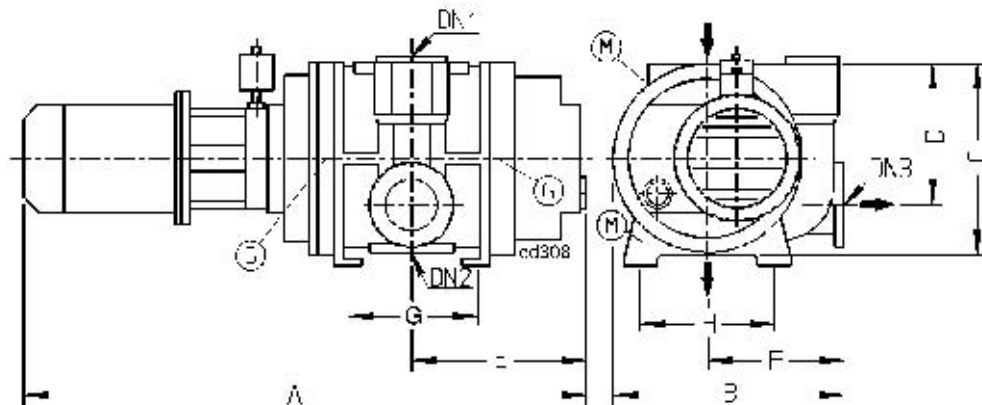
Roots pumps with pumping speed up to 4,900 m³/h

WKP 4000



- ▶ Highest compression levels of all vendors
- ▶ Integrated bypass valve
- ▶ No cooling water consumption
- ▶ Pressure surge resistant version available (AD types)
- ▶ Only vendor of Roots pumps with magnetic coupling (AM types)
- ▶ Pumps in accordance with directive 94/9/EC (ATEX) are available (ADEx types)

Dimensions



	WKP 4000 A	WKP 4000 AD	WKP 4000 AM	WKP 4000 ADM	WKP 4000 ADEx
A	1570 mm	1570 mm	1630 mm	1630 mm	1570 mm
B	655 mm	655 mm	655 mm	655 mm	655 mm
C	510 mm	510 mm	510 mm	510 mm	510 mm
D	390 mm	390 mm	390 mm	390 mm	390 mm
E	453 mm	453 mm	453 mm	453 mm	453 mm
F	400 mm	400 mm	400 mm	400 mm	400 mm
G	400 mm	400 mm	400 mm	400 mm	400 mm
H	450 mm	450 mm	450 mm	450 mm	450 mm
Connection					
DN1	DN 250 ISO-F	DN 250 PN 16	DN 250 ISO-F	DN 250 PN 16	DN 250 PN 16
DN2	DN 160 ISO-F	DN 150 PN 16	DN 160 ISO-F	DN 150 PN 16	DN 150 PN 16
DN3	DN 160 ISO-F	DN 150 PN 16	DN 160 ISO-F	DN 150 PN 16	DN 150 PN 16

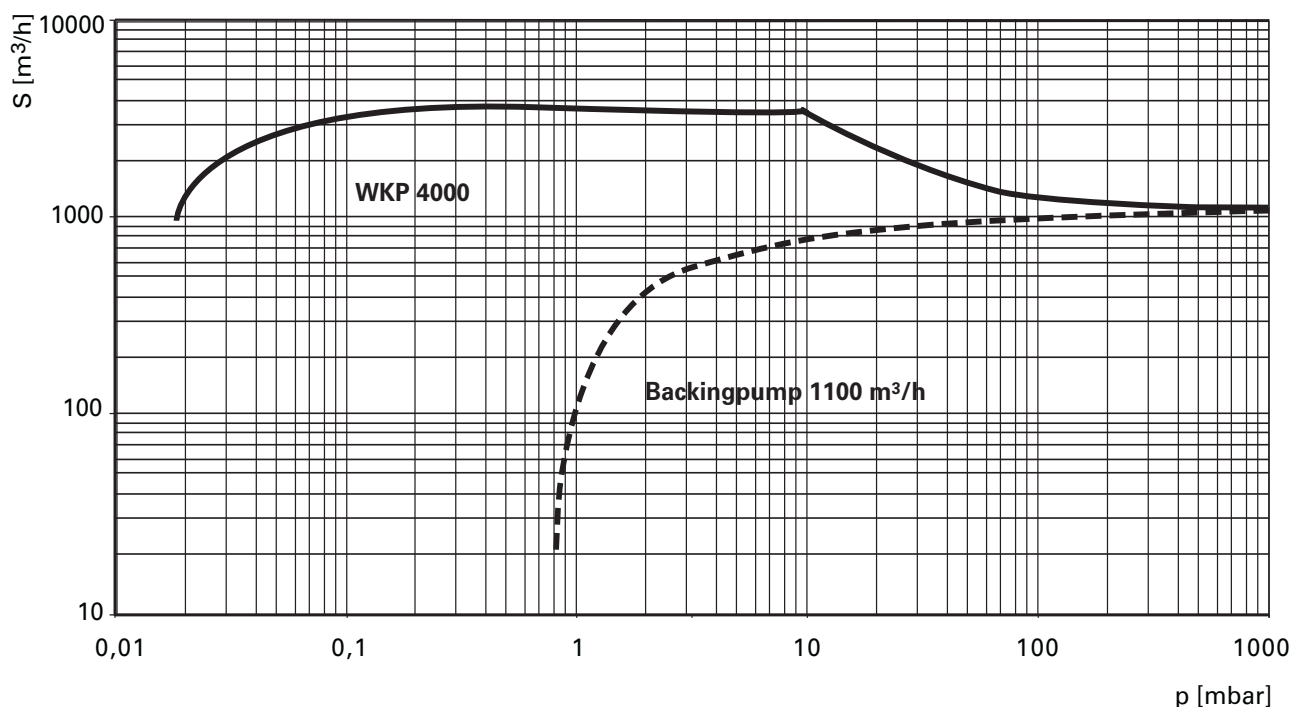
Technical data

	Motor with 50 Hz	Motor with 60 Hz	without motor
Nominal pumping speed	4050 m ³ /h	4860 m ³ /h	-
Differential pressure at the overflow valve	25 mbar	25 mbar	25 mbar
Differential pressure at the overflow valve ADEx	-	-	20 mbar
Emission sound pressure level (EN ISO 2151) at intake pressure 1 mbar	74 dB(A)	74 dB(A)	74 dB(A)
Emission sound pressure level (EN ISO 2151) at intake pressure 10 mbar	79 dB(A)	79 dB(A)	79 dB(A)
Leak rate: Pumps with shaft sealings	1·10 ⁻² mbar l/s	1·10 ⁻² mbar l/s	1·10 ⁻² mbar l/s
Leak rate: Magnetic coupled pumps	1·10 ⁻⁵ mbar l/s	1·10 ⁻⁵ mbar l/s	1·10 ⁻⁵ mbar l/s
Pump fluid filling	6.8 l	6.8 l	6.8 l
Motor rating	11 kW	15 kW	-
Rotational speed	3000 rpm	3600 rpm	-
Mains requirement: voltage	400 V, 50 Hz	400 V, 60 Hz	-
Weight	600 kg	600 kg	520 kg

Ordering Number

WKP 4000 A	PP W71 000	PP W71 004	PP W71 001
WKP 4000 AD	PP W71 700	PP W71 704	PP W71 701
WKP 4000 AM	PP W72 000	PP W72 002	-
WKP 4000 ADM	PP W72 700	PP W72 702	-
WKP 4000 ADEx	-	-	PP W71 990

Pumping speed



Pumping speed of WKP 4000 A with backing pump (single stage) of 1100 m³/h at 50 Hz.

Roots pumps

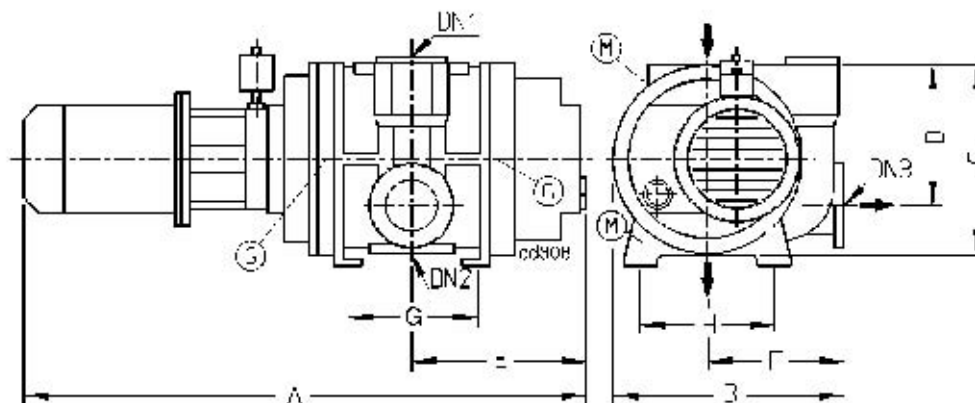
Roots pumps with pumping speed up to 7,300 m³/h

WKP 6000



- ▶ Highest compression levels of all vendors
- ▶ Integrated bypass valve
- ▶ No cooling water consumption
- ▶ Pressure surge resistant version available (AD types)
- ▶ Only vendor of Roots pumps with magnetic coupling (AM types)

Dimensions



	WKP 6000 A	WKP 6000 AD	WKP 6000 AM	WKP 6000 ADM
A	1860 mm	1860 mm	1920 mm	1920 mm
B	655 mm	655 mm	655 mm	655 mm
C	510 mm	510 mm	510 mm	510 mm
D	390 mm	390 mm	390 mm	390 mm
E	578 mm	578 mm	578 mm	578 mm
F	400 mm	400 mm	400 mm	400 mm
G	400 mm	400 mm	400 mm	400 mm
H	450 mm	450 mm	450 mm	450 mm
Connection				
DN1	DN 250 ISO-F	DN 250 PN 16	DN 250 ISO-F	DN 250 PN 16
DN2	DN 160 ISO-F	DN 150 PN 16	DN 160 ISO-F	DN 150 PN 16
DN3	DN 160 ISO-F	DN 150 PN 16	DN 160 ISO-F	DN 150 PN 16

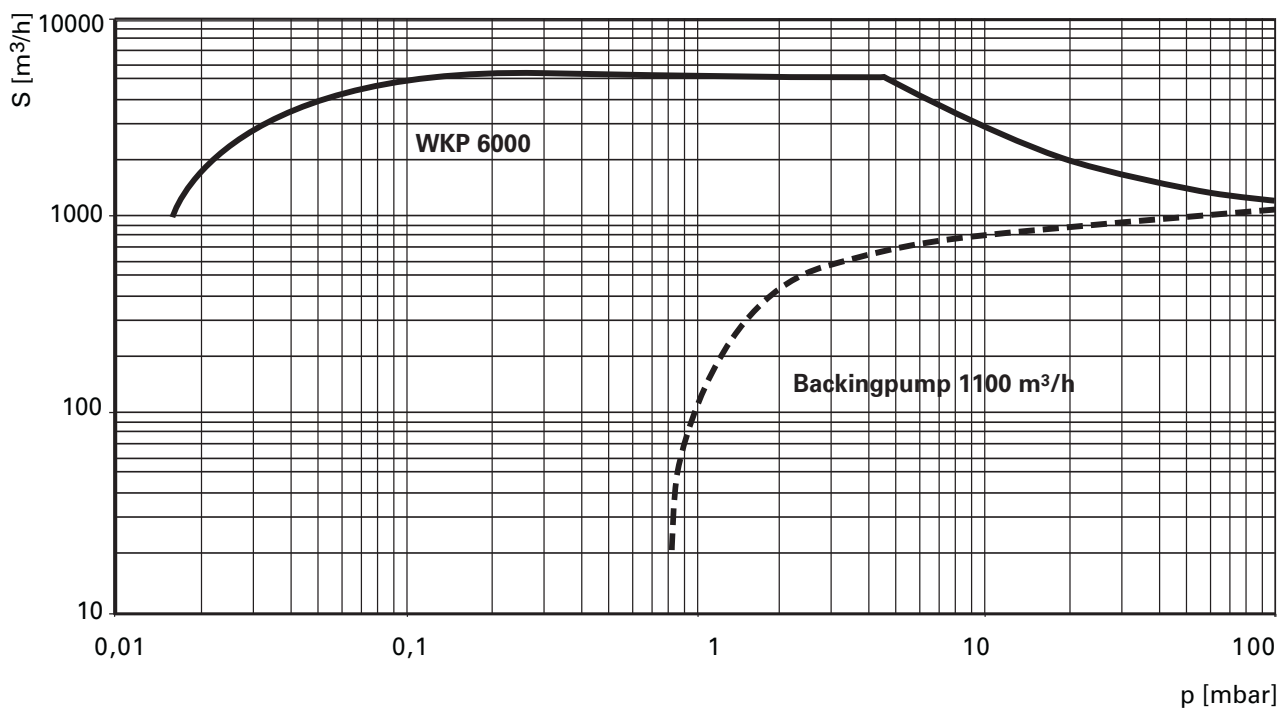
Technical data

	Motor with 50 Hz	Motor with 60 Hz	without motor
Nominal pumping speed	6075 m ³ /h	7290 m ³ /h	-
Differential pressure at the overflow valve	20 mbar	20 mbar	20 mbar
Emission sound pressure level (EN ISO 2151) at intake pressure 1 mbar	74 dB(A)	74 dB(A)	74 dB(A)
Emission sound pressure level (EN ISO 2151) at intake pressure 10 mbar	79 dB(A)	79 dB(A)	79 dB(A)
Leak rate: Pumps with shaft sealings	1·10 ⁻² mbar l/s	1·10 ⁻² mbar l/s	1·10 ⁻² mbar l/s
Leak rate: Magnetic coupled pumps	1·10 ⁻⁵ mbar l/s	1·10 ⁻⁵ mbar l/s	1·10 ⁻⁵ mbar l/s
Pump fluid filling	6.8 l	6.8 l	6.8 l
Motor rating	15 kW	18.5 kW	-
Rotational speed	3000 rpm	3600 rpm	-
Mains requirement: voltage	400 V, 50 Hz	400 V, 60 Hz	-
Weight	850 kg	850 kg	750 kg

Ordering Number

WKP 6000 A	PP W76 000	PP W76 004	PP W76 001
WKP 6000 AD	PP W76 700	PP W76 704	PP W76 701
WKP 6000 AM	PP W77 000	PP W77 002	-
WKP 6000 ADM	PP W77 700	PP W77 702	-

Pumping speed

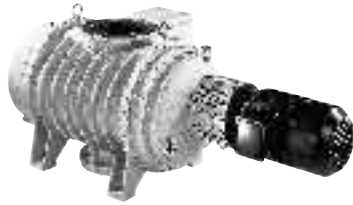


Pumping speed of WKP 6000 A with backing pump (single stage) of 1100 m³/h at 50 Hz.

Roots pumps

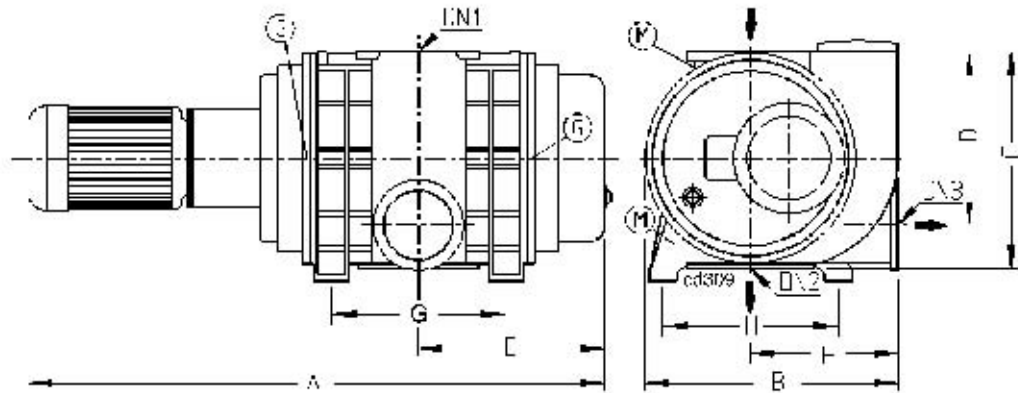
Roots pumps with pumping speed up to 12,000 m³/h

WKP 8000



- ▶ Highest compression levels of all vendors
- ▶ Integrated bypass valve
- ▶ No cooling water consumption
- ▶ Operation with frequency converter up to 12,000 m³/h

Dimensions



WKP 8000

A	2160 mm
B	895 mm
C	765 mm
D	610 mm
E	665 mm
F	510 mm
G	600 mm
H	600 mm

Connection

DN1	DN 320 ISO-F
DN2	DN 320 ISO-F
DN3	DN 250 ISO-F

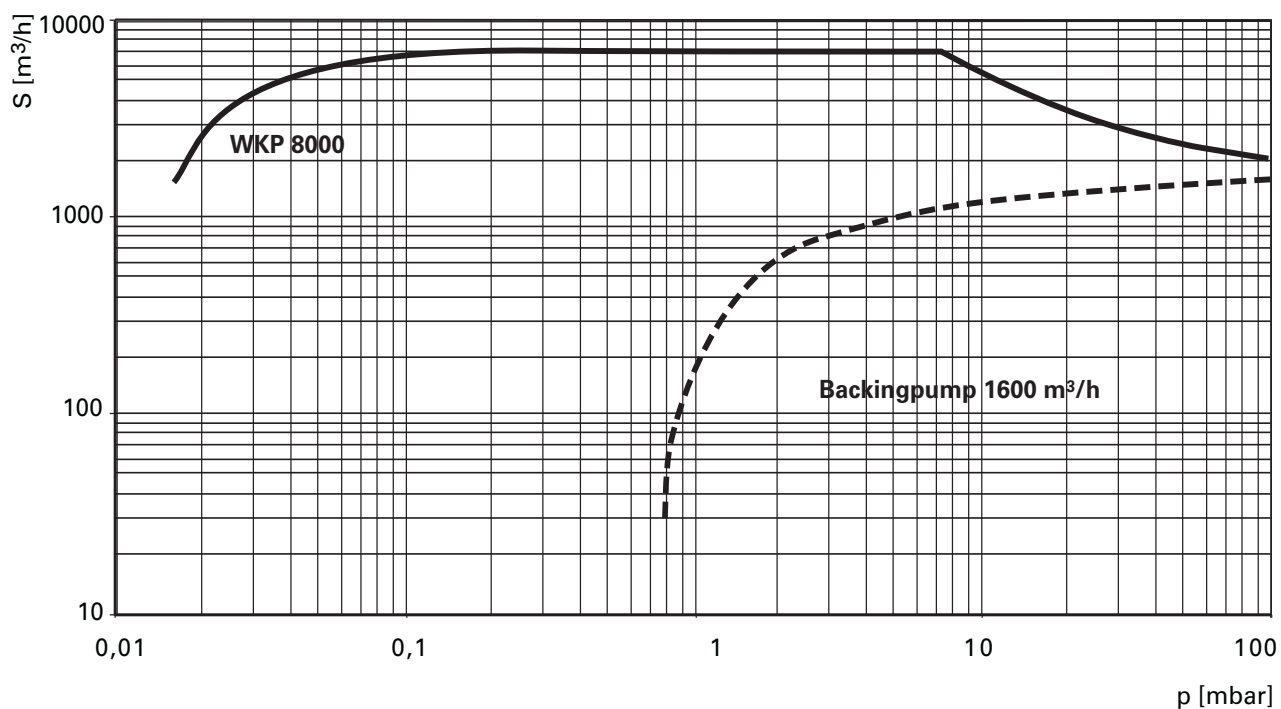
Technical data

	Motor with 50 Hz	Motor with 60 Hz	without motor
Nominal pumping speed	8000 m ³ /h	9600 m ³ /h	-
Differential pressure at the overflow valve	27 mbar	27 mbar	27 mbar
Emission sound pressure level (EN ISO 2151) at intake pressure 1 mbar	74 dB(A)	74 dB(A)	74 dB(A)
Emission sound pressure level (EN ISO 2151) at intake pressure 10 mbar	78 dB(A)	78 dB(A)	78 dB(A)
Leak rate: Pumps with shaft sealings	1·10 ⁻² mbar l/s	1·10 ⁻² mbar l/s	1·10 ⁻² mbar l/s
Pump fluid filling	21 l	21 l	21 l
Motor rating	22 kW	30 kW	-
Rotational speed	1500 rpm	1800 rpm	-
Mains requirement: voltage	400 V, 50 Hz	400 V, 60 Hz	-
Weight	1550 kg	1600 kg	1400 kg

Ordering Number

WKP 8000	PP W80 000	PP W80 060	PP W80 001
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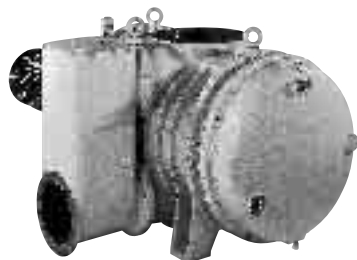
Pumping speed



Pumping speed of WKP 8000 with backing pump (single stage) of 1600 m³/h at 50 Hz.

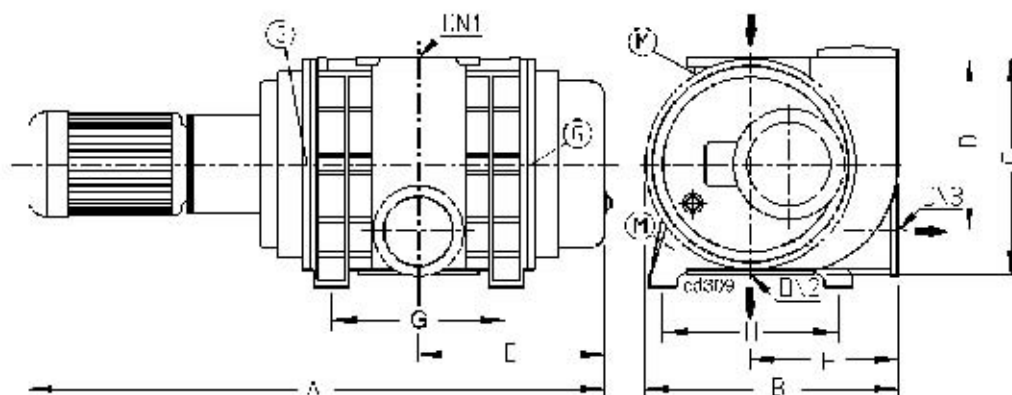
Roots pumps with pumping speed up to 25,000 m³/h

WKP 18000



- ▶ Highest compression levels of all vendors
- ▶ Integrated bypass valve
- ▶ No cooling water consumption
- ▶ Operation with frequency converter up to 25,000 m³/h

Dimensions



WKP 18000

A	2630 mm
B	1460 mm
C	1000 mm
D	820 mm
E	860 mm
F	960 mm
G	840 mm
H	840 mm

Connection

DN1	DN 400 PN 10
DN2	DN 400 PN 10
DN3	DN 320 ISO-F

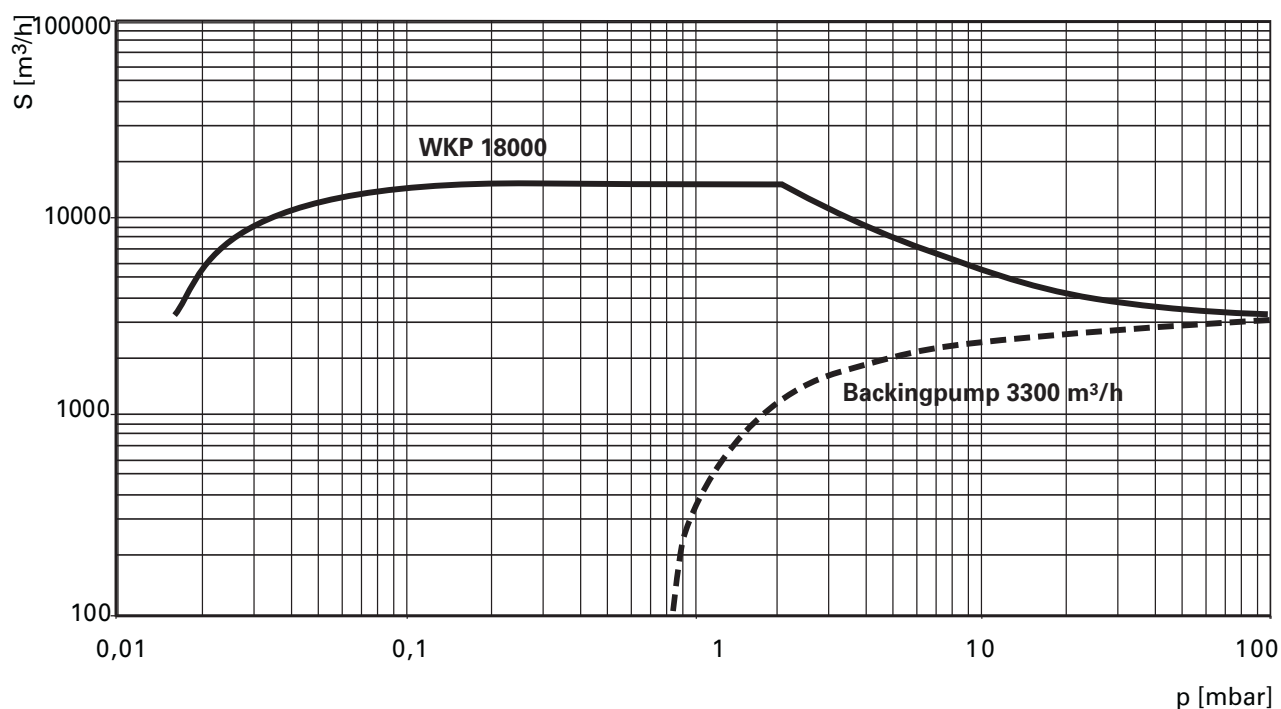
Technical data

	Motor with 50 Hz	Motor with 60 Hz	without motor
Nominal pumping speed	17850 m ³ /h	21420 m ³ /h	-
Differential pressure at the overflow valve	10 mbar	10 mbar	10 mbar
Emission sound pressure level (EN ISO 2151) at intake pressure 1 mbar	75 dB(A)	75 dB(A)	75 dB(A)
Emission sound pressure level (EN ISO 2151) at intake pressure 10 mbar	79 dB(A)	79 dB(A)	79 dB(A)
Leak rate: Pumps with shaft sealings	1·10 ⁻² mbar l/s	1·10 ⁻² mbar l/s	1·10 ⁻² mbar l/s
Pump fluid filling	68 l	68 l	68 l
Motor rating	45 kW	55 kW	-
Rotational speed	1500 rpm	1800 rpm	-
Mains requirement: voltage	400 V, 50 Hz	400 V, 60 Hz	-
Weight	3100 kg	3100 kg	2800 kg

Ordering Number

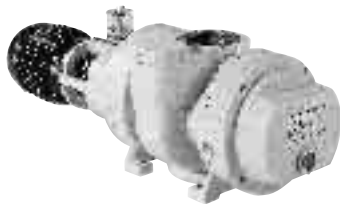
WKP 18000	PP W90 000	PP W90 060	PP W90 001
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Pumping speed



Pumping speed of WKP 18000 with backing pump (single stage) of 3300 m³/h at 50 Hz.

Accessories for all Roots pumps



Accessories

	Order.-No.
Splinter shield, for WKP 250 A/AM	PK 300 010-X
Splinter shield, for WKP 500 A/AM	PP 030 149 AX
Splinter shield, for WKP 500 AD/ADM	PP 042 350-X
Splinter shield, for WKP 1000/2000 A/AM	PP 031 114-X
Splinter shield, for WKP 1000 AD/2000 AD/ADM	PP 031 115-X
Splinter shield, for WKP 4000/6000 A/AM	PP 031 136-X
Splinter shield, for WKP 4000 AD/6000 AD/ADM	PP 031 137-X
Splinter shield, for WKP 8000/12000	PP 030 152-X
Splinter shield, for WKP 18000/25000	PP 030 336-T

Consumables

	Order.-No.
0.5 l Mineral oil P3	PK 001 136-T
1 l Mineral oil P3	PK 001 106-T
5 l Mineral oil P3	PK 001 107-T
20 l Mineral oil P3	PK 001 108-T
50 l Mineral oil P3	PK 001 109-T
200 l Mineral oil P3	PK 001 110-T
0.5 l Perfluoropolyether F5	PK 001 851-T
1 l Perfluoropolyether F5	PK 001 852-T
5 l Perfluoropolyether F5	PK 001 853-T
20 l Perfluoropolyether F5	PK 001 854-T
50 l Perfluoropolyether F5	PK 001 855-T
0.5 l oil D1	PK 005 881-T
1 l oil D1	PK 005 875-T
5 l oil D1	PK 005 876-T
20 l oil D1	PK 005 877-T
50 l oil D1	PK 005 878-T
200 l oil D1	PK 005 879-T

More accessories on request (see page 95) .

Miscellaneous available products



- ▶ Gas-cooled Roots pumps
- ▶ Pumping speed of 250 m³/h up to 12.000 m³/h
- ▶ Dry (oilfree) compressing
- ▶ From 130 mbar up to atmospheric pressure



	WGK 500	WGK 1500	WGK 4000	WGK 8000
Nominal pumping speed 50 Hz (m ³ /h)	520	1500	4600	8000
Rotational speed (min ⁻¹)	3000	1500	1500	1500
Pump fluid filling (l)	3	5	21	21
Weight, pump without motor (kg)	116	520	1100	1500

Hint: The motor and the eventually necessary gas cooler should be chosen individually, to ensure an optimum adaption to the process.



**The complete Roots pumping stations program for all applications
in low and medium vacuum ranges**

Standard pumping stations

Pfeiffer Vacuum offers an extensive range of Roots pumping stations:

WOD series

consists of Roots pump WKP 250 A to WKP 6000 A and a rotary vane pump with oil mist filter.

WPC series

Pumping stations offer pumping speeds of 220 to 5500 m³/h for dry, inert, nonreactive gases and gas mixtures (separate brochure PW 0014 PE available on request).



Selection chart WOD series

The number within the name indicates the pumping speed at 0.1 mbar.

The final pressures of the pumping stations are $< 5 \cdot 10^{-4}$ mbar. The marked squares indicate the

preference series. For these pumping stations most parts are also available in a corrosive version.

	WKP 250	WKP 500	WKP 1000	WKP 2000	WKP 4000	WKP 6000
UNO/DUO 35	222	382				
UNO/DUO 65	242	412	800			
UNO/DUO 120	250	440	900	1600		
UNO/DUO 250		470	950	1800	3000	
BA 251		471	951	1801	3001	
BA 501			1001	2001	3501	4801

Selection chart WPC series

The number within the name indicates the pumping speed at 1 mbar.

The final pressures of the pumping stations are $< 3 \cdot 10^{-2}$ mbar. The marked squares indicate the

preference series. Within these series the oil mist filter is integrated part of the rotary vane pump.

	WKP 250	WKP 500	WKP 1000	WKP 2000	WKP 4000	WKP 6000
UNO 60	220	380	750			
UNO 90	230	400	800			
UNO 200	250	450	910	1600		
UNO 240		470	950	1800	3000	
UNO 400		480	980	1900	3200	4200
UNO 630			1000	1950	3300	4500

The pumping units of both series are available with and without switch cabinet.

Combinations with other backing pumps and with additional accessories are also possible.

Pumping speed curves and dimensions are available on request.

Customized pumping stations

- ▶ Pumping stations tailored to meet the customer requirements
- ▶ Pressure range between 1000 mbar and 10^{-4} mbar
- ▶ Pumping speeds range between 100 m³/h and 150,000 m³/h

Expert consultation service
In-house software enables project engineers to accurately size the vacuum components based on customer requirements. Based on the design data (please ask for our checklist), we will calculate.

- ▶ Pumping speed
- ▶ Evacuation times
- ▶ Conductance values
- ▶ Intermediate pressures
- ▶ Gas outlet temperatures
- ▶ Cooling effects

Backing pumps

Backing pumps can be supplied either those from our own production or from other suppliers. The following are available, depending on the application:

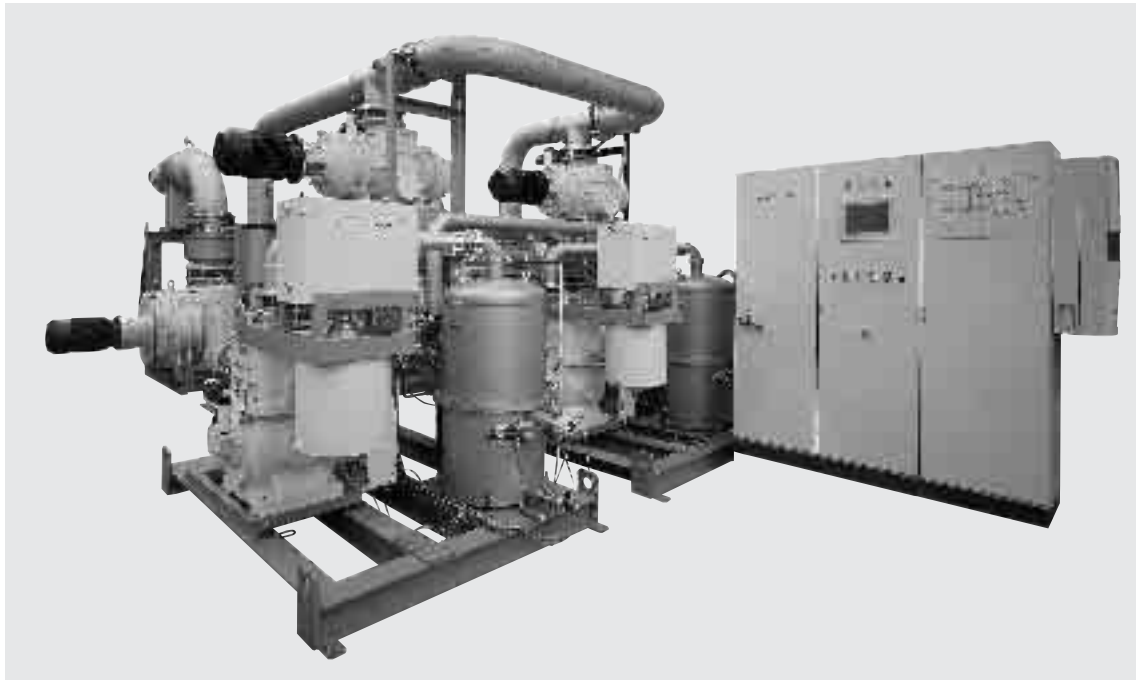
- ▶ Rotary vane pumps lubricated with recirculating oil, single- and two-stage
- ▶ Liquid ring pumps
- ▶ Dry pumps

Accessories that can be integrated depending on application:

- ▶ Electrical controls
- ▶ Measuring devices
- ▶ Pressure regulators
- ▶ Heat exchangers and condensers
- ▶ Soundproofing encapsulation for indoor and outdoor installations
- ▶ Silencers
- ▶ Liquid separators
- ▶ Dust separators
- ▶ Vibration isolation
- ▶ Flushing equipment



Roots pumping station used in the manufacture of polyester. Pumping speed 3650 m³/h at 40 mbar



Roots pumping station with switch cabinet for a simulation chamber. Pumping speed 45000 m³/h at 0.7 bar

Scope of delivery

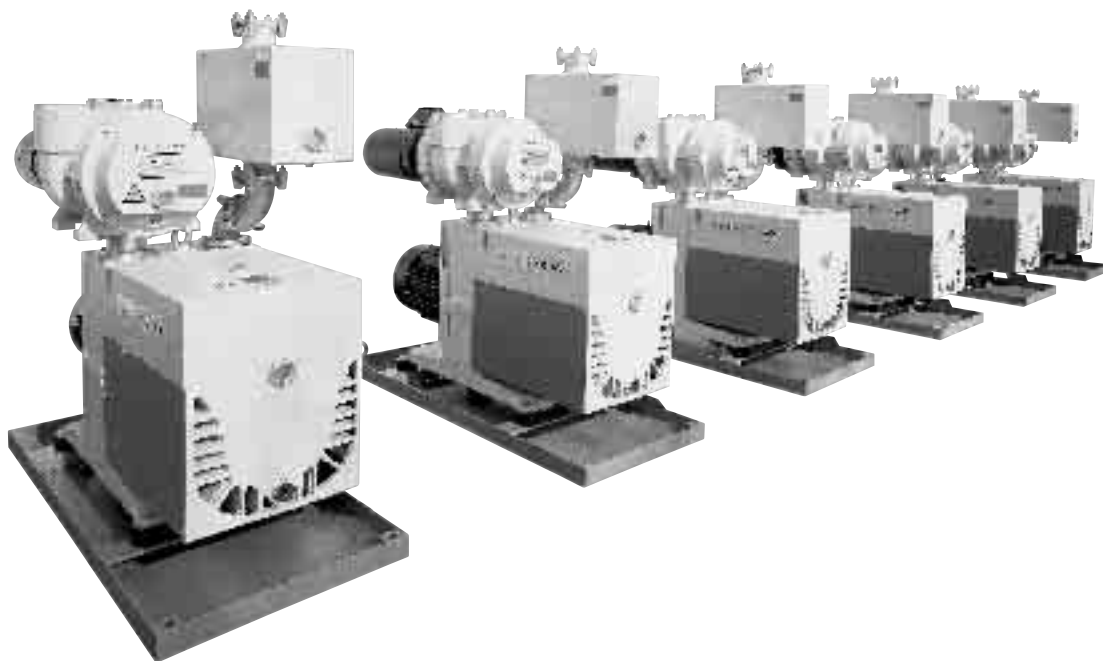
Counter flanges

Counter flanges (flanges with a pipe connection) on the suction and pressure sides are included in delivery.

Pump fluids

For pumping stations that operate with pump oil P3, the first filling is included in the delivery. It is supplied as a separate item.

For models with special pump fluids (e.g. F5, D1), the pump fluid must be ordered separately. If required, the pumps are assembled and tested with the special pump fluid.

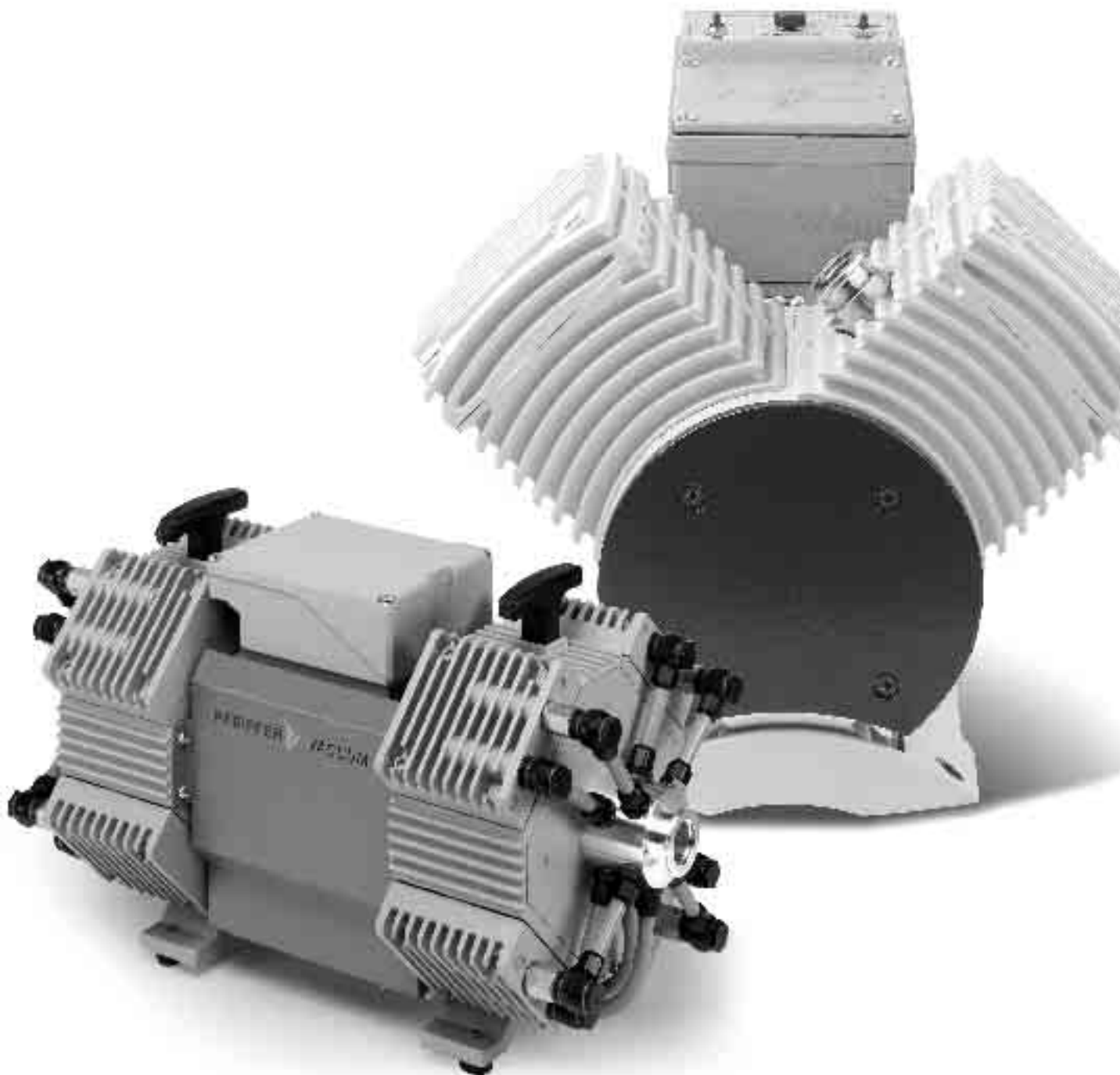


Note on explosion-protection measures for vacuum pumps

In numerous applications, the vapors of flammable solvents or reactive gases need to be pumped and compressed. This requires special measures to avoid dangers caused by the formation of or from the operation with potentially explosive atmospheres.

Customized pumping stations within the scope of directive 94/9 EC (ATEX, pumping of combustible vapor or gases) need to be discussed with Pfeiffer Vacuum in every case.

However, it is the ultimate responsibility of the customer and facility into which the vacuum generation equipment is integrated to ensure suitable protection measures.



Universal dry compressing pumps

Contents

	Page
Diaphragm pumps	122
Your advantages/Applications	123
MVP 015-2/015-4	124
MVP 020-3 AC/DC	126
MVP 035-2	128
MVP 055-3/C	130
MVP 160-3/C	132
XtraDry™	134
Your advantages/Applications	135
XtraDry™ 150-2	136
XtraDry™ 250-1	136



Diaphragm pumps



Dry and oil-free!
The ideal backing pump for Pfeiffer Vacuum
turbopumps

Diaphragm pumps

Your advantages

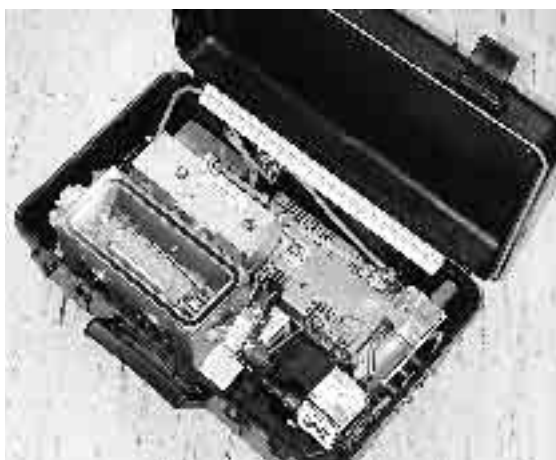
- ▶ Pumping speeds ranging from 1 to 10.4 m³/h
- ▶ Absolutely oil-free vacuum
- ▶ Long service life
- ▶ Low noise and vibration levels
- ▶ Highly reliable
- ▶ Highly gas tight
- ▶ Maintenance-friendly through easy diaphragm and valve replacement
- ▶ Can be used anywhere in the world due to multi-voltage motors

Applications

All areas where an oil-free, dry vacuum and uncontaminated pumping of gases is required.

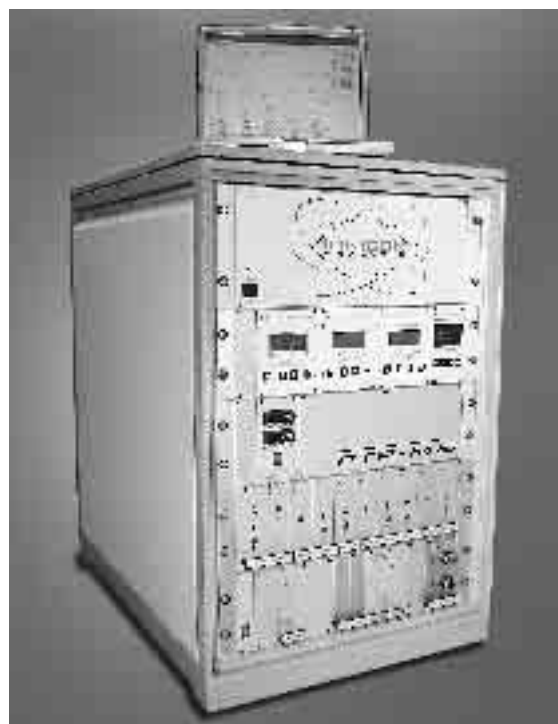
In pumping stations, plants, research, laboratories, analytical, chemistry (corrosive gas version) leak detection.

Suited as a backing pump for many Pfeiffer Vacuum turbopumps in applications involving only light gas loads.



Portable time of flight Mass Spectrometer (TOF-MS)* with diaphragm pump

* Developed by: Johns Hopkins University Applied Physics Laboratory



Proton Transfer Reaction Mass Spectrometer (PTR-MS) with MVP 055-3



Plasma cleaner SEM/TEM with MVP 015



Automatic Sample Preparation System (AsaP) SEM/TEM with MVP 015



Transmission Electron Microscopy (TEM) with MVP 015

Diaphragm pumps

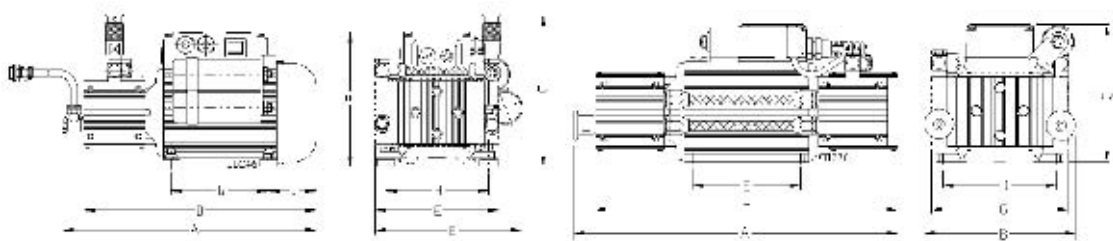
Diaphragm pumps with pumping speed 0.9 m³/h

MVP 015-2/015-4



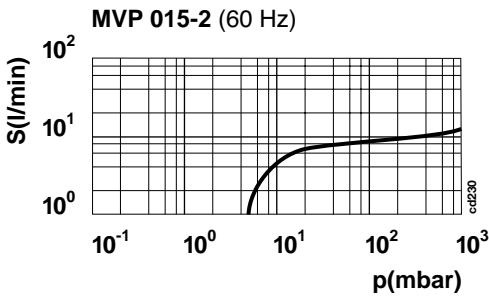
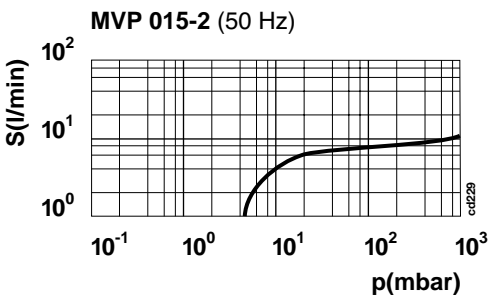
- ▶ Pumping of dry and non corrosive gases
- ▶ Completely oil free!
- ▶ Long service life of diaphragms and valves
- ▶ As backing pump for turbopumps and stand alone version applicable
- ▶ Very quiet, noise level approx. 52 dB(A)
- ▶ When utilizing the gas ballast function, small amounts of vapors can be pumped (MVP 015-2)

Dimensions



	MVP 015-2	MVP 015-4
	MVP 015-2	MVP 015-4
A	287 mm	330 mm
B	170 mm	154 mm
C	175 mm	140 mm
D	265 mm	116 mm
E	140 mm	110 mm
F	153.5 mm	308 mm
G	110 mm	140 mm
H	116 mm	-
J	55 mm	-

Pumping speed



Technical data

	MVP 015-2	MVP 015-4	MVP 015-4
Ultimate pressure: Total without gas ballast	≤ 3.5 mbar	$\leq 5 \cdot 10^{-1}$ mbar	$\leq 5 \cdot 10^{-1}$ mbar
Ultimate pressure: Total with gas ballast	4.5 mbar	-	-
Nominal pumping speed at 50 Hz	0.9 m ³ /h	0.9 m ³ /h	-
Nominal pumping speed at 60 Hz	1.1 m ³ /h	-	1.1 m ³ /h
Flange (in)	G 1/8" elbow union + enclosed hose DN 6 x 1000 mm with a straight union in G 1/4" at the end	DN 16 ISO-KF / G 1/8"	DN 16 ISO-KF / G 1/8"
Flange (out)	G 1/8" + silencer	G 1/8" + silencer	G 1/8" + silencer
Mains requirement (range)	-	230 V, +5 %/-10 %, 50 Hz	120 V, +5 %/-10 %, 60 Hz
Mains requirement (switchable)	90-127/187-265 V, 50/60 Hz	-	-
Power switch	yes	no	no
Motor rating	120 W	80 W	80 W
Current max.	1.1 A	0.3 A	0.4 A
Rotational speed at 50 Hz	1500 rpm	1500 rpm	-
Rotational speed at 60 Hz	1800 rpm	-	1800 rpm
Leak rate	$5 \cdot 10^{-3}$ mbar l/s	$5 \cdot 10^{-3}$ mbar l/s	$5 \cdot 10^{-3}$ mbar l/s
Exhaust pressure max.	1050 mbar	1050 mbar	1050 mbar
Ambient temperature	12 - 40 °C	12 - 40 °C	12 - 40 °C
Weight	6.5 kg	7.5 kg	7.5 kg
Emission sound pressure level	52 dB(A)	52 dB(A)	52 dB(A)

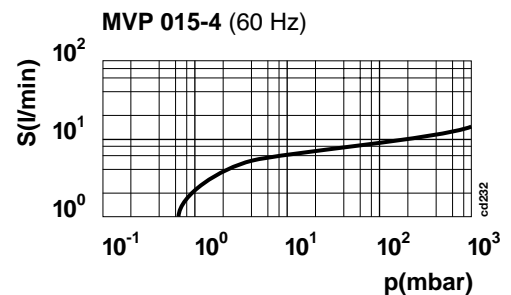
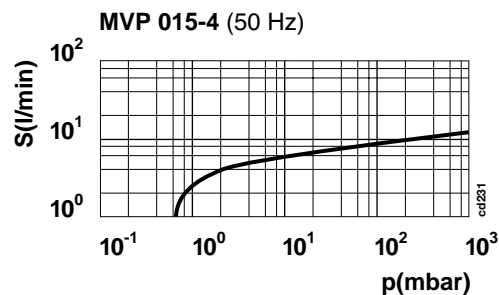
Ordering Number

MVP 015	PK T05 100	PK T05 065	PK T05 064
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Accessories

Mains cable for wiring (no plug)	P4 564 309 ZH	-	-
Mains cable, safety plug CEE 7, EURO counter plug C 13 (230 V), 3 m	P4 564 309 ZA	-	-
Mains cable, UL plug NEMA 5-15P, EURO counter plug C13 (115 V AC), 3 m	P4 564 309 ZE	-	-
Relay box backing pump, 1-phase 5 A	PM 041 937-T	PM 041 937-T	PM 041 937-T
Small flange, DN 16 ISO-KF / G 1/8"	PK 050 108-T	PK 050 108-T	PK 050 108-T

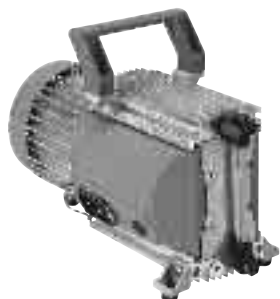
Pumping speed



Diaphragm pumps

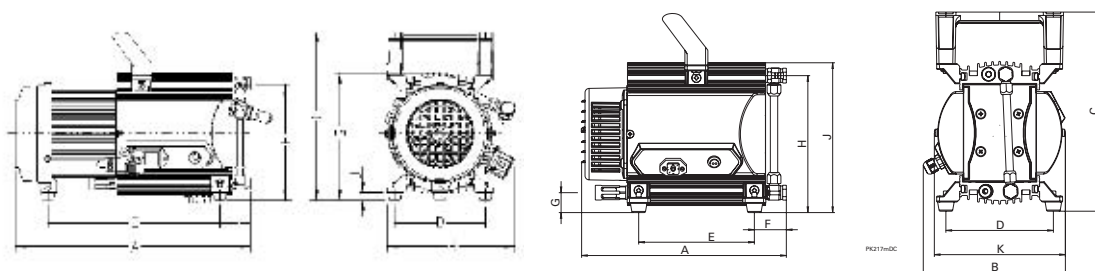
Diaphragm pumps with pumping speed 1 m³/h

MVP 020-3 AC/DC



- ▶ Pumping of dry and non corrosive gases
- ▶ Completely oil free!
- ▶ Long service life of diaphragms and valves
- ▶ As backing pump for turbopumps and stand alone version applicable
- ▶ Very quiet, noise level approx. 52 dB(A)
- ▶ Interval operation and rotation speed control (DC-type)

Dimensions

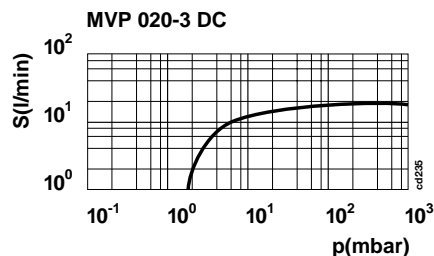


MVP 020-3 AC

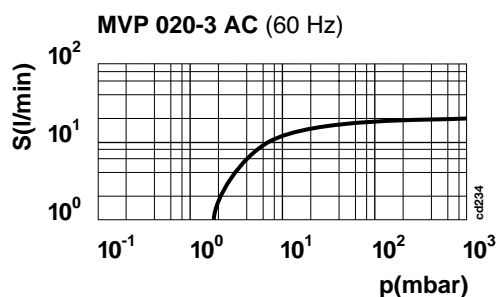
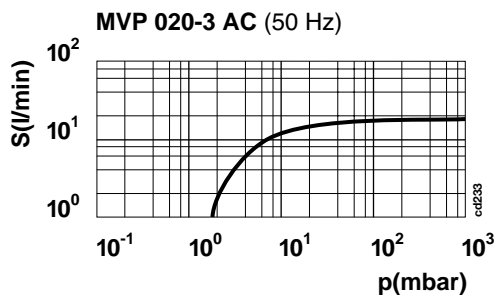
MVP 020-3 DC

	MVP 020-3 AC	MVP 020-3 DC
A	303 mm	223 mm
B	165 mm	155 mm
C	217 mm	217 mm
D	117 mm	117 mm
E	226 mm	126 mm
F	35 mm	35 mm
G	163 mm	22 mm
H	149 mm	149 mm
J	10 mm	163 mm
K	-	143 mm

Pumping speed



Pumping speed



Technical data

	MVP 020-3 AC	MVP 020-3 DC
Ultimate pressure: Total without gas ballast	≤ 2 mbar	≤ 2 mbar
Ultimate pressure with flushing gas nozzle	≤ 3 mbar	≤ 3 mbar
Nominal pumping speed at 50 Hz	1 m³/h	-
Nominal pumping speed at 60 Hz	1.2 m³/h	-
Pumping speed at 1500 min⁻¹	-	1 m³/h
Flange (in)	G 1/8" elbow union + enclosed hose DN 8 x 1000 mm with a elbow union in G 1/4" at the end	G 1/8" + hose wave DN 6
Flange (out)	G 1/8" + silencer	G 1/8" + silencer
Mains requirement (range)	-	24 V +/- 10 %
Mains requirement (switchable)	90-126/180-254 V, 50/60 Hz	-
Power switch	yes	no
Motor rating	80 W	64 W
Current max.	1.7 A	3.5 A
Rotational speed max.	-	1500 rpm
Rotational speed at 50 Hz	1500 rpm	-
Rotational speed at 60 Hz	1800 rpm	-
Leak rate	1·10⁻¹ mbar l/s	1·10⁻¹ mbar l/s
Exhaust pressure max.	1100 mbar	1100 mbar
Ambient temperature	12 - 40 °C	12 - 40 °C
Weight	6.5 kg	4.1 kg
Emission sound pressure level	48 dB (A)	48 dB (A)

Ordering Number

MVP 020	PK T01 100	PK T01 150
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Accessories

Mains cable for wiring (no plug)	PK 050 111	-
Mains cable, UL plug, EURO box CEE 22 (115 V AC), 2.5 m	PK 050 110	-
Mains cable, safety plug, EURO box CEE 22 (230 V), 2.5 m	PK 050 109	-
Mains cable, safety plug CEE 7, EURO counter plug C 13 (230 V), 3 m	-	P4 564 309 ZA
Mains cable, UL plug NEMA 5-15P, EURO counter plug C13 (115 V AC), 3 m	-	P4 564 309 ZE
TPS 150, mains pack for wall/standard rail fitting	-	PM 051 461-T
Connecting cable, length 3 m	-	PM 051 103-T
Connecting cable, length 5 m	-	PM 051 104-T
Connecting cable TC - MVP 020, 0.5 m	-	PM 041 959-X
Cable connector for Rotation speed control / for intermittent operation	-	P0 992 287
Mating plug for voltage supply	-	P0 920 635 E
Relay box backing pump, 1-phase 5 A	PM 041 937-T	-
Small flange, DN 16 ISO-KF / G 1/8"	PK 050 108-T	PK 050 108-T
Flushing gas nozzle	PK 050 122	PK 050 122

Diaphragm pumps

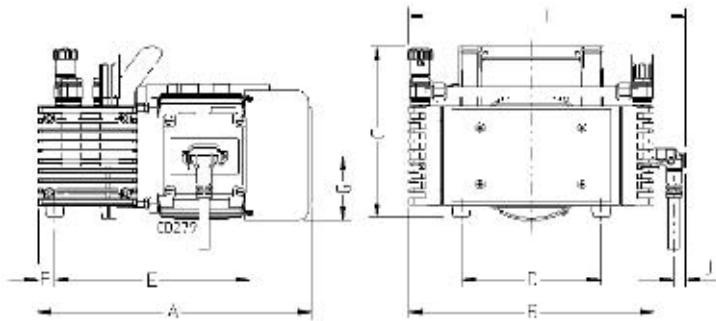
Diaphragm pumps with pumping speed 2.1 m³/h

MVP 035-2

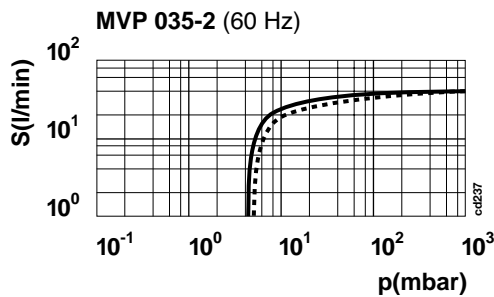
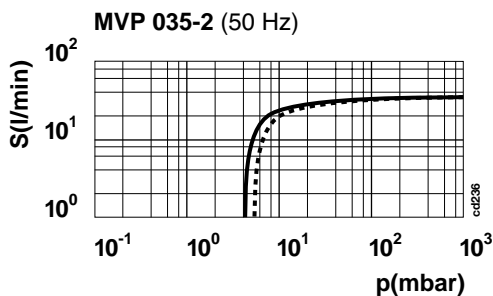


- ▶ Pumping of dry and non corrosive gases
- ▶ Completely oil free!
- ▶ Long service life of diaphragms and valves
- ▶ As backing pump for turbopumps and stand alone version applicable
- ▶ Very quiet, noise level approx. 52 dB(A)
- ▶ Small amounts of vapors can be pumped when utilizing the gas ballast function

Dimensions



MVP 035-2	
A	263 mm
B	235 mm
C	171 mm
D	134 mm
E	186.4 mm
F	17 mm
G	71 mm
H	266 mm
J	11 mm



— without gas ballast - - - - with gas ballast

Technical data

MVP 035-2

Ultimate pressure: Total without gas ballast	≤ 4 mbar
Ultimate pressure: Total with gas ballast	≤ 5 mbar
Nominal pumping speed at 50 Hz	2.1 m ³ /h
Nominal pumping speed at 60 Hz	2.4 m ³ /h
Flange (in)	G 1/4" elbow union + enclosed hose DN 8 x 1000 mm with a elbow union in G 1/4" at the end
Flange (out)	G 1/4" + silencer
Mains requirement (switchable)	90-126/180-254 V, 50/60 Hz
Power switch	yes
Motor rating	180 W
Current max.	3.8 A
Rotational speed at 50 Hz	1500 1/min
Rotational speed at 60 Hz	1800 1/min
Leak rate	1·10 ⁻¹ mbar l/s
Exhaust pressure max.	1100 mbar
Ambient temperature	12 - 40 °C
Weight	10.5 kg
Emission sound pressure level	49 dB(A)

Ordering Number

MVP 035	PK T01 200
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Accessories

Mains cable for wiring (no plug)	PK 050 111
Mains cable, UL plug, EURO box CEE 22 (115 V AC), 2.5 m	PK 050 110
Mains cable, safety plug, EURO box CEE 22 (230 V), 2.5 m	PK 050 109
Relay box backing pump, 1-phase 5 A	PM 041 937-T
Small flange, DN 16 ISO-KF / G 1/4"	PK 050 114-T

Diaphragm pumps

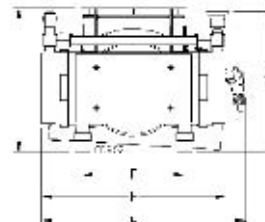
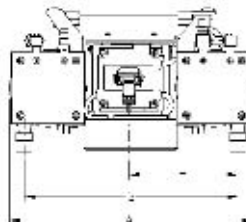
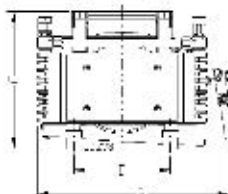
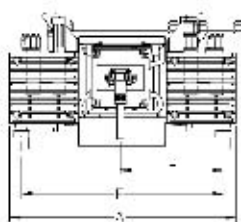
Diaphragm pumps with pumping speed 3.3 m³/h

MVP 055-3/C



- ▶ Pumping of dry and corrosive gases (C - Type)
- ▶ Completely oil free!
- ▶ Long service life of diaphragms and valves
- ▶ As backing pump and stand alone version for turbopumps applicable
- ▶ Very quiet, noise level approx. 53 dB(A)
- ▶ When utilizing the gas ballast function, small amounts of vapors can be pumped

Dimensions

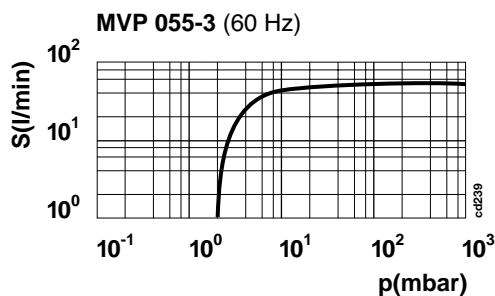
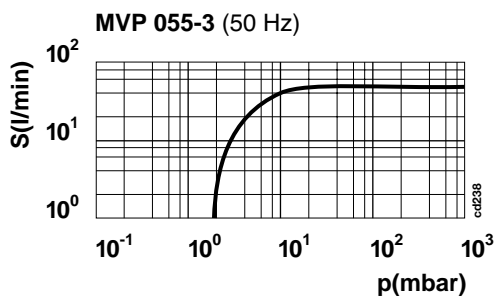


MVP 055-3

MVP 055-3 C

	MVP 055-3	MVP 055-3 C
A	315 mm	321 mm
B	266 mm	268 mm
C	189 mm	189 mm
D	134 mm	184 mm
E	281 mm	241 mm
F	143 mm	134 mm
G	-	281 mm
H	-	143 mm

Pumping speed



Technical data

	MVP 055-3	MVP 055-3 C
Ultimate pressure: Total without gas ballast	≤ 2 mbar	≤ 2 mbar
Ultimate pressure: Total with gas ballast	-	≤ 4 mbar
Nominal pumping speed at 50 Hz	3.3 m³/h	3 m³/h
Nominal pumping speed at 60 Hz	3.8 m³/h	3.5 m³/h
Flange (in)	G 1/4" elbow union + enclosed hose DN 8 x 1000 mm with a elbow union in G 1/4" at the end	DN 16 ISO-KF / 1/8" NPT
Flange (out)	G 1/4" + silencer	Hose wave DN 8 mm / 1/8" NPT
Mains requirement (switchable)	90-126 / 180-254 V, 50/60 Hz	90-126 / 180-254 V, 50/60 Hz
Power switch	yes	yes
Motor rating	200 W	200 W
Current max.	3.8 A	4 A
Rotational speed at 50 Hz	1500 1/min	1500 1/min
Rotational speed at 60 Hz	1800 1/min	1800 1/min
Leak rate	1 · 10 ⁻¹ mbar l/s	1 mbar l/s
Exhaust pressure max.	1100 mbar	1100 mbar
Ambient temperature	12 - 40 °C	12 - 40 °C
Weight	16 kg	16.5 kg
Emission sound pressure level	52 dB (A)	50 dB (A)

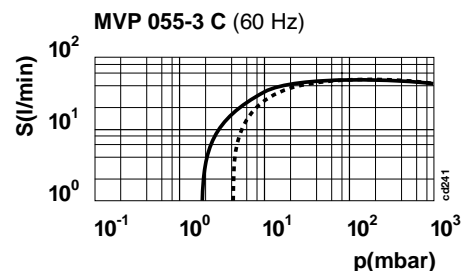
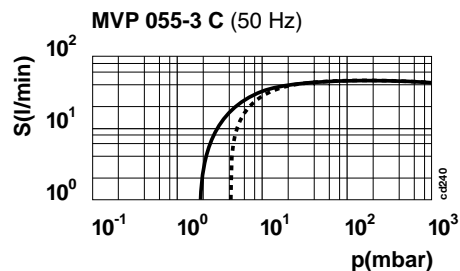
Ordering Number

MVP 055	PK T01 300	PK T01 350
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Accessories

Mains cable for wiring (no plug)	PK 050 111	PK 050 111
Mains cable, UL plug, EURO box CEE 22 (115 V AC), 2.5 m	PK 050 110	PK 050 110
Mains cable, safety plug, EURO box CEE 22 (230 V), 2.5 m	PK 050 109	PK 050 109
Relaisbox Vorpumpe, 1-phas. 5 A	PM 041 937-T	PM 041 937-T
Small flange, DN 16 ISO-KF / G 1/4" (inlet)	PK 050 115-T	-
Small flange, DN 16 ISO-KF / G 1/4" (outlet)	PK 050 114-T	-
Screw-in flange for exhaust, DN 16 ISO-KF / 1/8" NPT	-	P0 920 746 E
Flushing gas connection	-	PK 050 123

Pumping speed

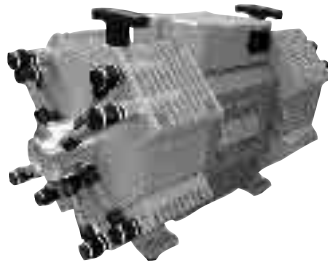


— without gas ballast ----- with gas ballast

Diaphragm pumps

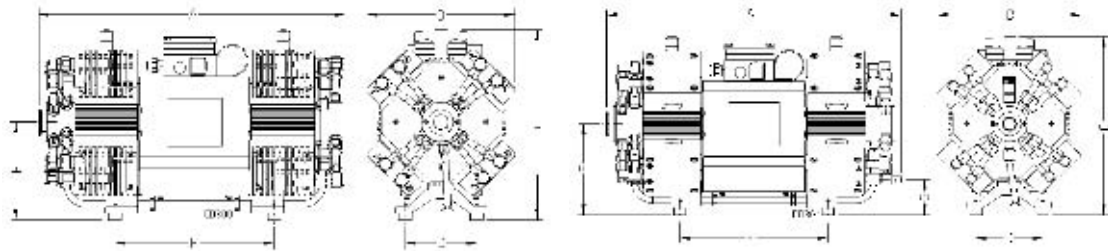
Diaphragm pumps with pumping speed 9.6 m³/h

MVP 160-3/C



- ▶ Pumping of dry and corrosive gases (C - Types)
- ▶ Completely oil free!
- ▶ Long service life of diaphragms and valves
- ▶ As backing pump for turbopumps and stand alone version applicable
- ▶ Very quiet, noise level approx. 53 dB(A)
- ▶ When utilizing the gas ballast function, small amounts of vapors can be pumped

Dimensions

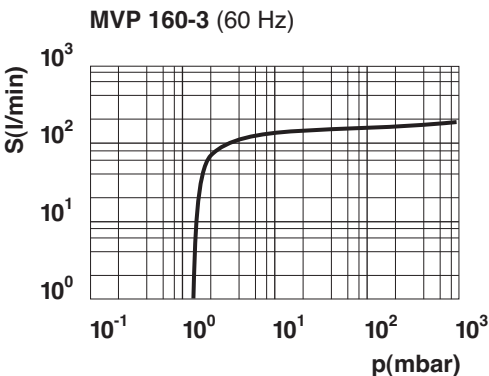
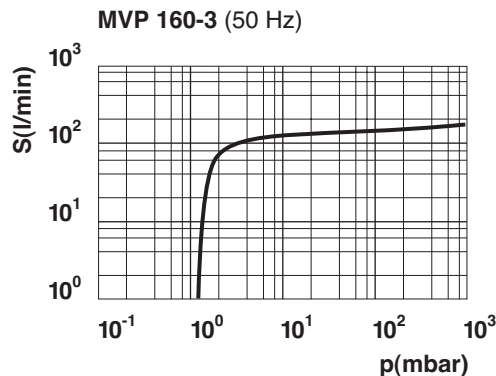


MVP 160-3

MVP 160-3 C

	MVP 160-3	MVP 160-3 C
A	485 mm	500 mm
B	230 mm	235 mm
C	290 mm	295 mm
D	110 mm	110 mm
E	244 mm	244 mm
F	151 mm	151 mm
G	-	58 mm

Pumping speed



Technical data

	MVP 160-3	MVP 160-3	MVP 160-3 C	MVP 160-3 C
Ultimate pressure: Total without gas ballast	≤ 2 mbar	≤ 2 mbar	≤ 2 mbar	≤ 2 mbar
Ultimate pressure: Total with gas ballast	-	-	≤ 9 mbar	≤ 9 mbar
Nominal pumping speed at 50 Hz	-	9.6 m³/h	8.3 m³/h	-
Nominal pumping speed at 60 Hz	10.4 m³/h	10.4 m³/h	8.9 m³/h	8.9 m³/h
Flange (in)	DN 25 ISO-KF	DN 25 ISO-KF	DN 25 ISO-KF	DN 25 ISO-KF
Flange (out)	G 1/4" + silencer	G 1/4" + silencer	DN 8 Hose wave / 1/8" NPT	DN 8 hose wave / 1/8" NPT
Mains requirement (range)	120 V, +5 %/ - 10 %, 60 Hz	230 V +/- 10 %, 50/60 Hz	230 V, +/- 10 %, 50/60 Hz	120 V, +5 % / -10 %, 60 Hz
Power switch	yes	yes	yes	yes
Motor rating	390 W	390 W	390 W	390 W
Current max.	5.2 A	3.1 A	3.1 A	5.2 A
Rotational speed at 50 Hz	-	1500 rpm	1500 rpm	-
Rotational speed at 60 Hz	1800 rpm	1800 rpm	1800 rpm	1800 rpm
Leak rate	1·10 ⁻¹ mbar l/s	1·10 ⁻¹ mbar l/s	1 mbar l/s	1 mbar l/s
Exhaust pressure max.	1100 mbar	1100 mbar	1100 mbar	1100 mbar
Ambient temperature	12 - 40 °C	12 - 40 °C	12 - 40 °C	12 - 40 °C
Weight	24 kg	24 kg	25 kg	25 kg
Emission sound pressure level	53 dB (A)	53 dB (A)	53 dB (A)	53 dB (A)

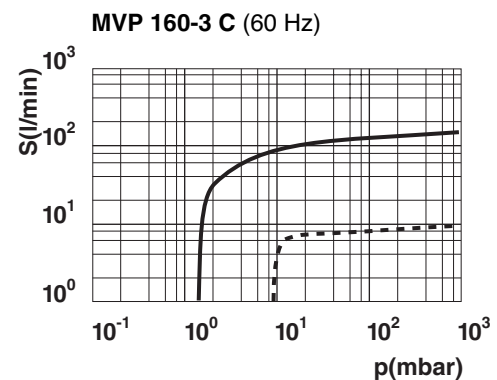
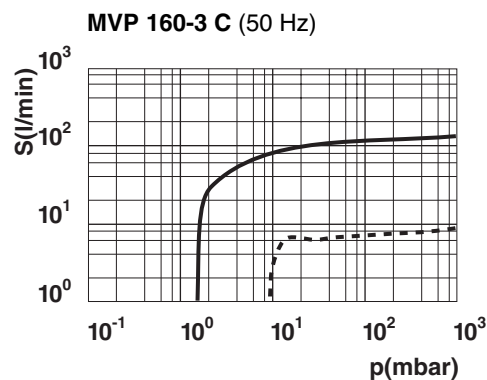
Ordering Number

MVP 160	PK T01 401	PK T01 400	PK T01 450	PK T01 451
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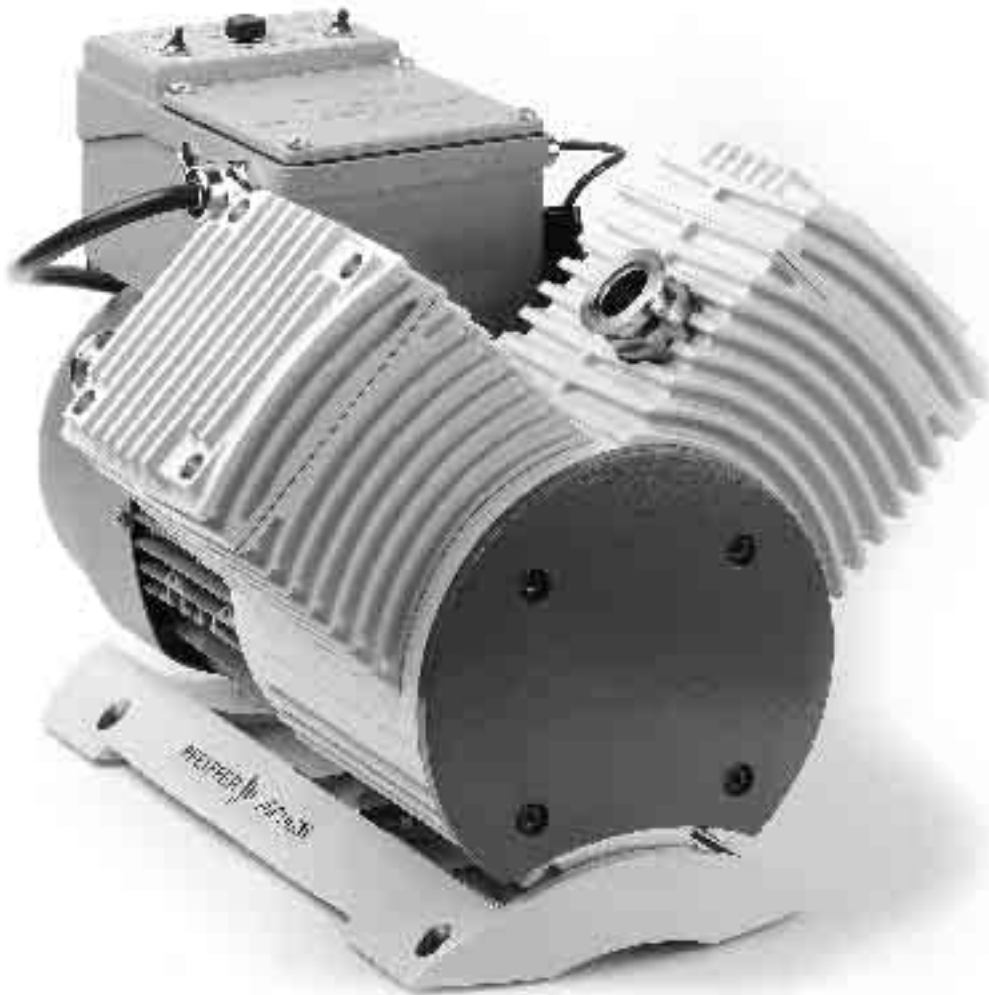
Accessories

Mains cable for wiring (no plug)	PK 050 111	PK 050 111	PK 050 111	PK 050 111
Mains cable, UL plug, EURO box CEE 22 (115 V AC), 2.5 m	PK 050 110	-	-	PK 050 110
Mains cable, safety plug, EURO box CEE 22 (230 V), 2.5 m	-	PK 050 109	PK 050 109	-
Relay box backing pump, 1-phase 5 A	PM 041 937-T	PM 041 937-T	PM 041 937-T	PM 041 937-T
Flushing gas connection	-	-	PK 050 123	PK 050 123

Pumping speed



— without gas ballast - - - - with gas ballast



**The pump that always stays "clean". For clean and safe processes.
Absolutely dry and oil-free!
Innovative technology without particle emissions**

XtraDry™

The clean and oil-free vacuum pump – a pumping concept for all rough and medium vacuum applications.

Your advantages

Particle-free

- ▶ No contamination of the process
- ▶ No particle emissions

Oil-free

- ▶ Absolutely dry suction chamber
- ▶ No hydrocarbons on the intake side
- ▶ No oil in the entire pump body

Powerful

- ▶ Pumping speed independent of the type of gas

Low vibrations

- ▶ Precisely tuned running characteristic
- ▶ For extremely quiet operation

Reliable

- ▶ Designed for demanding requirements while at same time keeping maintenance requirements low

Economic

- ▶ Long service intervals reduce operating costs

Applications

The ideal backing pump for high vacuum pumps, for example, turbopumps from Pfeiffer Vacuum

Analytical systems

- ▶ Mass spectrometers
- ▶ Leak detectors
- ▶ Electron microscopes

Medical technology

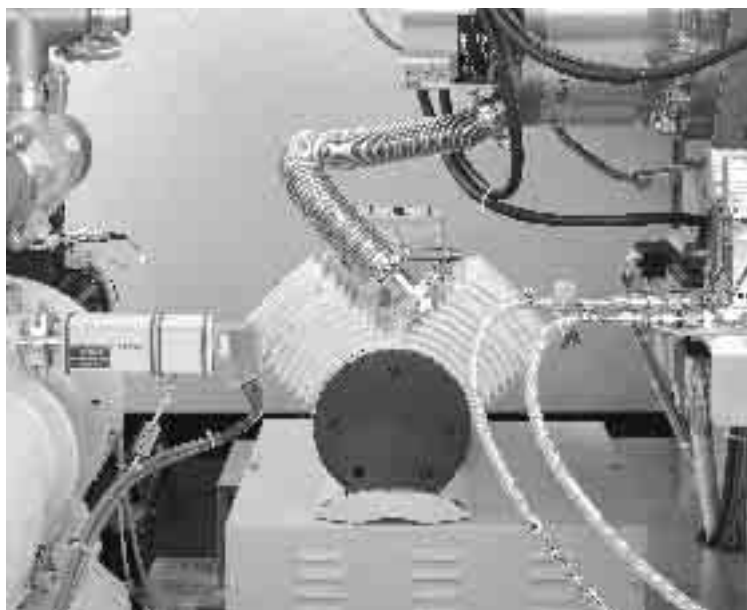
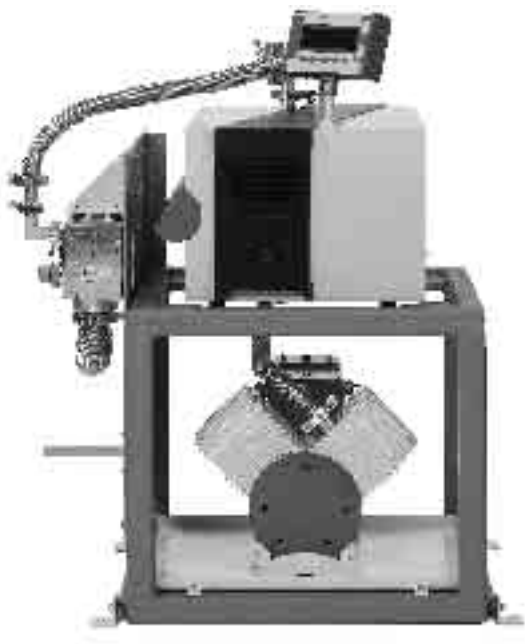
- ▶ Sterilization
- ▶ Vacuum packaging

Industry

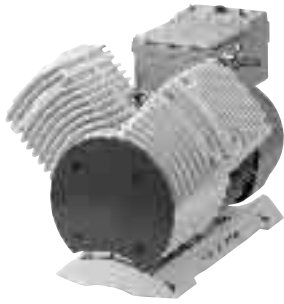
- ▶ Lamps and tubes production
- ▶ Coating

Further applications

- ▶ Robotics
- ▶ Differential sealing systems



XtraDry™ with volume flow rates of 7.5 to 13m³/h



Particle-free

- ▶ No process contamination
- ▶ No particle emissions
- ▶ Soft start mode eliminates turbulence

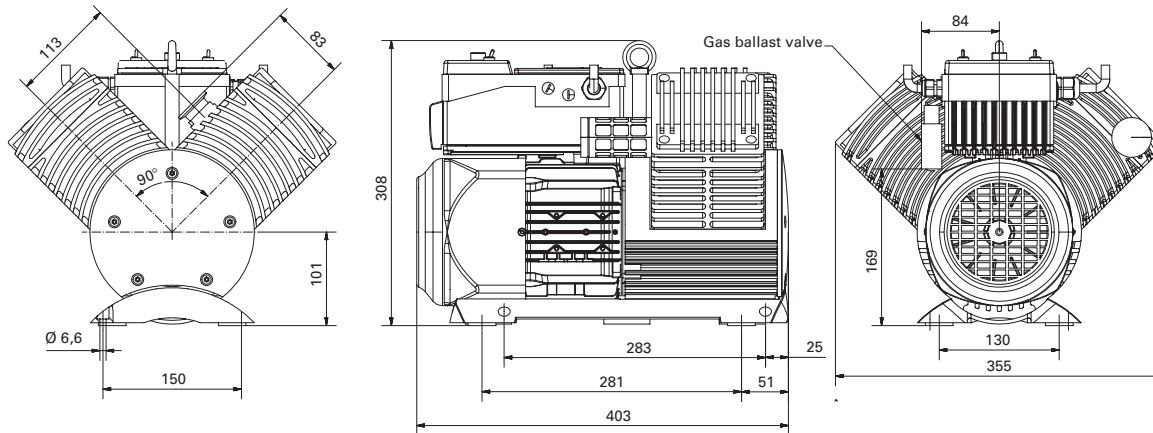
Oil-free

- ▶ Absolutely dry pump chamber
- ▶ No hydrocarbons on the intake side
- ▶ No oil in the entire pump body

High-performance, low vibration, flexible

- ▶ Volume flow rate independent of the type of gas
- ▶ Precisely tuned for extremely smooth operation
- ▶ Standby mode for an extended service life
- ▶ Speed matching in connection with Pfeiffer Vacuum turbopumps for perfect adaptation to the process
- ▶ Frequency converter operates independently of the mains frequency

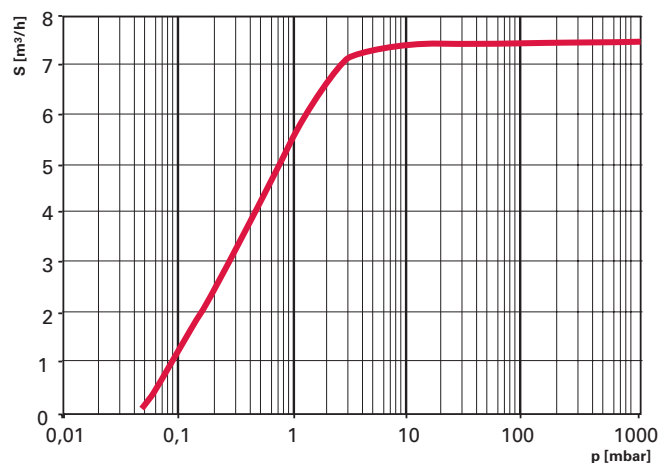
Dimensions (in mm)



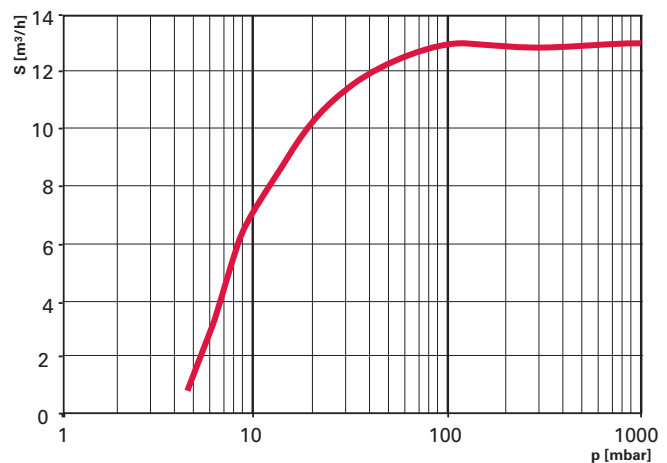
XtraDry™

Pumping speed

XtraDry™ 150-2



XtraDry™ 250-1



Technical data

	XtraDry™ 150-2	XtraDry™ 250-1
Flange (in)	DN 25 ISO-KF	DN 25 ISO-KF
Flange (out)	DN 25 ISO-KF / 1/2"	DN 25 ISO-KF / 1/2"
Ultimate pressure	<0.05 mbar	<4 mbar
Nominal pumping speed	7.5 m³/h	13 m³/h
Max. exhaust pressure	1.1 bar	1.1 bar
Leak rate	< 0.01 mbar l/s	< 0.01 mbar l/s
Nominal motor rating	550 W	550 W
sound pressure level	≤ 58 dB(A)	≤ 58 dB(A)
Ambient temperature	12-40 °C	12-40 °C
Weight	29 kg	29 kg

Ordering Number

230 V +/- 10%, 50/60 Hz	PO P01 050	PO P01 060
115 V +/- 10%, 50/60 Hz	PO P01 051	PO P01 061
100 V +/- 10%, 50/60 Hz	PO P01 052	PO P01 062

Accessories

Silencer for the XtraDry™*	PO 003 270	PO 003 270
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* included in delivery

Optional accessories

Speed control TCX 010 ¹⁾	PO 003 307-X	PO 003 307-X
Speed control TCX 020 ²⁾	PO 003 363-X	PO 003 363-X
Connection cable TCX / XtraDry™, 1 m	PO 003 346	PO 003 346
Connection cable TCX / XtraDry™, 3 m	PO 003 347	PO 003 347

¹⁾ In combination with Pfeiffer Vacuum turbopumps with drive electronics TC 600/750

²⁾ In combination with Pfeiffer Vacuum turbopumps with drive electronics TCP 350





**Turbopumps for all high and
ultra high vacuum applications**

**From the inventor of the turbopump
with over 250,000 units sold**

Contents

	Page
Selection aid	140
Applications	141
Operating principle/Type series	142
Type designations/Installation bearings	143
Important information relating to the technical data	144
Safety is important	145
 CompactTurbo™	 146
Your advantages/Drive electronics	147
Power supplies/Control units	148
Accessories	149
Ordering examples	150
Applications	151
TPD 011	152
TMH/U 071	156
TMH/U 261/262	164
TMH/U 521 DN 100/DN 160	172
TMH/U 1201 / TMH/U 1501	182
TMH 1801 / TMH/U 2301	192
 MagneticTurbo™	 202
Your advantages/Drive electronics/Power supply units/Control units/Accessories	203
Ordering examples	204
TMH/U 200 M / TMH/U 400 M	206
TMH/U 1000 M / TMH/U 1600 M	212
HiMag™ 2400	222
 Turbo accessories	 228
 Economy pumping stations	 262
Your advantages/Applications	263
TSH 071 E, DN 40 ISO-KF	264
TSH/U 071 E, DN 63 CF-F	266
TSH/U 071 E, DN 63 ISO-K	268
 TurboCube™ pumping stations	 270
Your advantages/Applications	271



Selection aid

	Analytics and surface physics					Electronics and semi-conductor engineering				Vacuum process engineering				Research and development							Industrial applications				Others														
	Electron microscopy	Leak detection	Mass spectrometry	Surface analysis	Plasma monitoring	Residual gas analysis	Defects analysis	Ion implantation	Molecular beam epitaxy	Plasma etching	PVD/sputtering	CVD	Foil coating	Glass coating	Surface refinement	Solar cell manufacture	Wear protection	UHV/XHV systems	Fusion technology	Gas guidance systems	Nuclear research	Plasma physics	X-ray tubes	Space applications	Storage rings	Particle accelerators	Space simulation chamber	Leak detection systems	Metallurgy	Vacuum furnaces	Vacuum soldering	Heat treatment	Differential pumping systems	Insulating vacuum	Lamps and tubes manufacture	Load lock chambers	Handling systems		
MagneticTurbo™																																							
TMH/U 200	●		▲	●			●	▲										●		●		●	▲	●	●									▲					
TMH/U 400	●		▲	●			●	▲										●		●		▲		●	●														
TMH/U 400 for corrosive gases							▲	●	●									●		▲																			
TMH/U 1000	▲			▲			●	▲			●				●			●											●										
TMH/U 1000 for corrosive gases							▲	●	●		▲	●			▲														▲										
TMH/U 1600							●	▲			●		●	●	●	●	●	▲	●								▲		●										
TMH/U 1600 for corrosive gases							▲	●	●	●	▲	●	▲		▲		▲											▲		▲									
HiMag™ 2400							●	●		●	●	●	●	●	●	●	●	●	●								●		●										
CompactTurbo™																																							
TPD 011	●	●	●		●	●													●				●				●							●	●	●			
TMH/U 071	●	●	●	●	●	●	●											●	●			●	●	●	●	●	●	●	●					●	●	●	●		
TMH/U 261/262	●	▲	●	●	▲	▲	●	▲		▲				●				●	●	●	▲	▲	●	▲	●	●	●	●	●					●	▲	●	●	●	
TPH/U 261 for corrosive gases							▲	●	●	●	▲	●		▲						▲	●																		
TMH/U 521	●		●	▲		▲	●	▲			●		●	●				●		●	▲	▲		●	●	●	●	●	●					●		▲	▲	●	
TPH/U 521 for corrosive gases							▲	●	●	●	▲	●		▲						▲	●																		
TPH/U 1201	▲						●	▲			●		●	●	●	●	●	▲	●		▲						▲		●	●	●	●	▲	▲		▲			
TPH/U 1201 for corrosive gases							▲	●	●	●	▲	●		▲		▲	▲				●									▲	▲	▲							
TPH/U 1501							●	▲			●		●	●	●	●	●	▲	●								●		●	●	●	●	●						
TPH/U 1501 for corrosive gases							▲	●	●	●	▲	●		▲		▲	▲													▲	▲	▲							
TPH/U 1801							●	▲			●		●	●	●	●	●	▲	●								●		●	●	●	●	●						
TPH/U 1801 for corrosive gases							▲	●	●	●	▲	●		▲		▲	▲													▲	▲	▲							
TPH/U 2301							●	▲			●		●	●	●	●	●	▲	●								●		●	●	●	●							
TPH/U 2301 for corrosive gases							▲	●	●	●	▲	●		▲		▲	▲													▲	▲	▲							

● Recommended ▲ Possible

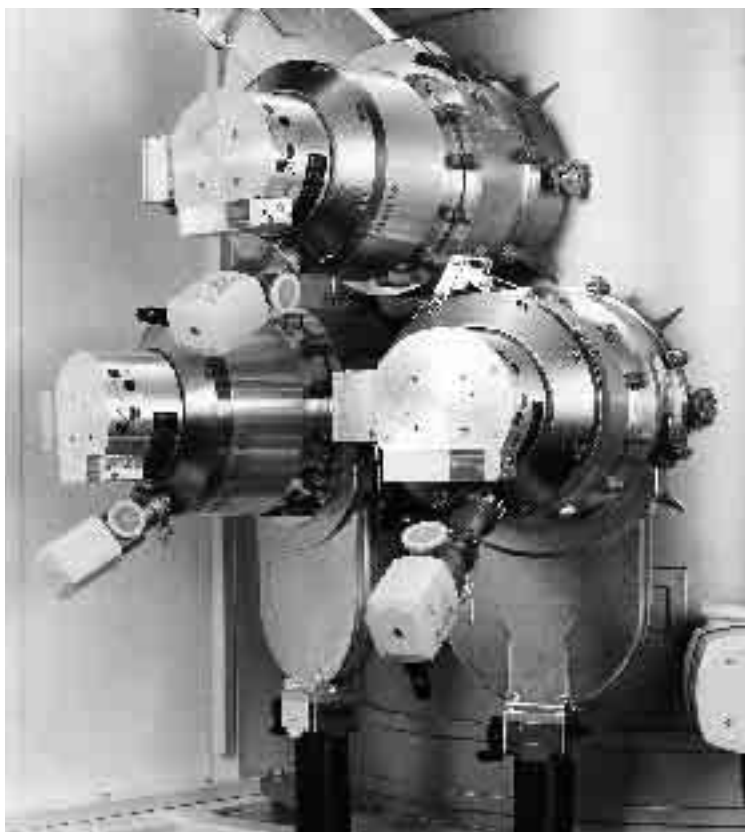
Applications

In the production of many products of everyday life and in many areas of engineering research, vacuum technology plays a decisive role. Here the turbopump is of decisive importance in providing extremely pure process conditions.

Examples for applications can be found in many different areas:

- ▶ **Analytics** (mass spectrometry, electron microscopy, and many more)
- ▶ **Semiconductor industry** (electronic components, integrated circuits (ICs), solar cells and many more)
- ▶ **Optical/glass industry** (heat protection, anti-reflection, reflection, optical filter coatings and many more)
- ▶ **Coating technology** (surface protection, decorative coatings, displays, screens and many more)

- ▶ **Vacuum metallurgy** (vacuum soldering, vacuum sintering, vacuum alloys, vacuum furnaces and many more)
- ▶ **Leak detection** (vacuum systems, vehicle fuel tanks, airbag cartridges, packages)
- ▶ **Research facilities** (nuclear particle physics, fusion research, Laser applications and many more)
- ▶ **Lamp industry** (lamp production and many more)



Evaporation coating of anti-reflection coatings on lenses in a spectacle glass coating unit.



Operating principle

The turbopump belongs to the kinetic type of vacuum pump. The pumping principle of impulse transfer to gas molecules operates efficiently only within a pressure range below 0.01 mbar. For this reason a further pump,

the so-called backing pump or fore-vacuum pump is required for operating a turbopump whereby the backing pump compresses the gases to atmospheric conditions.

Type series

Pfeiffer Vacuum as the inventor of the turbopump proves through the complete type series **CompactTurbo™** and **MagneticTurbo™** its engineering leadership. The entire spectrum of widely differing applications can be covered reliably and in a cost-effective manner.

The modular pump designs are available either by way of pure turbopumps or by way of turbopumps with integrated Holweck stages. Whereas classic turbopumps offer advantages in industrial applications involving particle loads and high gas loads, the advantage of the pumps equipped with Holweck stages is the higher start-up pressure with respect to the backing pump thereby reducing system costs and space requirements. In addition, turbopumps of a special design are available for applications involving corrosive gases.



CompactTurbo™

The Pfeiffer Vacuum **CompactTurbo™** series excels through its unique rotor design with a maintenance-free permanent magnetic bearing on the high vacuum side combined with ceramic ball bearings on the forevacuum side. This so-called hybrid bearing offers besides the best process compatibility, the utmost service life and reliability. The drive of the turbopumps can be designed to be highly flexible so that it can be adapted optimally to the specific application. Besides the integrated, space saving DC drive unit, separate drive units are available for the pumps up to a size of 500 l/s. The power supply may also be either integrated or separate.

The Pfeiffer Vacuum **HiMag™ 2400** pump, the drive and magnetic bearing electronics have been integrated within the pump. This pump may be powered either separately or integrated thereby offering the utmost flexibility combined with smallest size.

The advanced design tried and tested for reliability and ruggedness allows safe operation even in difficult applications due to the integrated safety concepts. With comprehensive diagnostic facilities, the user is informed at all times about the status of his magnetically suspended turbopump.

Patented venting mechanisms support the concept, minimize cycle times and accelerate necessary process interruptions.

The **MagneticTurbo™** series excels above all through the entirely magnetic and thus noncontact bearing which is maintenance-free. In the case of the MagneticTurbo™, the drive and magnetic bearing electronics have been combined with the power supply in a separate controller. In the case of the innovative and newly developed



MagneticTurbo™



Type designations

The product designation of Pfeiffer Vacuum turbopumps is self-explanatory and provides information on the specific variant of the pump in each case.

TPH¹ 1201² UPCN³

The product designation consists of a family designation (¹), the size which is oriented on the pumping speed of the pump (²) and on the properties (³) of the pump:

According to the example TPH¹ 1201² UPCN³ the product designation indicates the following:

1. Family designation

- T = Turbopump
- P = Pure turbopump
- M = Turbopump with Holweck stage
- S = Turbopumping station
- H = Flange variants ISO-K, ISO-KF or ISO-F for high vacuum applications
- U = CF-F flange, metal seal for ultrahigh vacuum applications
- D = "Drag" pump, for the medium vacuum range

2. Model designation

1201 = Model designation of the pump related to its pumping speed class

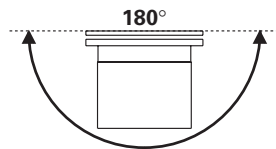
3. Properties

- U = **U**pside down version
- P = **P**urge sealing gas system
- M = **M**agnetic bearing
- C = **C**orrosive version for corrosive gases
- H = **H**igh throughput
- T = **T**emperature management system
- Y = Installation in any orientation
- N = Integrated power supply

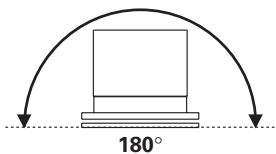


Installation orientations of turbopumps:

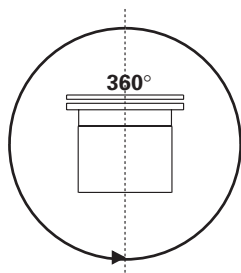
For pumps with the following characteristics:



P / PN / PC / PCN
Standard version



UP / UPN / UPC / UPCN
All turbopumps with
"U" in their properties



TPD011 / YP / YPN / MP / MPC /
MPCT / MPCH / MPCHT
All turbopumps with "Y" or "M"
in their properties

Important information relating to the technical data

Turbopumps are characterized through specific technical data which shall be described briefly in the following. Moreover, the brochure "Working with Turbopumps" which is available from Pfeiffer Vacuum provides in-depth information on operation, dimensioning and characterizing turbopumps.

Pumping speed

The pumping speed of a turbopump depends on its size and design. It is stated in liters per second and is a function of the intake pressure. The pumping speed characteristics are assigned to the products.

Compression ratio

The compression ratio of a turbopump is the ratio between forevacuum pressure measured at the forevacuum flange of the pump and the high vacuum pressure at the intake flange. Compression is stated for different types of gas and is determined without gas load. With the aid of this value it is possible to determine for a given backing pump the theoretical final pressure of the entire pumping station configuration.

Final pressures

The data stated for the final pressure apply for the conditions laid down in DIN 28428. These values are attained under clean conditions, using metal seals in the high vacuum area and after baking out or degassing the pump for 48 hours. Pumps with an aluminium housing are unsuitable for baking out and for this reason the final pressure is stated which is attained without baking the pump out and with clean Viton® seals.

The final pressures stated in the technical data are always practice related values which may be easily improved upon in the case of a corresponding pretreatment (venting with dry inert gas, degassing). The theoretically attainable minimum values depend on the gas-type specific compression ratios K_{0i} and the partial pressures P_{Vi} on the forevacuum side as well as the system-specific gas flows Q_{total} like, for example, desorption from the surface being pumped down by a turbopump having an effective pumping speed of S_{eff} .

$$P_{\text{final min}} = \frac{Q_{\text{total}}}{S_{\text{eff}}} + \frac{P_{\text{vv1}}}{K_{01}} + \dots + \frac{P_{\text{vvn}}}{K_{0n}}$$

As a rule, these theoretical final pressures can be attained only approximately since the system-specific conditions will generally have a significant influence on the final pressures.

Final pressures for turbopumps depending on housing material, flange type, backing pump used and rotor coating:

	Rotary vane pump or dry backing pump with $p < 0.05$ mbar	Diaphragm vacuum pump with $p < 0.05$ mbar	Corrosive gas version with rotary vane pump or dry backing pump with $p < 0.05$ mbar
Stainless-Steel housing with CF-F ¹⁾	$< 5 \cdot 10^{-10}$ mbar	$< 1 \cdot 10^{-8}$ mbar	$< 1 \cdot 10^{-8}$ mbar
Stainless-Steel housing with ISO-K ²⁾	$< 5 \cdot 10^{-10}$ mbar	$< 1 \cdot 10^{-8}$ mbar	$< 1 \cdot 10^{-8}$ mbar
Aluminium housing with ISO-K ³⁾	$< 1 \cdot 10^{-7}$ mbar	$< 1 \cdot 10^{-7}$ mbar	$< 1 \cdot 10^{-7}$ mbar

¹⁾ Bakeable with copper seal

²⁾ Bakeable with aluminium seal

³⁾ Not bakeable, with elastomer seal

Final pressure in accordance with DIN 28 428, attained in a measurement chamber 48 hours after baking out.



Gas throughput

The term gas throughput, is used to describe the ability of the turbopump to pump quantities of gas for a certain pressure level through the pump. Here there are many dependencies which are also dependent on the specific application. In the catalog, the various approaches for the maximum gas load of differing gases is taken into account through two different values.

1. Gas throughputs at an intake pressure of 0.1 mbar (speed drop is possible!)
2. Gas throughputs at nominal rotation speed

All gas throughput data stated in the technical data apply under the following conditions:

- Operation with a backing pump which at least offers the performance data of the backing pump specified in connection with the gas load data.
- Operation with water cooling at the specified water throughput and a water feed temperature of 25 °C max. Ambient temperature of 25 °C, use of sealing gas.

A turbopump cannot be operated simultaneously at its maximum gas load and at its maximum forevacuum pressure.

Maximum permissible forevacuum pressure

The maximum permissible forevacuum pressure of the turbopump is the pressure at which the turbopump can still be operated within the performance limits of the pump. It depends on the gas load pumped through the turbopump and the pumping speed of the backing pump used. For gas load operation, the forevacuum pressure should not exceed more than approximately 50 % of the maximum permissible forevacuum pressure.

Safety is important

Notes relating to the mounting materials for turbopumps

Our turbopumps excel by a high degree of safety. This is based on our own theoretical and practical analyses regarding the crash behavior and the high safety margins in the design of the pumps. And we must

claim the same also for the interface between the pumps and the customer's system. For this reason, we are offering a full line of installation components which ensure safe interface connections and which are presented together with the pump accessories.

Further information

Working with Turbopumps

Vacuum Solutions for the Analytical Industry

Order.-No.

PT 0053 PE

PI 0043 PE





**The high-performance turbopumps for all applications in
analytics, industry and research**

CompactTurbo™

Your advantages

The CompactTurbo™ series excels through its unique flexibility and variety, thereby optimally matching the respective requirements and applications of our customers.

We make a difference between necessary and optional accessories for operating the turbopump. The optional accessories allow for a useful adaptation of the pump to widely varying process conditions.

As an aid for selecting the right product, information is provided below on the usage of the accessories:

- ▶ **Drive electronics**
- ▶ **Power supplies**
- ▶ **Control units**
- ▶ **Accessories**

and ordering examples are provided at the end of this introduction.

Flexible

- ▶ Modular design
- ▶ Individual adaptation of operation
- ▶ Troublefree integration of further pumps and measuring instruments

Safe and reliable

- ▶ Highly reliable through rugged mechanical design and well proven bearing system
- ▶ Utmost reliability through constant monitoring of all connected components
- ▶ Worldwide service

Cost, space and time saving

- ▶ Minimum space requirement by compact design
- ▶ Very simple to operate due to plug and play
- ▶ Low system costs through small backing pumps

Drive electronics

The drive electronics drive and monitor the rotor and control the entire pump. Depending on the type of turbopump, the drive unit is either an integrated component of the pump or a separate unit.

Beyond only controlling the motor, the functions and parameters of the drive electronics are highly versatile and may be adapted through the serial interface, through the use of an operating unit or a PC to the respective applications and processes.

Integrated drive electronics

Depending on size and design of the desired turbopump, different integrated drive units are available. Specifically these are the **TC 100**, **TC 600** and **TC 750**.

Separate drive electronics

For the integration of the drive electronics within the customer's system, Pfeiffer Vacuum offers as an alternative to the integrated drive units, the plug-in board **TCK 100** for operation off 24 V DC. The pump types TPD 011 and TMH/U 071 to 262 are available equipped with this version.

Further flexibility is offered by the separate drive electronics **TCP 350** for the CompactTurbo™ pumps of size 071-521. This is ideal for applications in the area of research, for example, where the pumps are exposed to high-intensity radiation or where the system does not offer sufficient space for the integrated drive. The drive unit TCP 350 combines through its various functions of the drive electronics

described above also the power supply within a single compact unit. The length of the cable run between pump and TCP 350 may be up to 100 m.



Power supplies

TPS 100, TPS 150, TPS 200, TPS 300, TPS 600

In order to operate the pumps with TC, a power supply (output voltage 24 to 140 V depending on the type of pump) is necessary. These units ensure the corresponding power supply for the turbopump. These power supply units can be used worldwide in connection with all standard single phase mains. A further simplification in the usage of the turbopumps is offered by the unique, complete integration of compact power supplies in the entire pump

family of the CompactTurbo™ series. This version offers a maximum degree of independence with minimum installation complexity.

Further operational convenience is provided through the combined display and operating units with integrated power supplies for the respective pump size. These Display Control Units (DCU) can be installed within standardized rack systems and offer many possibilities of adjustment and control.



CompactTurbo™ with integrated power supply

Control units

Display Control Unit DCU and Handheld Programming Unit HPU

With the aid of the discrete Display Control Unit DCU 001, all control and information means of the turbopump implemented in TC may, through the existing interface, be indicated, respectively configured independently of a higher level controller.

An expanded functionality compared to the installable DCU is offered by the Handheld Programming Unit HPU 001 through which completely configured parameter sets can be read from the TC and also saved within the HPU. With the HPU 001, the saved data sets may then be transferred to other pumps.

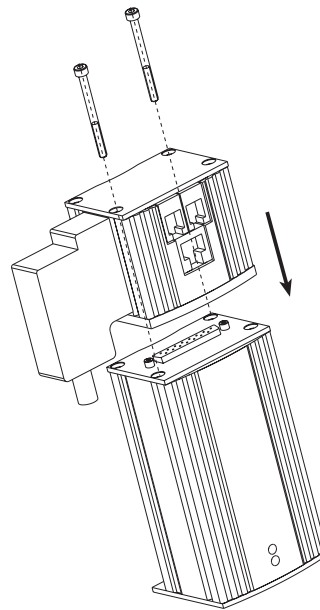
Accessories

For the CompactTurbo™ type series we are offering a comprehensive line of accessories which, owing to its modularity, can be adapted to any application. In the following figure the important accessory items are presented.

Besides the accessories shown **like venting valve, sealing gas valve, heater, relay for controlling the backing pump, water cooling and air cooling, the operating units DCU and the power supply TPS** are available either as 19-in. rackmount modules or separately by way of individual components.

For maximum reliability and process flexibility, an adequate cooling unit (air or water) needs to be provided.

When using turbopumps within systems which are particularly sensitive to vibrations, like electron microscopes, for example, additional **vibration compensators** are available.



TC 100 with plugged on TCS 010

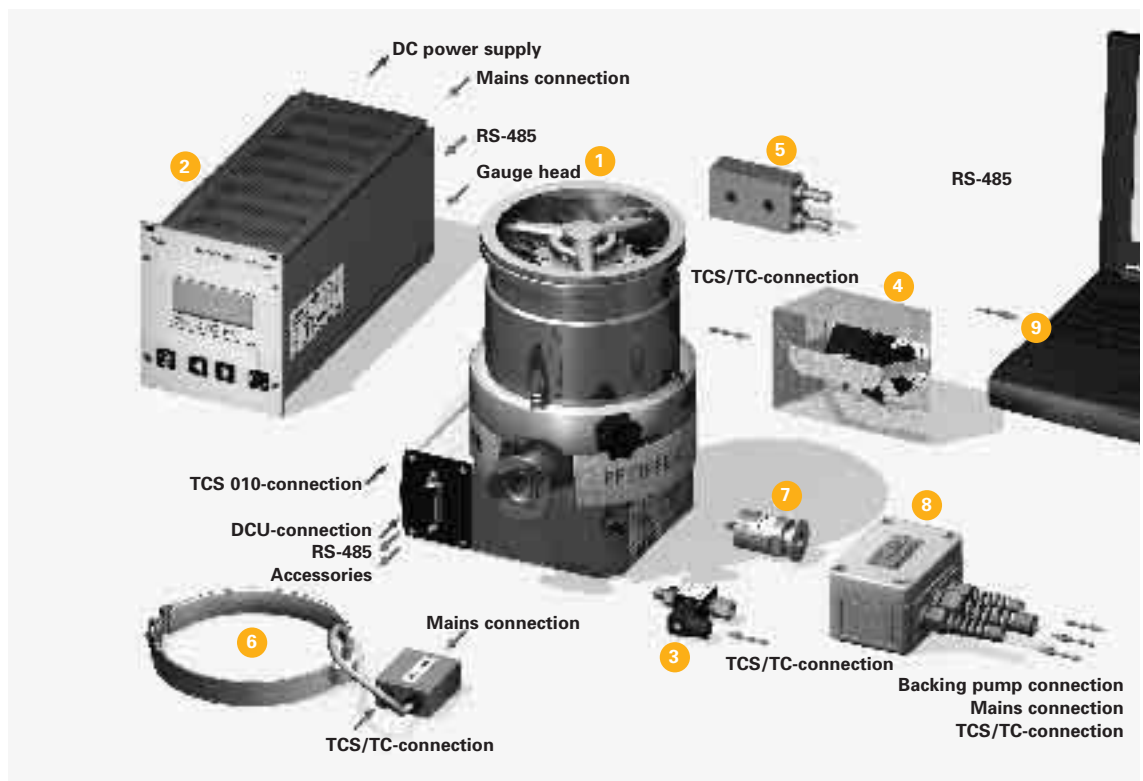
When using the TC 600/TC 750, up to four accessory items (venting valve, heater, relay for backing pump control and air cooling) may be connected directly. In the case of the TC 100 and when wanting to operate up to 2 accessory items, the TCS 010 needs to be used in addition.

For trouble-free integration within systems which are controlled by field buses, various field bus options are available in addition.

For the allocation of the accessory items with respect to the individual pumps, please refer to the accessories overviews for the individual pump groups.



- 1 Pump and controller
- 2 Power supply (TPS) with integrated Display Control Unit DCU
- 3 Venting valve
- 4 Air cooling
- 5 Water cooling
- 6 Heater
- 7 Sealing gas valve
- 8 Relay box for backing pump
- 9 PC



Drive concept TC 100 with accessories

Ordering examples:

Customer's requirement: TMH 071 P, DN 63 ISO-K with TC 100, power supply (230 V), water cooling

Item	Order.-No.	Description
1	PM P02 980	TMH 071 P, DN 63 ISO-K incl. TC 100
2	PM 051 421	Connection cable TC-TPS
3	PM 041 827 -T	Mains pack TPS 100 for wall/standard rail fitting
4	P 4564 309 ZA	Mains cable 230 V (safety plug)
5	PM 016 000 -T	Water cooling
6	PM 016 360 -T	Mounting kit (centering ring + bracket screws)

Customer's requirement: TMH 261 P, DN 100 CF, TCP 350, water cooling, heater (230 V), splinter shield

Item	Order.-No.	Description
1	PM P03 455	TMH 261 P, DN 100 CF for TCP 350
2	PM 051 803 -T	Connection cable Turbo-TCP 350
3	PM C01 740	TCP 350
4	P 4564 309 ZA	Mains cable 230 V (EURO)
5	PM 016 040 -T	Water cooling
6	PM 041 903 -T	Heating sleeve (230 V)
7	PM 016 315	Splinter guard DN 100 CF
8	PF 505 003 -T	Mounting kit (hex. screw kit + washers and nuts)

Customer's requirement: TMH 262, DN 100 ISO-K, suitable for all systems, onboard power supply (US, 110 V), air cooled, venting valve

Item	Order.-No.	Description
1	PM P03 540	TMH 262 YPN, DN 100 ISO-K incl. TC 100 and integrated power supply
2	P 4564 309 ZE	Mains cable 110 V (US)
3	PM 061 460 -U	TCS 010 (for connecting the air cooling and/or venting valve)
4	PM Z01 252	Air cooling
5	PM Z01 135	Venting valve TVF 005
6	PM 016 365 -T	Mounting kit (centering ring + bracket screws)

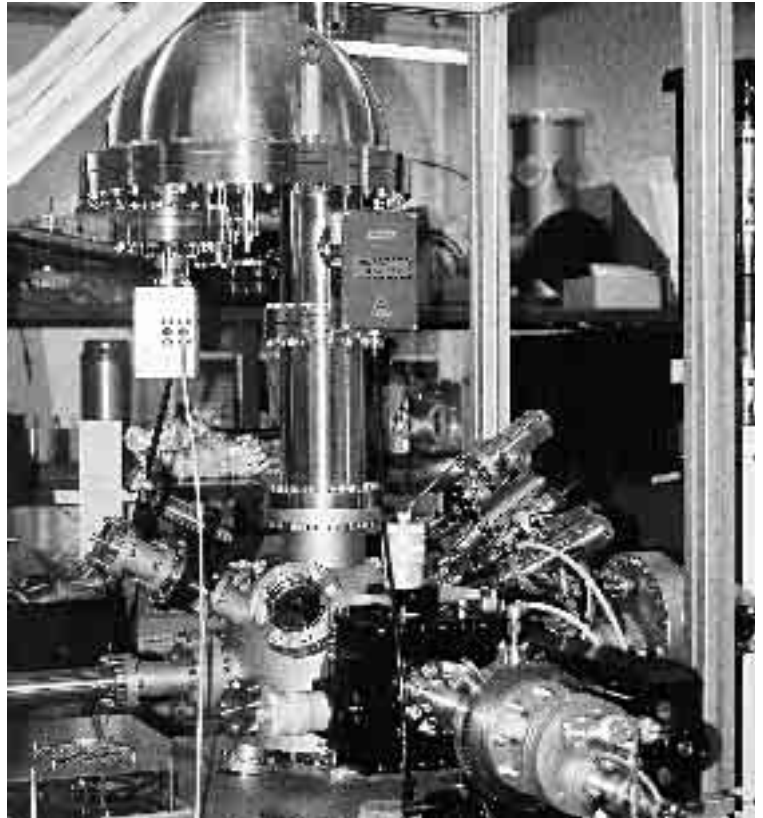
Customer's requirement: TPH 2301 DN 250 ISO-F, corrosive gas version, water cooling, power supply including display (US, 110 V), sealing gas valve, Profibus adapter, mesh guard

Item	Order.-No.	Description
1	PM P03 846	TPH 2301 PC, DN 250 ISO-F incl. TC 750 and water cooling
2	PM 051 103 -T	Connection cable TC-TPS
3	PM C01 697	DCU 600
4	P 4564 309 ZE	Mains cable 110 V (US)
5	PM Z01 142	Sealing gas valve
6	PM 051 257 -T	Profibus Gateway TIC 250
7a	PM 016 482 -T	Mounting kit (protective screen + centering ring + hex. screws)
7b	PM 016 487 -T	Mounting kit (protective screen + centering ring + stud screws + nuts)

Applications



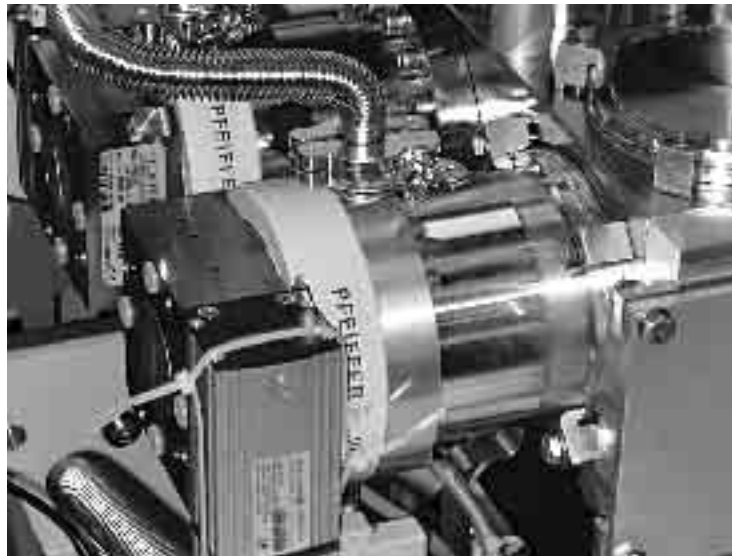
Pumping of xenon at high gas loads within a lithography system using extremely short wave ultraviolet light



Surface analysis with TMH 521, TMH 071



Scanning electron microscope (SEM) with TMH 262, TPD 011



Fourier Transformation Mass Spectrometer (FT-MS) with TMU 262

Drag pump with a pumping speed of 10 l/s

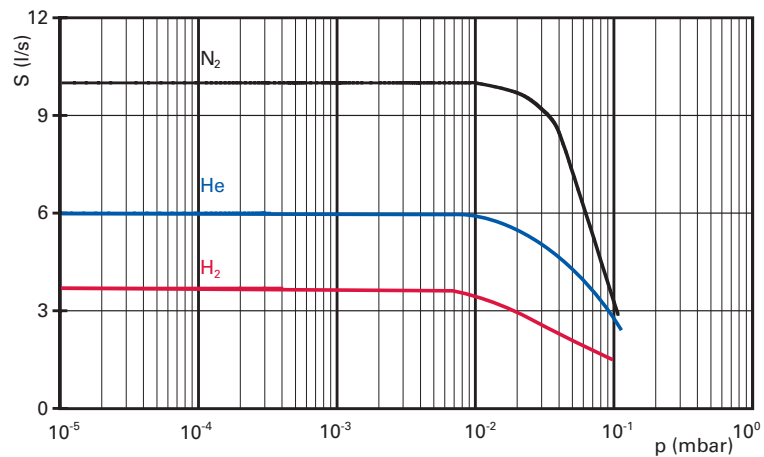
TPD 011



- ▶ The worlds smallest mass produced drag pump
- ▶ Very high critical backing pressure allows the use of small diaphragm pumps
- ▶ Integrated drive unit TC100
- ▶ Integrated power supply available (N type)
- ▶ Rugged mechanical design
- ▶ Unaffected by vibrations and impact, ideal for mobile applications
- ▶ Interfaces: RS-485, Remote, Profibus optional
- ▶ Type of cooling: Convection cooling

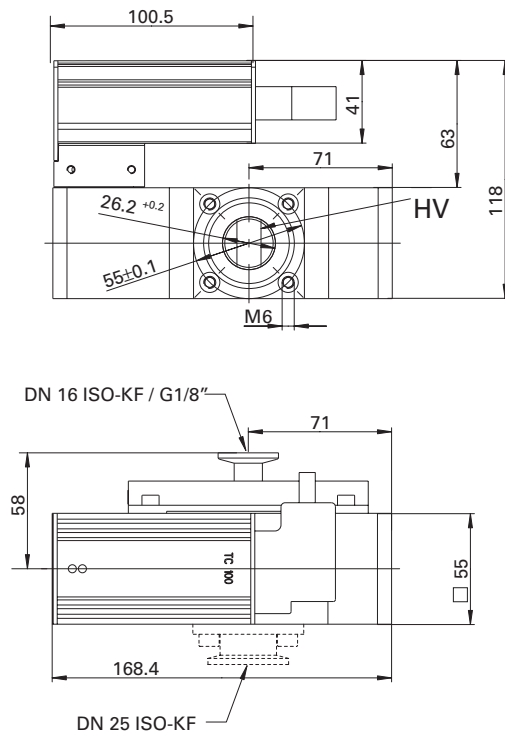


Pumping speed

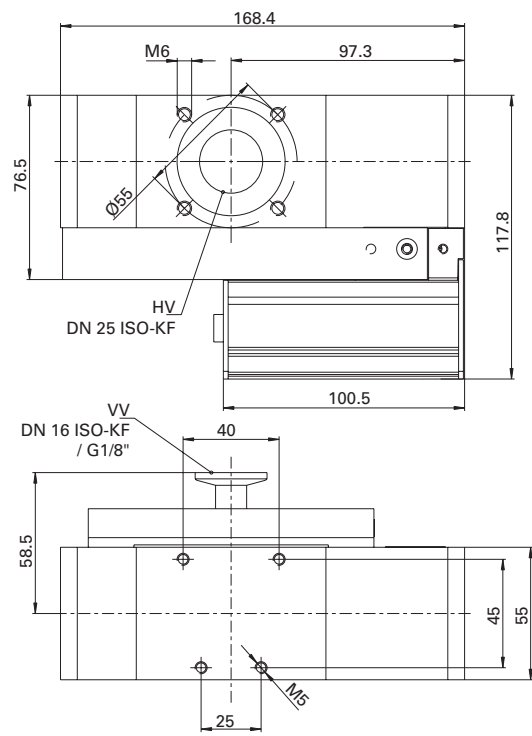


TPD 011, DN 25

Dimensions (in mm)



TPD 011, DN 25 ISO



TPD 011 N, DN 25 ISO

Technical data - TPD 011

TPD 011/ TPD 011 N DN 25 ISO-K	
Connection nominal diameter	
Flange (in)	DN 25
Flange (out)	DN16 ISO-KF / G 1/8"
Venting connection	no connection
Pumping speed [l/s]	
Hydrogen H ₂	3.7
Helium He	6
Nitrogen N ₂	10
Argon Ar	11.5
Compression ratio	
Hydrogen H ₂	$3 \cdot 10^2$
Helium He	$3 \cdot 10^3$
Nitrogen N ₂	$3 \cdot 10^6$
Argon Ar	$3 \cdot 10^7$
Max. fore vacuum pressure for N₂ [mbar]	25
Max. gas throughput at 0.1 mbar HV [mbar l/s]	
Hydrogen H ₂	0.15
Helium He	0.3
Nitrogen N ₂	0.65
Argon Ar	0.78
Max. gas throughput at nom. rotation speed [mbar l/s]	
Pumping speed of used backing pump	2.5 m ³ /h
Hydrogen H ₂	0.15
Helium He	0.15
Nitrogen N ₂	0.15
Argon Ar	0.15
Ultimate pressure [mbar]	$< 5 \cdot 10^{-5}$
Rotational speed [1/min]	90000
Run-up time [min]	0.9
Cooling method, standard	Convection cooling
Cooling water consumption [l/h]	-
Max. cooling water temperature [°C]	-
Weight [kg]	1.9
Ordering number pump	
with drive unit TC 100	PM P02 607
with drive unit TC 100 and integrated power supply	PM P03 640



Ordering numbers power supplies and cables - TPD 011

TPD 011/ TPD 011 N DN 25	
Ordering number pump	
with drive unit TC 100	PM P02 607
with drive unit TC 100 and integrated power supply	PM P03 640
Power supplies/power¹⁾	
DCU 100	100 W
power supply incl. Display control unit	PM C01 694
TPS 100 mains pack for wall/standard rail fitting	PM 041 827-T
TPS 101 mains pack 19" rack module 3 HE	PM 041 828-T
Control units	
DCU 001 Display Control Unit	PM 041 816-T
HPU 001 Handheld Programming Unit	PM 051 510-T
Accessorie for HPU (Power supply, software, PC-cable)	PM 061 005-T
Mains cable DCU/TPS/TCP/on Board, 3 m	
with safety plug (230 V AC)	P 4564 309 ZA
with UL plug (115 V AC)	P 4564 309 ZE
with UL plug (208 V AC)	P 4564 309 ZF
On Board (TPD 011 only, length 1.5 m)	
with safety plug (230 V AC)	P 4564 309 OA
with UL plug (115 V AC)	P 4564 309 OB
Connection cable, length 3 m for¹⁾	
TC 100 - TPS 100/150 with bridge	PM 051 421-T
TC 100/TCS 010 - TPS/DCU 100/150/200	PM 051 541-T
TC 100 - TPS/DCU 100/150/200 with RS-485	PM 051 431-T
Connection box TCS 010 for accessories and RS-485	PM 051 460-U
¹⁾ not for pumps with integrated power supply "N-Types"	



Ordering numbers accessories - TPD 011

Venting units and components	
Air drier TTV 001	PM Z00 121
Backing pump control	
Relay box, 1-phase 5 A (Diaphragm pump)	PM 041 937-T
Relay box, 1-phase 20 A (Rotary vane pump)	PM 041 938-T
Fore vacuum safety valve TVV 001, DN 16 ISO-KF 230 V AC	PM Z01 205
Fore vacuum safety valve TVV 001, DN 16 ISO-KF 115 V AC	PM Z01 206
General accessories	
Serial Interface Converter RS-232-485	PM 051 054-T
Profibus - Gateway TIC 250	PM 051 257-T
Adapter DN 25 ISO-KF	PM 093 315-T

TurboDrag pumps with a pumping speed up to 70 l/s

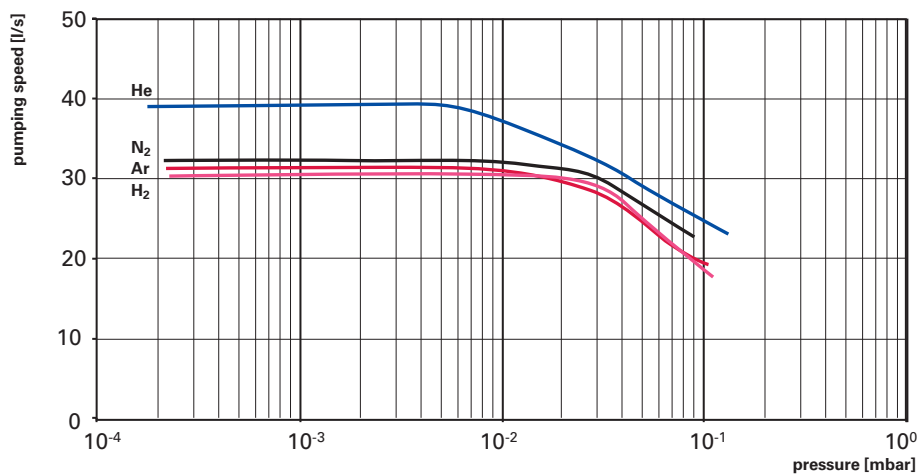
TMH/U 071



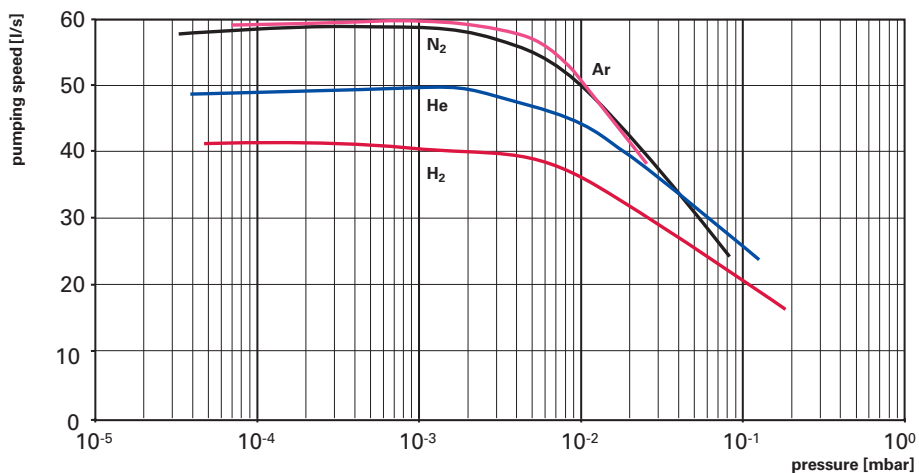
- ▶ Very high critical backing pressure allows the use of diaphragm pumps
- ▶ Modular drive and accessories concept
- ▶ Integrated drive unit TC 100
- ▶ Integrated power supply available (N types)
- ▶ Separate drive unit with power supply TCP 350 available as an alternative
- ▶ Installation in any orientation (Y types)
- ▶ Integrated sealing gas system
- ▶ Type of cooling: Air/water cooling
- ▶ Interfaces: RS-485, Remote, Profibus optional



Pumping speed

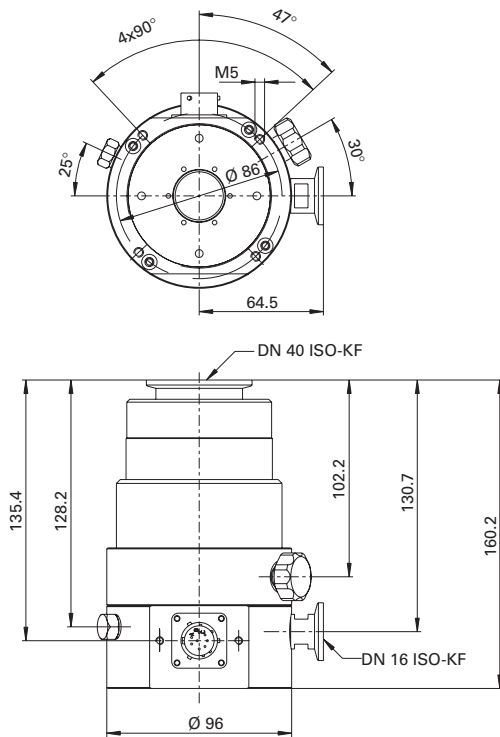


TMH 071 P, DN 40

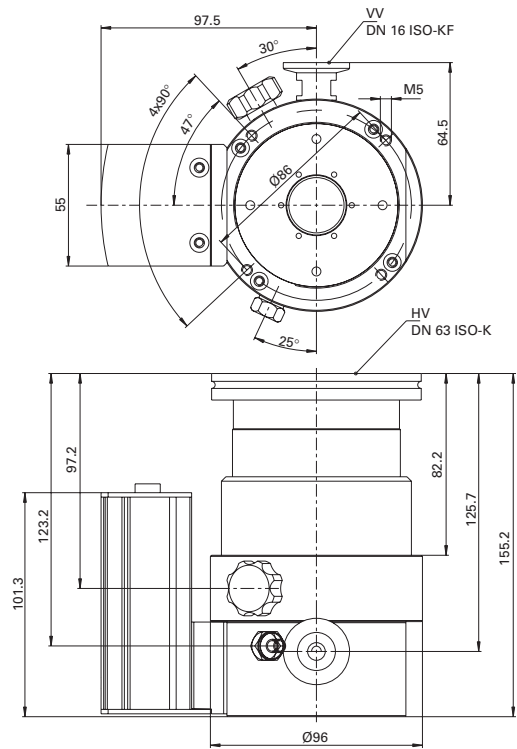


TMH 071 P, DN 63

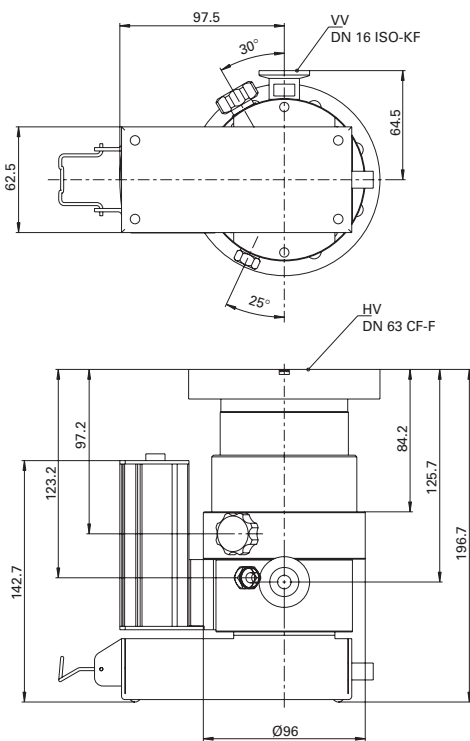
Dimensions (in mm)



TMH 071 P, DN 40 ISO-KF, for TCP 350



TMH 071 P, DN 63 ISO-K



TMU 071 P N, DN 63 CF-F

Technical data - TMH/U 071

	TMH 071 P DN 40 KF	TMH/U 071 P DN 63 ISO-K/ CF-F	TMH 071 P DN 40 KF	TMH/U 071 P DN 63 ISO-K/ CF-F
Connection nominal diameter				
Flange (in)	DN 40	DN 63	DN 40	DN 63
Flange (out)	DN 16 ISO-KF / G 1/4"	DN 16 ISO-KF / G 1/4"	DN 16 ISO-KF / G 1/4"	DN 16 ISO-KF / G 1/4"
Venting connection	G 1/8"	G 1/8"	G 1/8"	G 1/8"
Pumping speed [l/s]				
Hydrogen H ₂	32	42	32	42
Helium He	39	50	39	50
Nitrogen N ₂	33	59	33	59
Argon Ar	31	60	31	60
Compression ratio				
Hydrogen H ₂	>10 ⁵	>1·10 ⁵	>10 ⁵	>1·10 ⁵
Helium He	6·10 ⁶	6·10 ⁶	6·10 ⁶	6·10 ⁶
Nitrogen N ₂	>10 ¹¹	>10 ¹¹	>10 ¹¹	>10 ¹¹
Argon Ar	>10 ¹¹	>10 ¹¹	>10 ¹¹	>10 ¹¹
Max. fore vacuum pressure for N₂ [mbar]				
	18	18	18	18
Max. gas throughput at 0.1 mbar HV [mbar l/s]				
Hydrogen H ₂	2	2	2	2
Helium He	3	3	3	3
Nitrogen N ₂	2	2	2	2
Argon Ar	2	2	2	2
Max. gas throughput at nom. rotation speed [mbar l/s]				
Pumping speed of used backing pump	2.5 m ³ /h	2.5 m ³ /h	2.5 m ³ /h	2.5 m ³ /h
Hydrogen H ₂	7.3	7.3	7.3	7.3
Helium He	2.5	2.5	2.5	2.5
Nitrogen N ₂	1.2	1.2	1.2	1.2
Argon Ar	0.5	0.5	0.5	0.5
Ultimate pressure (see page 144) [mbar]	<1·10 ⁻⁷	<5·10 ⁻¹⁰	<1·10 ⁻⁷	<5·10 ⁻¹⁰
Rotational speed [1/min]	90000	90000	90000	90000
Run-up time [min]	2.5	2.5	2.5	2.5
Cooling method, standard	Air	Air	Air	Air
Cooling water consumption [l/h]	100	100	100	100
Max. cooling water temperature [°C]	25	25	25	25
Weight [kg]	2.4	3.8	2	3.4
Ordering number pump				
with drive unit TC 100	ISO-KF	PM P02 982	-	-
	ISO-K	-	PM P02 980	-
	CF-F	-	PM P02 981	-
with drive unit TC 100 and integrated power supply	ISO-KF	-	-	-
	ISO-K	-	-	-
	CF-F	-	-	-
without drive unit (for TCP 350)	ISO-KF	-	PM P03 442	-
	ISO-K	-	-	PM P03 440
	CF-F	-	-	PM P03 441



TMH 071 YP DN 40 KF	TMH/U 071 YP DN 63 ISO-K/ CF-F	TMH 071 YP DN 40 KF	TMH/U 071 YP DN 63 ISO-K/ CF-F	TMH 071 YPN DN 40 KF	TMH/U 071 YPN DN 63 ISO-K/ CF-F
DN 40	DN 63	DN 40	DN 63	DN 40	DN 63
DN 16 ISO-KF / G 1/4"	DN 16 ISO-KF / G 1/4"	DN 16 ISO-KF / G 1/4"	DN 16 ISO-KF / G 1/4"	DN 16 ISO-KF / G 1/4"	DN 16 ISO-KF / G 1/4"
G 1/8"	G 1/8"	G 1/8"	G 1/8"	G 1/8"	G 1/8"
32	42	32	42	32	40
39	50	39	50	39	48
33	59	33	59	33	56
31	60	31	60	31	56
$>10^5$	$>1 \cdot 10^5$	$>10^5$	$>1 \cdot 10^5$	$>10^5$	$>1 \cdot 10^5$
$6 \cdot 10^6$	$6 \cdot 10^6$	$6 \cdot 10^6$	$6 \cdot 10^6$	$6 \cdot 10^6$	$6 \cdot 10^6$
$>10^{11}$	$>10^{11}$	$>10^{11}$	$>10^{11}$	$>10^{11}$	$>10^{11}$
$>10^{11}$	$>10^{11}$	$>10^{11}$	$>10^{11}$	$>10^{11}$	$>10^{11}$
18	18	18	18	16	16
2	2	2	2	2	2
3	3	3	3	3	3
2	2	2	2	2	2
2	2	2	2	2	2
2.5 m ³ /h	2.5 m ³ /h	2.5 m ³ /h	2.5 m ³ /h	2.5 m ³ /h	2.5 m ³ /h
7.3	7.3	7.3	7.3	4.5	4.5
2.5	2.5	2.5	2.5	1.8	1.8
1.2	1.2	1.2	1.2	0.6	0.6
0.5	0.5	0.5	0.5	0.3	0.3
$<1 \cdot 10^{-7}$	$<5 \cdot 10^{-10}$	$<1 \cdot 10^{-7}$	$<5 \cdot 10^{-10}$	$<1 \cdot 10^{-7}$	$<5 \cdot 10^{-10}$
90000	90000	90000	90000	90000	90000
2.5	2.5	2.5	2.5	2.5	2.5
Air	Air	Air	Air	Air	Air
100	100	100	100	-	-
25	25	25	25	-	-
2.4	3.8	2.1	3.4	2.8	4.2
PM P03 525	-	-	-	-	-
-	PM P03 523	-	-	-	-
-	PM P03 524	-	-	-	-
-	-	-	-	PM P03 657	-
-	-	-	-	-	PM P03 655
-	-	-	-	-	PM P03 656
-	-	PM P03 528	-	-	-
-	-	-	PM P03 526	-	-
-	-	-	PM P03 527	-	-

Ordering numbers power supplies and cables - TMH/U 071

	TMH/U 071 P		
	DN 40 ISO-KF	DN 63 ISO-K	DN 63 CF-F
Ordering number pump			
with drive unit TC 100	PM P02 982	PM P02 980	PM P02 981
with drive unit TC 100 and integrated power supply	-	-	-
without drive unit (for TCP 350)	PM P03 442	PM P03 440	PM P03 441
Power supplies/power¹⁾			
DCU 100	100 W	100 W	100 W
DCU 100 power supply incl. Display control unit	PM C01 694	PM C01 694	PM C01 694
TPS 100 mains pack for wall/standard rail fitting	PM 041 827-T	PM 041 827-T	PM 041 827-T
TPS 101 mains pack 19" rack module 3 HE	PM 041 828-T	PM 041 828-T	PM 041 828-T
Turbo controller			
TCP 350	PM C01 740	PM C01 740	PM C01 740
TCP 350 with inbuilt Profibus interface	PM C01 741	PM C01 741	PM C01 741
Control units			
DCU 001 Display Control Unit	PM 041 816-T	PM 041 816-T	PM 041 816-T
HPU 001 Handheld Programming Unit	PM 051 510-T	PM 051 510-T	PM 051 510-T
Accessorie for HPU (Power supply, software, PC-cable)	PM 061 005-T	PM 061 005-T	PM 061 005-T
Mains cable DCU/TPS/TCP/on Board, 3 m			
with safety plug (230 V AC)	P 4564 309 ZA	P 4564 309 ZA	P 4564 309 ZA
with UL plug (115 V AC)	P 4564 309 ZE	P 4564 309 ZE	P 4564 309 ZE
with UL plug (208 V AC)	P 4564 309 ZF	P 4564 309 ZF	P 4564 309 ZF
Connection cable, length 3 m for			
TC 100 - TPS 100/150 with bridge ¹⁾	PM 051 421-T	PM 051 421-T	PM 051 421-T
TC 100/TCS 010 - TPS/DCU 100/150/200 ¹⁾	PM 051 541-T	PM 051 541-T	PM 051 541-T
TC 100 - TPS/DCU 100/150/200 with RS-485 ¹⁾	PM 051 431-T	PM 051 431-T	PM 051 431-T
TC 600 - TPS/DCU 100/200/300 ¹⁾	-	-	-
TCP 350 - Turbo 071/261/521	PM 051 803-T	PM 051 803-T	PM 051 803-T
Connection box TCS 010 for accessories and RS-485	PM 051 460-U	PM 051 460-U	PM 051 460-U

¹⁾ not for pumps with integrated power supply "N-Types" and TCP 350



TMH/U 071 YP/YPN		
DN 40 ISO-KF	DN 63 ISO-K	DN 63 CF-F
PM P03 525	PM P03 523	PM P03 524
PM P03 657	PM P03 655	PM P03 656
PM P03 528	PM P03 526	PM P03 527
100 W	100 W	100 W
PM C01 694	PM C01 694	PM C01 694
PM 041 827-T	PM 041 827-T	PM 041 827-T
PM 041 828-T	PM 041 828-T	PM 041 828-T
PM C01 740	PM C01 740	PM C01 740
PM C01 741	PM C01 741	PM C01 741
PM 041 816-T	PM 041 816-T	PM 041 816-T
PM 051 510-T	PM 051 510-T	PM 051 510-T
PM 061 005-T	PM 061 005-T	PM 061 005-T
-	-	-
-	-	-
-	-	-
PM 051 421-T	PM 051 421-T	PM 051 421-T
PM 051 541-T	PM 051 541-T	PM 051 541-T
PM 051 431-T	PM 051 431-T	PM 051 431-T
-	-	-
PM 051 803-T	PM 051 803-T	PM 051 803-T
PM 051 460-U	PM 051 460-U	PM 051 460-U



Ordering numbers Accessories - TMH/U 071

	TMH/U 071 P		
	DN 40 ISO-KF	DN 63 ISO-K	DN 63 CF-F
Ordering number pump			
with drive unit TC 100	PM P02 982	PM P02 980	PM P02 981
with drive unit TC 100 and integrated power supply	-	-	-
without drive unit (for TCP 350)	PM P03 442	PM P03 440	PM P03 441
Venting units and components			
Venting valve TVF 005	PM Z01 135	PM Z01 135	PM Z01 135
Air drier TTV 001	PM Z00 121	PM Z00 121	PM Z00 121
Cooling accessories			
Heat sink	PM 093 237-T	PM 093 237-T	PM 093 237-T
Air cooling	PM Z01 253	PM Z01 253	PM Z01 253
Water cooling ¹⁾	PM 016 000-T	PM 016 000-T	PM 016 000-T
Water cooling unit TZK 400 230V/50Hz ¹⁾	PM Z01 245	PM Z01 245	PM Z01 245
Heating accessories¹⁾			
Heating jacket 230 V AC, safety plug	-	-	PM 041 900-T
Heating jacket 208 V AC, UL plug	-	-	PM 041 901-T
Heating jacket 115 V AC, UL plug	-	-	PM 041 902-T
Backing pump control			
Relay box, 1-phase 5 A (Diaphragm pump)	PM 041 937-T	PM 041 937-T	PM 041 937-T
Relay box, 1-phase 20 A (Rotary vane pump)	PM 041 938-T	PM 041 938-T	PM 041 938-T
Connection cable backing pump relay box - TCP 350	PM 061 144-X	PM 061 144-X	PM 061 144-X
Fore vacuum safety valve TVV 001, DN 16 ISO-KF 230 V AC	PM Z01 205	PM Z01 205	PM Z01 205
Fore vacuum safety valve TVV 001, DN 16 ISO-KF 115 V AC	PM Z01 206	PM Z01 206	PM Z01 206
General accessories			
Sealing gas valve	PM Z01 142	PM Z01 142	PM Z01 142
Coated centering ring	-	PM 016 206-U	-
Coated centering ring with protection screen	-	PM 016 208-U	-
Protection screen	-	-	PM 016 333
Coated centering ring with integrated splinter shield	-	PM 016 207-U	-
Splinter shield	PM 006 375-X	-	PM 016 312
Vibration damper	PM 006 799-X	PM 006 800-X	PM 006 801-X
Cover plate IP 54 for the TC 600/750	-	-	-
PWM-box, pre-switching unit for rotation speed control	-	-	-
Serial Interface Converter RS-232-485	PM 051 054-T	PM 051 054-T	PM 051 054-T
Profibus - Gateway TIC 250	PM 051 257-T	PM 051 257-T	PM 051 257-T
Mounting materials			
Coated centering ring, bracket screws	-	PM 016 360-T	-
Coated centering ring with protect. screen, bracket screws	-	PM 016 362-T	-
Coated centering ring with splinter shield, bracket screws	-	PM 016 361-T	-
Set of hexagonal bolts for CF-flanges	-	-	PF 505 002-T
Set of stud screws for CF-flanges	-	-	PF 507 002-T

¹⁾ not for pumps with integrated power supply "N-Types"



TMH/U 071 YP/YPN		
DN 40 ISO-KF	DN 63 ISO-K	DN 63 CF-F
PM P03 525	PM P03 523	PM P03 524
PM P03 657	PM P03 655	PM P03 656
PM P03 528	PM P03 526	PM P03 527
PM Z01 135	PM Z01 135	PM Z01 135
PM Z00 121	PM Z00 121	PM Z00 121
PM 093 237-T	PM 093 237-T	PM 093 237-T
PM Z01 253	PM Z01 253	PM Z01 253
PM 016 000-T	PM 016 000-T	PM 016 000-T
PM Z01 245	PM Z01 245	PM Z01 245
-	-	PM 041 900-T
-	-	PM 041 901-T
-	-	PM 041 902-T
PM 041 937-T	PM 041 937-T	PM 041 937-T
PM 041 938-T	PM 041 938-T	PM 041 938-T
PM 061 144-X	PM 061 144-X	PM 061 144-X
PM Z01 205	PM Z01 205	PM Z01 205
PM Z01 206	PM Z01 206	PM Z01 206
PM Z01 142	PM Z01 142	PM Z01 142
-	PM 016 206-U	-
-	PM 016 208-U	-
-	-	PM 016 333
-	PM 016 207-U	-
PM 006 375-X	-	PM 016 312
PM 006 799-X	PM 006 800-X	PM 006 801-X
-	-	-
-	-	-
PM 051 054-T	PM 051 054-T	PM 051 054-T
PM 051 257-T	PM 051 257-T	PM 051 257-T
-	PM 016 360-T	-
-	PM 016 362-T	-
-	PM 016 361-T	-
-	-	PF 505 002-T
-	-	PF 507 002-T

TurboDrag and turbomolecular pumps with pumping speed up to 250 l/s

TMH/U 261/262



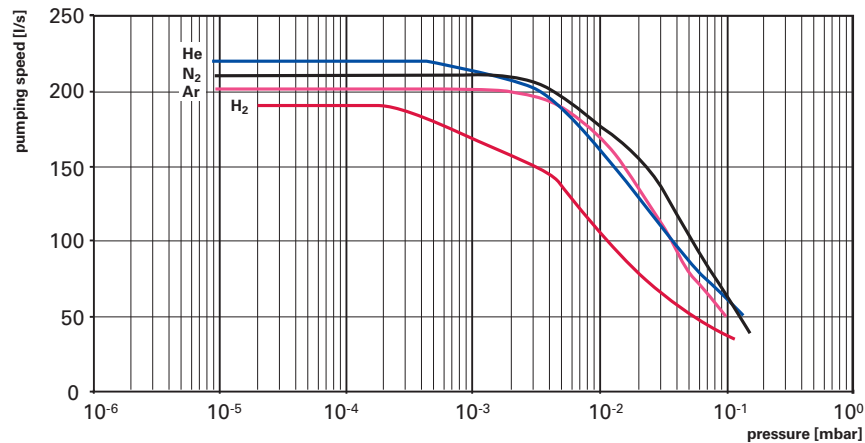
TMH/U 261/262:

- ▶ TurboDrag pump
- ▶ Very high critical backing pressure allows the use of diaphragm pumps
- ▶ Modular drive and accessories concept
- ▶ Integrated drive unit TC600 / TC100
- ▶ Integrated power supply available (N types)
- ▶ Separate drive unit with power supply TCP350 available as an alternative
- ▶ Installation in any orientation (Y types)
- ▶ Integrated sealing gas system
- ▶ Type of cooling: Air/water cooling
- ▶ Interfaces: RS-485, Remote, Profibus optional

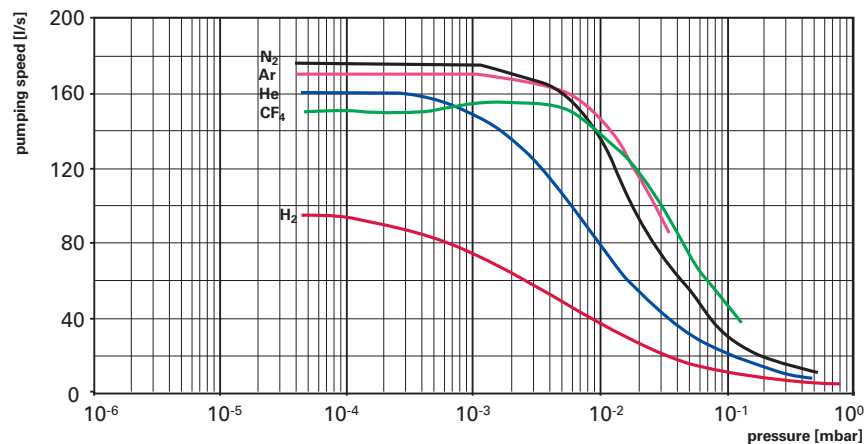
TPH 261 PC:

- ▶ Turbomolecular pump designed to handle corrosive gases
- ▶ Able to withstand high particulate applications
- ▶ Modular accessories concept
- ▶ Integrated drive unit TC 600
- ▶ Corrosion resistant lubricant
- ▶ Lubricant supply through an oil pump system
- ▶ Integrated sealing gas system
- ▶ Type of cooling: Water cooling
- ▶ Interfaces: RS485, Remote, Profibus optional

Pumping speed

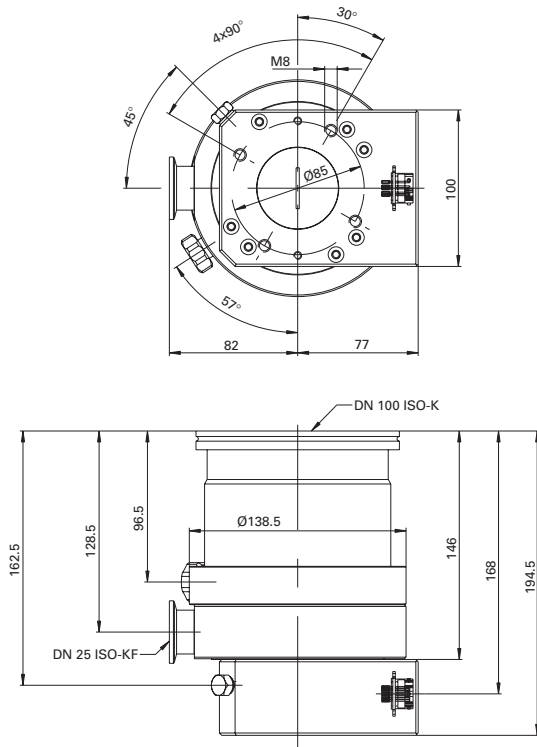


TMH 261 P, DN 100

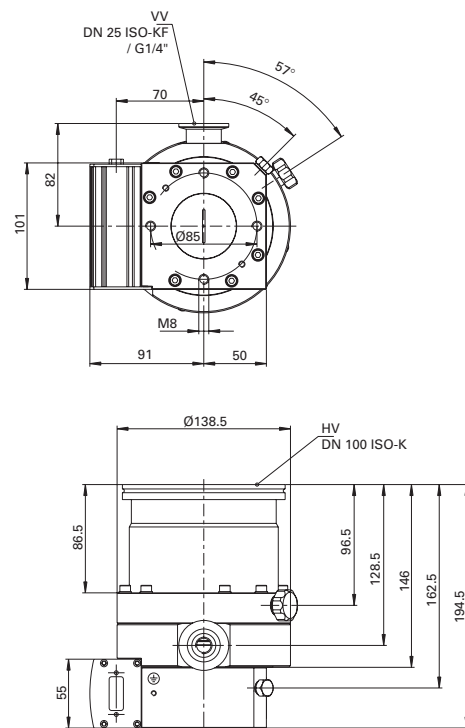


TPH 261 PC, DN 100

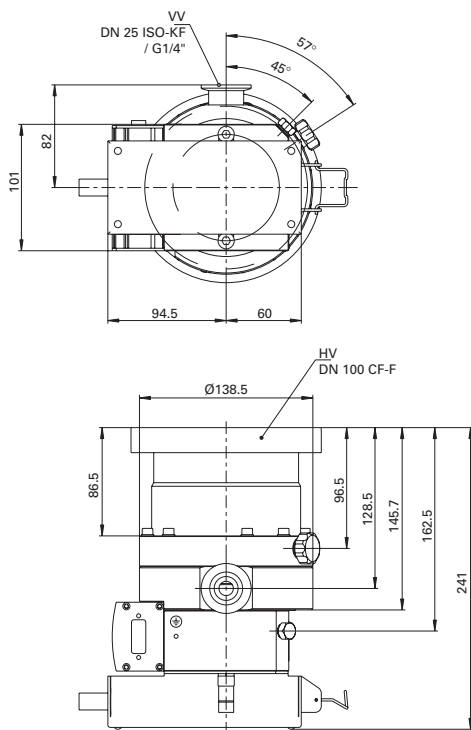
Dimensions (in mm)



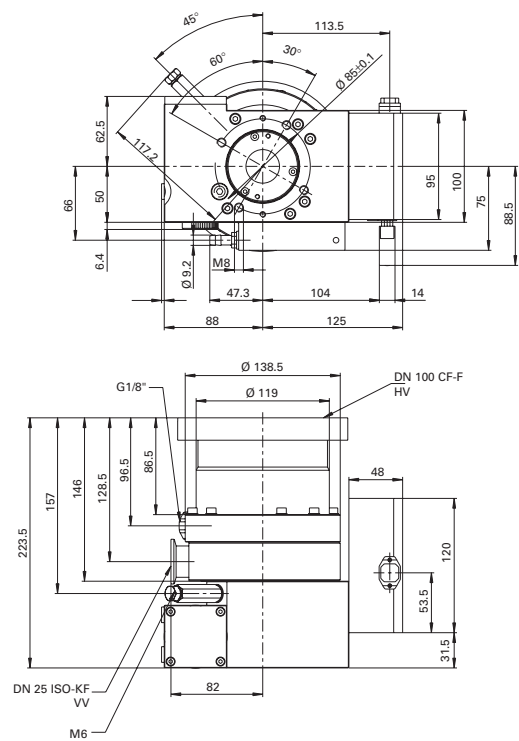
TMH 261 P, DN 100 ISO-K, for TCP 350



TMH 262 P, DN 100 ISO-K



TMU 262 P N, DN 100 CF-F



TPU 261 PC, DN 100 CF-F

Technical data - TMH/U 261/262

	TMH/U 261 P DN 100 ISO-K/ CF-F	TMH/U 262 P DN 100 ISO-K/ CF-F	TMH/U 261 YP DN 100 ISO-K/ CF-F	TMH/U 262 YP DN 100 ISO-K/ CF-F
Connection nominal diameter				
Flange (in)	DN 100	DN 100	DN 100	DN 100
Flange (out)	DN 25 ISO-KF / G 1/4"	DN 25 ISO-KF / G 1/4"	DN 25 ISO-KF / G 1/4"	DN 25 ISO-KF / G 1/4"
Venting connection	G 1/8"	G 1/8"	G 1/8"	G 1/8"
Pumping speed [l/s]				
Hydrogen H ₂	190	190	190	190
Helium He	220	220	220	220
Nitrogen N ₂	210	210	210	210
Argon Ar	200	200	200	200
CF ₄	-	-	-	-
Compression ratio				
Hydrogen H ₂	1.4·10 ⁴	1.4·10 ⁴	1.4·10 ⁴	1.4·10 ⁴
Helium He	3·10 ⁵	3·10 ⁵	3·10 ⁵	3·10 ⁵
Nitrogen N ₂	>1·10 ⁹	>1·10 ⁹	>1·10 ⁹	>1·10 ⁹
Argon Ar	>1·10 ⁹	>1·10 ⁹	>1·10 ⁹	>1·10 ⁹
CF ₄	-	-	-	-
Max. fore vacuum pressure for N₂ [mbar]	10	8.5	10	8.5
Max. gas throughput at 0.1 mbar HV [mbar l/s]				
Hydrogen H ₂	3.5	3	3.5	3
Helium He	6	5	6	5
Nitrogen N ₂	7	6	7	6
Argon Ar	7	3	7	3
CF ₄	-	-	-	-
Max. gas throughput at nom. rotation speed [mbar l/s]				
Pumping speed of used backing pump	10 m ³ /h	10 m ³ /h	10 m ³ /h	10 m ³ /h
Hydrogen H ₂	43	18	43	18
Helium He	9	5.1	9	5.1
Nitrogen N ₂	7	3.2	7	3.2
Argon Ar	4	2	4	2
CF ₄	-	-	-	-
Ultimate pressure (see page 144) [mbar]	<5·10 ⁻¹⁰	<5·10 ⁻¹⁰	<5·10 ⁻¹⁰	<5·10 ⁻¹⁰
Rotational speed [1/min]	60000	60000	60000	60000
Run-up time [min]	1.6	3.5	1.6	3.5
Cooling method, standard	Water, Air	Water, Air	Water, Air	Water, Air
Cooling water consumption [l/h]	100	100	100	100
Max. cooling water temperature [°C]	25	25	25	25
Weight [kg]	7.4	7	7.4	7
Ordering number pump				
with drive unit TC 100	ISO-K	-	PM P02 991	-
	CF-F	-	PM P02 996	-
with drive unit TC 100 and integrated power supply	ISO-K	-	-	-
	CF-F	-	-	-
with drive unit TC 600	ISO-K	PM P02 821	-	PM P03 530
	CF-F	PM P02 826	-	PM P03 535
without drive unit (for TCP 350)	ISO-K	PM P03 450	-	PM P03 531
	CF-F	PM P03 455	-	PM P03 536



TMH/U 262 PN DN 100 ISO-K/ CF-F	TMH/U 262 YPN DN 100 ISO-K/ CF-F	TPH/U 261 PC DN 100 ISO-K/ CF-F
DN 100	DN 100	DN 100
DN 25 ISO-KF / G 1/4"	DN 25 ISO-KF / G 1/4"	DN 25 ISO-KF
G 1/8"	G 1/8"	G 1/8"
175	175	156
220	220	92
220	220	175
220	220	170
-	-	155
1.4·10 ⁴	1.4·10 ⁴	3·10 ²
3·10 ⁵	3·10 ⁵	3,5·10 ³
>1·10 ⁹	>1·10 ⁹	>1·10 ⁷
>1·10 ⁹	>1·10 ⁹	6·10 ⁶
-	-	>1·10 ⁷
8.5	8.5	1
3.5	3.5	1
4	4	2
3	3	3
3	3	4
-	-	5
10 m ³ /h	10 m ³ /h	20 m ³ /h
3	3	> 50
2	2	16.5
1.5	1.5	8
1	1	4.7
-	-	5.5
<1·10 ⁻⁷	<1·10 ⁻⁷	<1·10 ⁻⁸
60000	60000	50000
3.5	3.5	2
Air	Air	Water
-	-	100
-	-	25
7.8	6.3	9
-	-	-
-	-	-
PM P03 660	PM P03 665	
PM P03 661	PM P03 666	
-	-	PM P02 830
-	-	PM P02 835
-	-	-
-	-	-

Ordering numbers power supplies and cables - TMH/U 261/262

	TMH/U 261 P		TMH/U 261 YP	
	DN 100 ISO-K	DN 100 CF-F	DN 100 ISO-K	DN 100 CF-F
Ordering number pump				
with drive unit TC 100	-	-	-	-
with drive unit TC 100 and integrated power supply	-	-	-	-
with drive unit TC 600	PM P02 821	PM P02 826	PM P03 530	PM P03 535
without drive unit (for TCP 350)	PM P03 450	PM P03 455	PM P03 531	PM P03 536
Power supplies/power¹⁾				
DCU 200	200 W	200 W	200 W	200 W
DCU 200 power supply incl. Display control unit	PM C01 695	PM C01 695	PM C01 695	PM C01 695
TPS 200 mains pack for wall/standard rail fitting	PM 041 813-T	PM 041 813-T	PM 041 813-T	PM 041 813-T
TPS 201 mains pack 19" rack module 3 HE	PM 041 819-T	PM 041 819-T	PM 041 819-T	PM 041 819-T
Turbo controller				
TCP 350	PM C01 740	PM C01 740	PM C01 740	PM C01 740
TCP 350 with inbuilt Profibus interface	PM C01 741	PM C01 741	PM C01 741	PM C01 741
Control units				
DCU 001 Display Control Unit	PM 041 816-T	PM 041 816-T	PM 041 816-T	PM 041 816-T
HPU 001 Handheld Programming Unit	PM 051 510-T	PM 051 510-T	PM 051 510-T	PM 051 510-T
Accessorie for HPU (Power supply, software, PC-cable)	PM 061 005-T	PM 061 005-T	PM 061 005-T	PM 061 005-T
Mains cable DCU/TPS/TCP/on Board, 3 m				
with safety plug (230 V AC)	P 4564 309 ZA	P 4564 309 ZA	P 4564 309 ZA	P 4564 309 ZA
with UL plug (115 V AC)	P 4564 309 ZE	P 4564 309 ZE	P 4564 309 ZE	P 4564 309 ZE
with UL plug (208 V AC)	P 4564 309 ZF	P 4564 309 ZF	P 4564 309 ZF	P 4564 309 ZF
Connection cable, length 3 m for				
TC 100 - TPS 100/150 with bridge ¹⁾	-	-	-	-
TC 100/TCS 010 - TPS/DCU 100/150/200 ¹⁾	-	-	-	-
TC 100 - TPS/DCU 100/150/200 with RS-485 ¹⁾	-	-	-	-
TC 600 - TPS/DCU 100/200/300 ¹⁾	PM 051 103-T	PM 051 103-T	PM 051 103-T	PM 051 103-T
TCP 350 - Turbo 071/261/521	PM 051 803-T	PM 051 803-T	PM 051 803-T	PM 051 803-T
Connection box TCS 010 for accessories and RS-485	-	-	-	-

¹⁾ not for pumps with integrated power supply "N-Types" and TCP 350

TMH/U 262 P/PN		TMH/U 262 YP/YPN		TPH/U 261 PC	
DN 100 ISO-K	DN 100 CF-F	DN 100 ISO-K	DN 100 CF-F	DN 100 ISO-K	DN 100 CF-F
PM P02 991	PM P02 996	PM P03 540	PM P03 545	-	-
PM P03 660	PM P03 661	PM P03 665	PM P03 666	-	-
-	-	-	-	PM P02 830	PM P02 835
-	-	-	-	-	-
150 W	150 W	150 W	150 W	200 W	200 W
PM C01 698	PM C01 698	PM C01 698	PM C01 698	PM C01 695	PM C01 695
PM 051 461-T	PM 051 461-T	PM 051 461-T	PM 051 461-T	PM 041 813-T	PM 041 813-T
-	-	-	-	PM 041 819-T	PM 041 819-T
-	-	-	-	-	-
-	-	-	-	-	-
PM 041 816-T	PM 041 816-T	PM 041 816-T	PM 041 816-T	PM 041 816-T	PM 041 816-T
PM 051 510-T	PM 051 510-T	PM 051 510-T	PM 051 510-T	PM 051 510-T	PM 051 510-T
PM 061 005-T	PM 061 005-T	PM 061 005-T	PM 061 005-T	PM 061 005-T	PM 061 005-T
P 4564 309 ZA	P 4564 309 ZA	P 4564 309 ZA	P 4564 309 ZA	P 4564 309 ZA	P 4564 309 ZA
P 4564 309 ZE	P 4564 309 ZE	P 4564 309 ZE	P 4564 309 ZE	P 4564 309 ZE	P 4564 309 ZE
P 4564 309 ZF	P 4564 309 ZF	P 4564 309 ZF	P 4564 309 ZF	P 4564 309 ZF	P 4564 309 ZF
PM 051 421-T	PM 051 421-T	PM 051 421-T	PM 051 421-T	-	-
PM 051 541-T	PM 051 541-T	PM 051 541-T	PM 051 541-T	-	-
PM 051 431-T	PM 051 431-T	PM 051 431-T	PM 051 431-T	-	-
-	-	-	-	PM 051 103-T	PM 051 103-T
-	-	-	-	-	-
PM 051 460-U	PM 051 460-U	PM 051 460-U	PM 051 460-U	-	-

Ordering numbers accessories - TMH/U 261/262

	TMH/U 261 P		TMH/U 261 YP	
	DN 100 ISO-K	DN 100 CF-F	DN 100 ISO-K	DN 100 CF-F
Ordering number pump				
with drive unit TC 100	-	-	-	-
with drive unit TC 100 and integrated power supply	-	-	-	-
with drive unit TC 600	PM P02 821	PM P02 826	PM P03 530	PM P03 535
without drive unit (for TCP 350)	PM P03 450	PM P03 455	PM P03 531	PM P03 536
Venting units and components				
Venting valve TVF 005	PM Z01 135	PM Z01 135	PM Z01 135	PM Z01 135
Air drier TTV 001	PM Z00 121	PM Z00 121	PM Z00 121	PM Z00 121
Cooling accessories				
Air cooling	PM Z01 252	PM Z01 252	PM Z01 252	PM Z01 252
Water cooling ¹⁾	PM 016 040-T	PM 016 040-T	PM 016 040-T	PM 016 040-T
Water cooling unit TZK 400 230V/50Hz ¹⁾	PM Z01 245	PM Z01 245	PM Z01 245	PM Z01 245
Heating accessories¹⁾				
Heating jacket 230 V AC, safety plug	-	PM 041 903-T	-	PM 041 903-T
Heating jacket 208 V AC, UL plug	-	PM 041 904-T	-	PM 041 904-T
Heating jacket 115 V AC, UL plug	-	PM 041 905-T	-	PM 041 905-T
Backing pump control				
Relay box, 1-phase 5 A (Diaphragm pump)	PM 041 937-T	PM 041 937-T	PM 041 937-T	PM 041 937-T
Relay box, 1-phase 20 A (Rotary vane pump)	PM 041 938-T	PM 041 938-T	PM 041 938-T	PM 041 938-T
Connection cable backing pump relay box - TCP 350	PM 061 144-X	PM 061 144-X	PM 061 144-X	PM 061 144-X
Fore vacuum safety valve TVV 001, DN 16 ISO-KF 230 V AC	PM Z01 205	PM Z01 205	PM Z01 205	PM Z01 205
Fore vacuum safety valve TVV 001, DN 16 ISO-KF 115 V AC	PM Z01 206	PM Z01 206	PM Z01 206	PM Z01 206
General accessories				
Sealing gas valve	PM Z01 142	PM Z01 142	PM Z01 142	PM Z01 142
Coated centering ring	PM 016 210-U	-	PM 016 210-U	-
Coated centering ring with protection screen	PM 016 212-U	-	PM 016 212-U	-
Protection screen	-	PM 016 336	-	PM 016 336
Coated centering ring with integrated splinter shield	PM 016 211-U	-	PM 016 211-U	-
Splinter shield	-	PM 016 315	-	PM 016 315
Vibration damper	PM 006 459-X	PM 006 488-X	PM 006 459-X	PM 006 488-X
Cover plate IP 54 for the TC 600/750	PM 051 327-U	PM 051 327-U	PM 051 327-U	PM 051 327-U
PWM-box, pre-switching unit for rotation speed control	PM 051 028-U	PM 051 028-U	PM 051 028-U	PM 051 028-U
Serial Interface Converter RS-232-485	PM 051 054-T	PM 051 054-T	PM 051 054-T	PM 051 054-T
Profibus - Gateway TIC 250	PM 051 257-T	PM 051 257-T	PM 051 257-T	PM 051 257-T
Mounting materials				
Coated centering ring, bracket screws	PM 016 365-T	-	PM 016 365-T	-
Coated centering ring with protect. screen, bracket screws	PM 016 367-T	-	PM 016 367-T	-
Coated centering ring with splinter shield, bracket screws	PM 016 366-T	-	PM 016 366-T	-
Set of hexagonal bolts for CF-flanges	-	PF 505 003-T	-	PF 505 003-T
Set of stud screws for CF-flanges	-	PF 507 002-T	-	PF 507 002-T

¹⁾ not for pumps with integrated power supply "N-Types"

TMH/U 262 P/PN		TMH/U 262 YP/YPN		TPH/U 261 PC	
DN 100 ISO-K	DN 100 CF-F	DN 100 ISO-K	DN 100 CF-F	DN 100 ISO-K	DN 100 CF-F
PM P02 991	PM P02 996	PM P03 540	PM P03 545	-	-
PM P03 660	PM P03 661	PM P03 665	PM P03 666	-	-
-	-	-	-	PM P02 830	PM P02 835
-	-	-	-	-	-
PM Z01 135	PM Z01 135	PM Z01 135	PM Z01 135	PM Z01 135	PM Z01 135
PM Z00 121	PM Z00 121	PM Z00 121	PM Z00 121	PM Z00 121	PM Z00 121
PM Z01 252	PM Z01 252	PM Z01 252	PM Z01 252	-	-
PM 016 040-T	PM 016 040-T	PM 016 040-T	PM 016 040-T	-	-
PM Z01 245	PM Z01 245	PM Z01 245	PM Z01 245	PM Z01 245	PM Z01 245
-	PM 041 903-T	-	PM 041 903-T	-	PM 041 903-T
-	PM 041 904-T	-	PM 041 904-T	-	PM 041 904-T
-	PM 041 905-T	-	PM 041 905-T	-	PM 041 905-T
PM 041 937-T	PM 041 937-T	PM 041 937-T	PM 041 937-T	PM 041 937-T	PM 041 937-T
PM 041 938-T	PM 041 938-T	PM 041 938-T	PM 041 938-T	PM 041 938-T	PM 041 938-T
-	-	-	-	-	-
PM Z01 205	PM Z01 205	PM Z01 205	PM Z01 205	PM Z01 205	PM Z01 205
PM Z01 206	PM Z01 206	PM Z01 206	PM Z01 206	PM Z01 206	PM Z01 206
PM Z01 142	PM Z01 142	PM Z01 142	PM Z01 142	PM Z01 142	PM Z01 142
PM 016 210-U	-	PM 016 210-U	-	PM 016 210-U	-
PM 016 212-U	-	PM 016 212-U	-	PM 016 212-U	-
-	PM 016 336	-	PM 016 336	-	PM 016 336
PM 016 211-U	-	PM 016 211-U	-	PM 016 211-U	-
-	PM 016 315	-	PM 016 315	-	PM 016 315
PM 006 459-X	PM 006 488-X	PM 006 459-X	PM 006 488-X	PM 006 459-X	PM 006 488-X
-	-	-	-	PM 051 327-U	PM 051 327-U
-	-	-	-	PM 051 028-U	PM 051 028-U
PM 051 054-T	PM 051 054-T	PM 051 054-T	PM 051 054-T	PM 051 054-T	PM 051 054-T
PM 051 257-T	PM 051 257-T	PM 051 257-T	PM 051 257-T	PM 051 257-T	PM 051 257-T
PM 016 365-T	-	PM 016 365-T	-	PM 016 365-T	-
PM 016 367-T	-	PM 016 367-T	-	PM 016 367-T	-
PM 016 366-T	-	PM 016 366-T	-	PM 016 366-T	-
-	PF 505 003-T	-	PF 505 003-T	-	PF 505 003-T
-	PF 507 002-T	-	PF 507 002-T	-	PF 507 002-T

TurboDrag and turbomolecular pumps with pumping speed up to 550 l/s

TMH/U 521



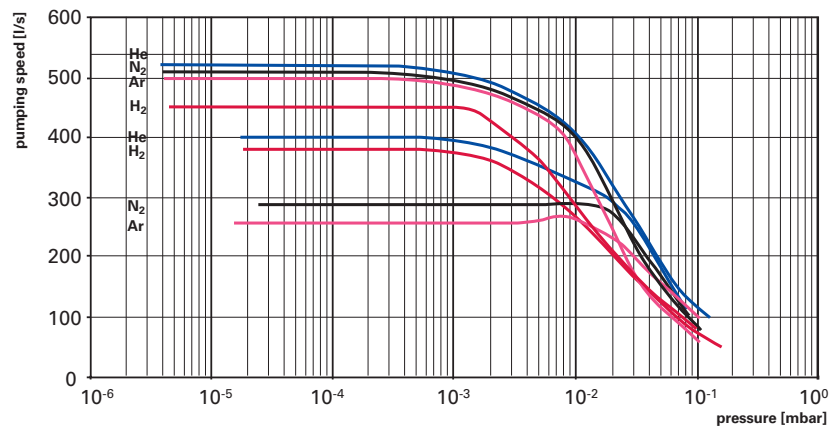
TMH/U 521:

- ▶ TurboDrag pump
- ▶ Highest compression values
- ▶ High critical backing pressure allows the use of diaphragm pumps
- ▶ Modular drive and accessories concept
- ▶ Integrated drive unit TC 600
- ▶ Integrated power supply available (N types)
- ▶ Separate drive unit with power supply TCP 350 available as an alternative
- ▶ Installation in any orientation (Y types)
- ▶ Integrated sealing gas system
- ▶ Type of cooling: Air/water cooling
- ▶ Interfaces: RS-485, Remote, Profibus optional

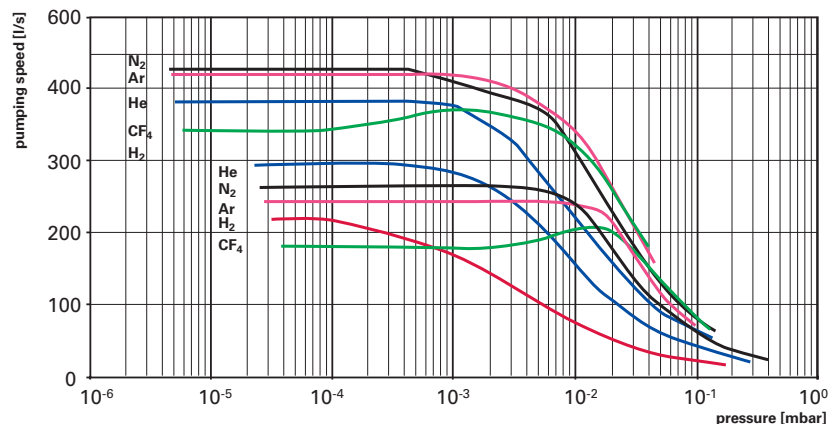
TPH 521 PC:

- ▶ Turbomolecular pump designed to handle corrosive gases
- ▶ Able to withstand high particulate applications
- ▶ Modular accessories concept
- ▶ Integrated drive unit TC 600
- ▶ Corrosion resistant lubricant
- ▶ Lubricant supply through an oil pump system
- ▶ Integrated sealing gas system
- ▶ Type of cooling: Water cooling
- ▶ Interfaces: RS-485, Remote, Profibus optional

Pumping speed

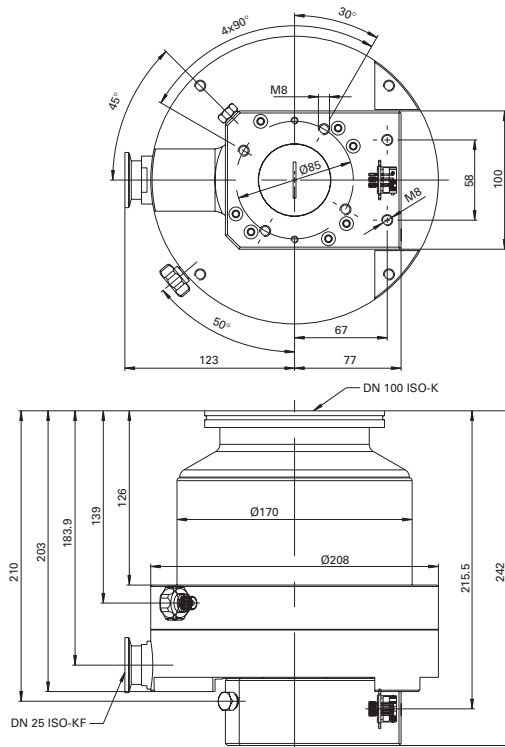


TMH 521 P, DN 100/DN 160

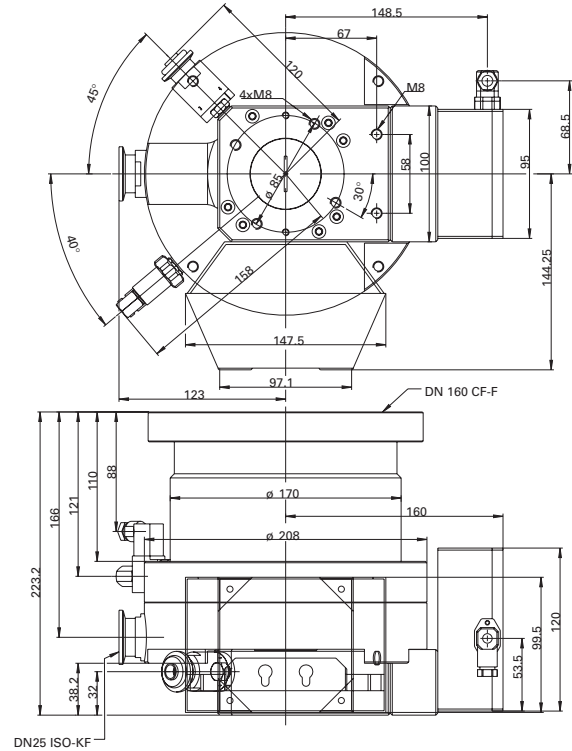


TPH 521 PC, DN 100/DN 160

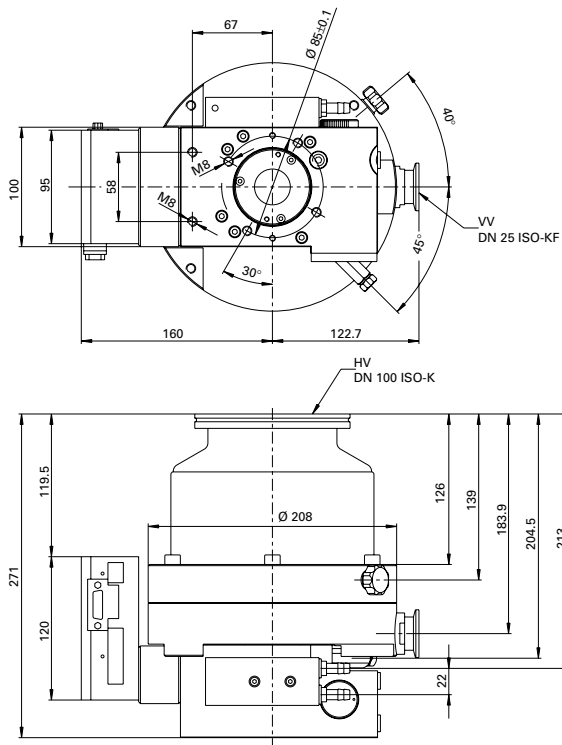
Dimensions (in mm)



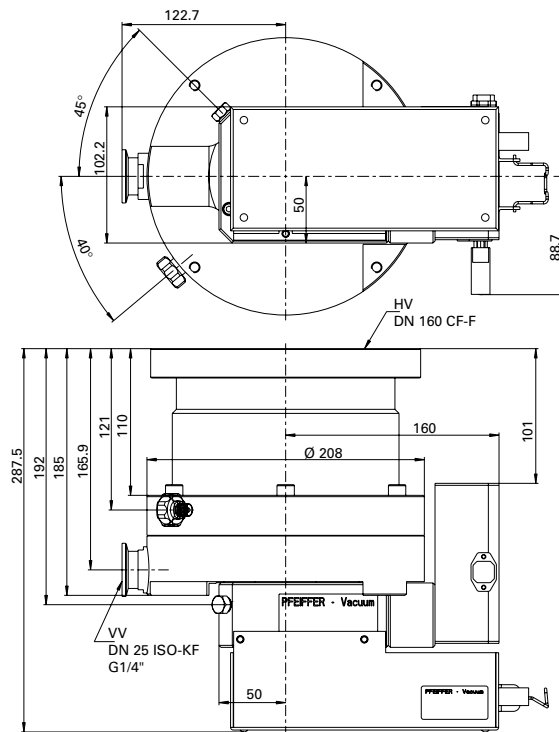
TMH 521 P, DN 100 ISO-K, for TCP 350



TMU 521 P, DN 160 CF-F



TPH 521 PC, DN 100 ISO-K



TMH 521 P N, DN 160 CF-F

Technical data - TMH/U 521

	TMH/U 521 P DN 100 ISO-K/ ISO-F/CF-F	TMH/U 521 YP DN 100 ISO-K/ ISO-F/CF-F	TMH/U 521 PN DN 100 ISO-K/ ISO-F/CF-F	TMH/U 521 YPN DN 100 ISO-K/ ISO-F/CF-F
Connection nominal diameter				
Flange (in)	DN 100	DN 100	DN 100	DN 100
Flange (out)	DN 25 ISO-KF / G 1/4"	DN 25 ISO-KF / G 1/4"	DN 25 ISO-KF / G 1/4"	DN 25 ISO-KF / G 1/4"
Venting connection	G 1/8"	G 1/8"	G 1/8"	G 1/8"
Pumping speed [l/s]				
Hydrogen H ₂	380	380	350	350
Helium He	400	400	360	360
Nitrogen N ₂	290	290	270	270
Argon Ar	260	260	250	250
CF ₄	-	-	-	-
Compression ratio				
Hydrogen H ₂	6.5 · 10 ⁵	6.5 · 10 ⁵	6.5 · 10 ⁵	6.5 · 10 ⁵
Helium He	5 · 10 ⁷	5 · 10 ⁷	5 · 10 ⁷	5 · 10 ⁷
Nitrogen N ₂	> 1 · 10 ¹²	> 1 · 10 ¹²	> 1 · 10 ¹²	> 1 · 10 ¹²
Argon Ar	> 1 · 10 ¹²	> 1 · 10 ¹²	> 1 · 10 ¹²	> 1 · 10 ¹²
CF ₄	-	-	-	-
Max. fore vacuum pressure for N₂ [mbar]	13	13	8	8
Max. gas throughput at 0.1 mbar HV [mbar l/s]				
Hydrogen H ₂	8	8	6	6
Helium He	12	12	6	6
Nitrogen N ₂	12	12	6	6
Argon Ar	12	12	7	7
CF ₄	-	-	-	-
Max. gas throughput at nom. rotation speed [mbar l/s]				
Pumping speed of used backing pump	10 m ³ /h	10 m ³ /h	10 m ³ /h	10 m ³ /h
Hydrogen H ₂	9.5	9.5	5	5
Helium He	8	8	3	3
Nitrogen N ₂	4	4	1,5	1,5
Argon Ar	2	2	1	1
CF ₄	-	-	-	-
Ultimate pressure (see page 144) [mbar]	< 5 · 10 ⁻¹⁰	< 5 · 10 ⁻¹⁰	< 5 · 10 ⁻¹⁰	< 5 · 10 ⁻¹⁰
Rotational speed [1/min]	50000	50000	50000	50000
Run-up time [min]	5.5	5.5	5.5	5.5
Cooling method, standard	Water, Air	Water, Air	Air	Air
Cooling water consumption [l/h]	100	100	-	-
Max. cooling water temperature [°C]	25	25	-	-
Weight [kg]	17.5	17.5	18.5	18.5
Ordering number pump				
with drive unit TC 600	ISO-K	PM P02 851	PM P03 551	-
	ISO-F	PM P03 721	PM P03 558	-
	CF-F	PM P02 856	PM P03 556	-
with drive unit TC 600 and integrated power supply	ISO-K	-	-	PM P03 671
	ISO-F	-	-	PM P03 673
	CF-F	-	-	PM P03 676
without drive unit (for TCP 350)	ISO-K	PM P03 461	PM P03 731	-
	ISO-F	PM P03 463	PM P03 733	-
	CF-F	PM P03 466	PM P03 736	-



TPH/U 521 PC DN 100 ISO-K/ ISO-F/CF-F	TMH/U 521 P DN 160 ISO-K/ ISO-F/CF-F	TMH/U 521 YP DN 160 ISO-K/ ISO-F/CF-F	TMH/U 521 PN DN 160 ISO-K/ ISO-F/CF-F	TMH/U 521 YPN DN 160 ISO-K/ ISO-F/CF-F	TPH/U 521 PC DN 160 ISO-K/ ISO-F/CF-F
DN 100	DN 160	DN 160	DN 160	DN 160	DN 160
DN 25 ISO-KF	DN 25 ISO-KF / G 1/4"	DN 25 ISO-KF / G 1/4"	DN 25 ISO-KF / G 1/4"	DN 25 ISO-KF / G 1/4"	DN 25 ISO-KF
G 1/8"	G 1/8"	G 1/8"	G 1/8"	G 1/8"	G 1/8"
220	450	450	450	450	300
296	520	520	520	520	380
260	510	510	510	510	430
245	500	500	500	500	430
200	-	-	-	-	360
3·10 ²	6,5·10 ⁵	6,5·10 ⁵	6,5·10 ⁵	6,5·10 ⁵	3·10 ²
4.8·10 ³	5·10 ⁷	5·10 ⁷	5·10 ⁷	5·10 ⁷	4.8·10 ³
>1·10 ⁷	>1·10 ¹²	>1·10 ¹²	>1·10 ¹²	>1·10 ¹²	>1·10 ⁷
>1·10 ⁷	>1·10 ¹²	>1·10 ¹²	>1·10 ¹²	>1·10 ¹²	>1·10 ⁷
>1·10 ⁷	-	-	-	-	>1·10 ⁷
1	13	13	8	8	1
3	8	8	6	6	3
4	12	12	6	6	4
6	12	12	6	6	6
7	12	12	7	7	7
8	-	-	-	-	8
35 m ³ /h	10 m ³ /h	10 m ³ /h	10 m ³ /h	10 m ³ /h	35 m ³ /h
> 50	9.5	9.5	5	5	> 50
14.5	8	8	3	3	14.5
7.6	4	4	1,5	1,5	7.6
3.8	2	2	1	1	3.8
4.3	-	-	-	-	4.3
<1·10 ⁻⁸	<5·10 ⁻¹⁰	<5·10 ⁻¹⁰	<5·10 ⁻¹⁰	<5·10 ⁻¹⁰	<1·10 ⁻⁸
43000	50000	50000	50000	50000	43000
3.5	5.5	5.5	5.5	5.5	3.5
Water	Water, Air	Water, Air	Air	Air	Water
100	100	100	-	-	100
25	25	25	-	-	25
16.5	17	17	18	18	16
PM P02 861	PM P02 850	PM P03 550	-	-	PM P02 860
PM P02 863	PM P03 720	PM P03 557	-	-	PM P02 862
PM P02 866	PM P02 855	PM P03 555	-	-	PM P02 865
-	-	-	PM P03 670	PM P03 740	-
-	-	-	PM P03 672	PM P03 742	-
-	-	-	PM P03 675	PM P03 745	-
-	PM P03 460	PM P03 730	-	-	-
-	PM P03 462	PM P03 732	-	-	-
-	PM P03 465	PM P03 735	-	-	-

Ordering numbers power supplies and cables - TMH/U 521

	DN 100 ISO-K	DN 100 ISO-F	DN 100 CF-F
Ordering number pump			
with drive unit TC 600	PM P02 851	PM P03 721	PM P02 856
with drive unit TC 600 and integrated power supply	PM P03 671	PM P03 673	PM P03 676
without drive unit (for TCP 350)	PM P03 461	PM P03 463	PM P03 466
		TMH/U 521 P/PN	
	DN 160 ISO-K	DN 160 ISO-F	DN 160 CF-F
Ordering number pump			
with drive unit TC 600	PM P02 850	PM P03 720	PM P02 855
with drive unit TC 600 and integrated power supply	PM P03 670	PM P03 672	PM P03 675
without drive unit (for TCP 350)	PM P03 460	PM P03 462	PM P03 465
Power supplies/power¹⁾	300 W	300 W	300 W
DCU 300	PM C01 696	PM C01 696	PM C01 696
power supply incl. Display control unit			
TPS 300 mains pack for wall/standard rail fitting	PM 041 814-T	PM 041 814-T	PM 041 814-T
TPS /301	PM 041 820-T	PM 041 820-T	PM 041 820-T
mains pack 19" rack module 3 HE			
Turbo controller			
TCP 350	PM C01 740	PM C01 740	PM C01 740
TCP 350 with inbuilt Profibus interface	PM C01 741	PM C01 741	PM C01 741
Control units			
DCU 001 Display Control Unit	PM 041 816-T	PM 041 816-T	PM 041 816-T
HPU 001 Handheld Programming Unit	PM 051 510-T	PM 051 510-T	PM 051 510-T
Accessorie for HPU (Power supply, software, PC-cable)	PM 061 005-T	PM 061 005-T	PM 061 005-T
Mains cable DCU/TPS/TCP/on Board, 3 m			
with safety plug (230 V AC)	P 4564 309 ZA	P 4564 309 ZA	P 4564 309 ZA
with UL plug (115 V AC)	P 4564 309 ZE	P 4564 309 ZE	P 4564 309 ZE
with UL plug (208 V AC)	P 4564 309 ZF	P 4564 309 ZF	P 4564 309 ZF
Connection cable, length 3 m for			
TC 100 - TPS 100/150 with bridge ¹⁾	-	-	-
TC 100/TCS 010 - TPS/DCU 100/150/200 ¹⁾	-	-	-
TC 100 - TPS/DCU 100/150/200 with RS-485 ¹⁾	-	-	-
TC 600 - TPS/DCU 100/200/300 ¹⁾	PM 051 103-T	PM 051 103-T	PM 051 103-T
TCP 350 - Turbo 071/261/521	PM 051 803-T	PM 051 803-T	PM 051 803-T

¹⁾ not for pumps with integrated power supply "N-Types" and TCP 350

TMH/U 521 YP/YPN			TPH/U 521 PC		
DN 100 ISO-K	DN 100 ISO-F	DN 100 CF-F	DN 100 ISO-K	DN 100 ISO-F	DN 100 CF-F
PM P03 551	PM P03 558	PM P03 556	PM P02 861	PM P02 863	PM P02 866
PM P03 741	PM P03 743	PM P03 746	-	-	-
PM P03 731	PM P03 733	PM P03 736	-	-	-
TMH/U 521 YP/YPN			TMH/U 521 PC		
DN 160 ISO-K	DN 160 ISO-F	DN 160 CF-F	DN 160 ISO-K	DN 160 ISO-F	DN 160 CF-F
PM P03 550	PM P03 557	PM P03 555	PM P02 860	PM P02 862	PM P02 865
PM P03 740	PM P03 742	PM P03 745	-	-	-
PM P03 730	PM P03 732	PM P03 735	-	-	-
300 W	300 W	300 W	300 W	300 W	300 W
PM C01 696	PM C01 696	PM C01 696	PM C01 696	PM C01 696	PM C01 696
PM 041 814-T	PM 041 814-T	PM 041 814-T	PM 041 814-T	PM 041 814-T	PM 041 814-T
PM 041 820-T	PM 041 820-T	PM 041 820-T	PM 041 820-T	PM 041 820-T	PM 041 820-T
PM C01 740	PM C01 740	PM C01 740	-	-	-
PM C01 741	PM C01 741	PM C01 741	-	-	-
PM 041 816-T	PM 041 816-T	PM 041 816-T	PM 041 816-T	PM 041 816-T	PM 041 816-T
PM 051 510-T	PM 051 510-T	PM 051 510-T	PM 051 510-T	PM 051 510-T	PM 051 510-T
PM 061 005-T	PM 061 005-T	PM 061 005-T	PM 061 005-T	PM 061 005-T	PM 061 005-T
P 4564 309 ZA	P 4564 309 ZA	P 4564 309 ZA	P 4564 309 ZA	P 4564 309 ZA	P 4564 309 ZA
P 4564 309 ZE	P 4564 309 ZE	P 4564 309 ZE	P 4564 309 ZE	P 4564 309 ZE	P 4564 309 ZE
P 4564 309 ZF	P 4564 309 ZF	P 4564 309 ZF	P 4564 309 ZF	P 4564 309 ZF	P 4564 309 ZF
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
PM 051 103-T	PM 051 103-T	PM 051 103-T	PM 051 103-T	PM 051 103-T	PM 051 103-T
PM 051 803-T	PM 051 803-T	PM 051 803-T	-	-	-

Ordering numbers accessories - TMH/U 521 DN 100

	DN 100 ISO-K	TMH/U 521 P/PN	
		DN 100 ISO-F	DN 100 CF-F
Ordering number pump			
with drive unit TC 600	PM P02 851	PM P03 721	PM P02 856
with drive unit TC 600 and integrated power supply	PM P03 671	PM P03 673	PM P03 676
without drive unit (for TCP 350)	PM P03 461	PM P03 463	PM P03 466
Venting units and components			
Venting valve TVF 005	PM Z01 135	PM Z01 135	PM Z01 135
Air drier TTV 001	PM Z00 121	PM Z00 121	PM Z00 121
Cooling accessories			
Air cooling	PM Z01 251	PM Z01 251	PM Z01 251
Water cooling ¹⁾	PM 016 500-T	PM 016 500-T	PM 016 500-T
Water cooling unit TZK 400 230V/50Hz ¹⁾	PM Z01 245	PM Z01 245	PM Z01 245
Heating accessories¹⁾			
Heating jacket 230 V AC, safety plug	-	-	PM 051 096-T
Heating jacket 208 V AC, UL plug	-	-	PM 051 097-T
Heating jacket 115 V AC, UL plug	-	-	PM 051 098-T
Backing pump control			
Relay box, 1-phase 5 A (Diaphragm pump)	PM 041 937-T	PM 041 937-T	PM 041 937-T
Relay box, 1-phase 20 A (Rotary vane pump)	PM 041 938-T	PM 041 938-T	PM 041 938-T
Connection cable backing pump relay box - TCP 350	PM 061 144-X	PM 061 144-X	PM 061 144-X
Fore vacuum safety valve TVV 001, DN 16 ISO-KF 230 V AC	PM Z01 205	PM Z01 205	PM Z01 205
Fore vacuum safety valve TVV 001, DN 16 ISO-KF 115 V AC	PM Z01 206	PM Z01 206	PM Z01 206
General accessories			
Sealing gas valve	PM Z01 142	PM Z01 142	PM Z01 142
Coated centering ring	PM 016 210-U	PM 016 210-U	-
Coated centering ring with protection screen	PM 016 212-U	PM 016 212-U	-
Protection screen	-	-	PM 016 336
Coated centering ring with integrated splinter shield	PM 016 211-U	PM 016 211-U	-
Splinter shield	-	-	PM 016 315
Vibration damper	PM 006 459-X	PM 006 459-X	PM 006 488-X
Cover plate IP 54 for the TC 600/750	PM 051 327-U	PM 051 327-U	PM 051 327-U
PWM-box, pre-switching unit for rotation speed control	PM 051 028-U	PM 051 028-U	PM 051 028-U
Serial Interface Converter RS-232-485	PM 051 054-T	PM 051 054-T	PM 051 054-T
Profibus - Gateway TIC 250	PM 051 257-T	PM 051 257-T	PM 051 257-T
Mounting materials			
Coated centering ring, bracket screws	PM 016 380-T	-	-
Coated centering ring with protect. screen, bracket screws	PM 016 382-T	-	-
Coated centering ring with splinter shield, bracket screws	PM 016 381-T	-	-
Coated centering ring, hexagonal bolts	-	PM 016 450-T	-
Coated centering ring with protect. screen, hexagonal bolts	-	PM 016 452-T	-
Coated centering ring with splinter shield, hexagonal bolts	-	PM 016 451-T	-
Coated centering ring, stud screws	-	PM 016 455-T	-
Coated centering ring with protection screen, stud screws	-	PM 016 457-T	-
Coated centering ring with splinter shield, stud screws	-	PM 016 456-T	-
Set of hexagonal bolts for CF-flanges	-	-	PF 505 003-T
Set of stud screws for CF-flanges	-	-	PF 507 002-T

¹⁾ not for pumps with integrated power supply "N-Types"

TMH/U 521 YP/YPN			TPH/U 521 PC		
DN 100 ISO-K	DN 100 ISO-F	DN 100 CF-F	DN 100 ISO-K	DN 100 ISO-F	DN 100 CF-F
PM P03 551	PM P03 558	PM P03 556	PM P02 861	PM P02 863	PM P02 866
PM P03 741	PM P03 743	PM P03 746	-	-	-
PM P03 731	PM P03 733	PM P03 736	-	-	-
PM Z01 135	PM Z01 135	PM Z01 135	PM Z01 135	PM Z01 135	PM Z01 135
PM Z00 121	PM Z00 121	PM Z00 121	PM Z00 121	PM Z00 121	PM Z00 121
PM Z01 251	PM Z01 251	PM Z01 251	-	-	-
PM 016 500-T	PM 016 500-T	PM 016 500-T	-	-	-
PM Z01 245	PM Z01 245	PM Z01 245	PM Z01 245	PM Z01 245	PM Z01 245
-	-	PM 051 096-T	-	-	PM 051 096-T
-	-	PM 051 097-T	-	-	PM 051 097-T
-	-	PM 051 098-T	-	-	PM 051 098-T
PM 041 937-T	PM 041 937-T	PM 041 937-T	PM 041 937-T	PM 041 937-T	PM 041 937-T
PM 041 938-T	PM 041 938-T	PM 041 938-T	PM 041 938-T	PM 041 938-T	PM 041 938-T
PM 061 144-X	PM 061 144-X	PM 061 144-X	-	-	-
PM Z01 205	PM Z01 205	PM Z01 205	PM Z01 205	PM Z01 205	PM Z01 205
PM Z01 206	PM Z01 206	PM Z01 206	PM Z01 206	PM Z01 206	PM Z01 206
PM Z01 142	PM Z01 142	PM Z01 142	PM Z01 142	PM Z01 142	PM Z01 142
PM 016 210-U	PM 016 210-U	-	PM 016 210-U	PM 016 210-U	-
PM 016 212-U	PM 016 212-U	-	PM 016 212-U	PM 016 212-U	-
-	-	PM 016 336	-	-	PM 016 336
PM 016 211-U	PM 016 211-U	-	PM 016 211-U	PM 016 211-U	-
-	-	PM 016 315	-	-	PM 016 315
PM 006 459-X	PM 006 459-X	PM 006 488-X	PM 006 459-X	PM 006 459-X	PM 006 488-X
PM 051 327-U	PM 051 327-U	PM 051 327-U	PM 051 327-U	PM 051 327-U	PM 051 327-U
PM 051 028-U	PM 051 028-U	PM 051 028-U	PM 051 028-U	PM 051 028-U	PM 051 028-U
PM 051 054-T	PM 051 054-T	PM 051 054-T	PM 051 054-T	PM 051 054-T	PM 051 054-T
PM 051 257-T	PM 051 257-T	PM 051 257-T	PM 051 257-T	PM 051 257-T	PM 051 257-T
PM 016 380-T	-	-	PM 016 380-T	-	-
PM 016 382-T	-	-	PM 016 382-T	-	-
PM 016 381-T	-	-	PM 016 381-T	-	-
-	PM 016 450-T	-	-	PM 016 450-T	-
-	PM 016 452-T	-	-	PM 016 452-T	-
-	PM 016 451-T	-	-	PM 016 451-T	-
-	PM 016 455-T	-	-	PM 016 455-T	-
-	PM 016 457-T	-	-	PM 016 457-T	-
-	PM 016 456-T	-	-	PM 016 456-T	-
-	-	PF 505 003-T	-	-	PF 505 003-T
-	-	PF 507 002-T	-	-	PF 507 002-T

Ordering numbers accessories - TMH/U 521 DN 160

	TMH/U 521 P/PN		
	DN 160 ISO-K	DN 160 ISO-F	DN 160 CF-F
Ordering number pump			
with drive unit TC 600	PM P02 850	PM P03 720	PM P02 855
with drive unit TC 600 and integrated power supply	PM P03 670	PM P03 672	PM P03 675
without drive unit (for TCP 350)	PM P03 460	PM P03 462	PM P03 465
Venting units and components			
Venting valve TVF 005	PM Z01 135	PM Z01 135	PM Z01 135
Air drier TTV 001	PM Z00 121	PM Z00 121	PM Z00 121
Cooling accessories			
Air cooling	PM Z01 251	PM Z01 251	PM Z01 251
Water cooling ¹⁾	PM 016 500-T	PM 016 500-T	PM 016 500-T
Water cooling unit TZK 400 230V/50Hz ¹⁾	PM Z01 245	PM Z01 245	PM Z01 245
Heating accessories¹⁾			
Heating jacket 230 V AC, safety plug	-	-	PM 051 096-T
Heating jacket 208 V AC, UL plug	-	-	PM 051 097-T
Heating jacket 115 V AC, UL plug	-	-	PM 051 098-T
Backing pump control			
Relay box, 1-phase 5 A (Diaphragm pump)	PM 041 937-T	PM 041 937-T	PM 041 937-T
Relay box, 1-phase 20 A (Rotary vane pump)	PM 041 938-T	PM 041 938-T	PM 041 938-T
Connection cable backing pump relay box - TCP 350	PM 061 144-X	PM 061 144-X	PM 061 144-X
Fore vacuum safety valve TVV 001, DN 16 ISO-KF 230 V AC	PM Z01 205	PM Z01 205	PM Z01 205
Fore vacuum safety valve TVV 001, DN 16 ISO-KF 115 V AC	PM Z01 206	PM Z01 206	PM Z01 206
General accessories			
Sealing gas valve	PM Z01 142	PM Z01 142	PM Z01 142
Coated centering ring	PM 016 216-U	PM 016 216-U	-
Coated centering ring with protection screen	PM 016 218-U	PM 016 218-U	-
Protection screen	-	-	PM 016 339
Coated centering ring with integrated splinter shield	PM 016 217-U	PM 016 217-U	-
Splinter shield	-	-	PM 016 318
Vibration damper	PM 006 492-X	PM 006 492-X	PM 006 493-X
Cover plate IP 54 for the TC 600/750	PM 051 327-U	PM 051 327-U	PM 051 327-U
PWM-box, pre-switching unit for rotation speed control	PM 051 028-U	PM 051 028-U	PM 051 028-U
Serial Interface Converter RS-232-485	PM 051 054-T	PM 051 054-T	PM 051 054-T
Profibus - Gateway TIC 250	PM 051 257-T	PM 051 257-T	PM 051 257-T
Mounting materials			
Coated centering ring, bracket screws	PM 016 385-T	-	-
Coated centering ring with protect. screen, bracket screws	PM 016 387-T	-	-
Coated centering ring with splinter shield, bracket screws	PM 016 386-T	-	-
Coated centering ring, hexagonal bolts	-	PM 016 460-T	-
Coated centering ring with protect. screen, hexagonal bolts	-	PM 016 462-T	-
Coated centering ring with splinter shield, hexagonal bolts	-	PM 016 461-T	-
Coated centering ring, stud screws	-	PM 016 465-T	-
Coated centering ring with protection screen, stud screws	-	PM 016 467-T	-
Coated centering ring with splinter shield, stud screws	-	PM 016 466-T	-
Set of hexagonal bolts for CF-flanges	-	-	PF 505 003-T
Set of stud screws for CF-flanges	-	-	PF 507 003-T

¹⁾ not for pumps with integrated power supply "N-Types"

TMH/U 521 YP/YPN			TPH/U 521 PC		
DN 160 ISO-K	DN 160 ISO-F	DN 160 CF-F	DN 160 ISO-K	DN 160 ISO-F	DN 160 CF-F
PM P03 550	PM P03 557	PM P03 555	PM P02 860	PM P02 862	PM P02 865
PM P03 740	PM P03 742	PM P03 745	-	-	-
PM P03 730	PM P03 732	PM P03 735	-	-	-
PM Z01 135	PM Z01 135	PM Z01 135	PM Z01 135	PM Z01 135	PM Z01 135
PM Z00 121	PM Z00 121	PM Z00 121	PM Z00 121	PM Z00 121	PM Z00 121
PM Z01 251	PM Z01 251	PM Z01 251	-	-	-
PM 016 500-T	PM 016 500-T	PM 016 500-T	-	-	-
PM Z01 245	PM Z01 245	PM Z01 245	PM Z01 245	PM Z01 245	PM Z01 245
-	-	PM 051 096-T	-	-	PM 051 096-T
-	-	PM 051 097-T	-	-	PM 051 097-T
-	-	PM 051 098-T	-	-	PM 051 098-T
PM 041 937-T	PM 041 937-T	PM 041 937-T	PM 041 937-T	PM 041 937-T	PM 041 937-T
PM 041 938-T	PM 041 938-T	PM 041 938-T	PM 041 938-T	PM 041 938-T	PM 041 938-T
PM 061 144-X	PM 061 144-X	PM 061 144-X	-	-	-
PM Z01 205	PM Z01 205	PM Z01 205	PM Z01 205	PM Z01 205	PM Z01 205
PM Z01 206	PM Z01 206	PM Z01 206	PM Z01 206	PM Z01 206	PM Z01 206
PM Z01 142	PM Z01 142	PM Z01 142	PM Z01 142	PM Z01 142	PM Z01 142
PM 016 216-U	PM 016 216-U	-	PM 016 216-U	PM 016 216-U	-
PM 016 218-U	PM 016 218-U	-	PM 016 218-U	PM 016 218-U	-
-	-	PM 016 339	-	-	PM 016 339
PM 016 217-U	PM 016 217-U	-	PM 016 217-U	PM 016 217-U	-
-	-	PM 016 318	-	-	PM 016 318
PM 006 492-X	PM 006 492-X	PM 006 493-X	PM 006 492-X	PM 006 492-X	PM 006 493-X
PM 051 327-U	PM 051 327-U	PM 051 327-U	PM 051 327-U	PM 051 327-U	PM 051 327-U
PM 051 028-U	PM 051 028-U	PM 051 028-U	PM 051 028-U	PM 051 028-U	PM 051 028-U
PM 051 054-T	PM 051 054-T	PM 051 054-T	PM 051 054-T	PM 051 054-T	PM 051 054-T
PM 051 257-T	PM 051 257-T	PM 051 257-T	PM 051 257-T	PM 051 257-T	PM 051 257-T
PM 016 385-T	-	-	PM 016 385-T	-	-
PM 016 387-T	-	-	PM 016 387-T	-	-
PM 016 386-T	-	-	PM 016 386-T	-	-
-	PM 016 460-T	-	-	PM 016 460-T	-
-	PM 016 462-T	-	-	PM 016 462-T	-
-	PM 016 461-T	-	-	PM 016 461-T	-
-	PM 016 465-T	-	-	PM 016 465-T	-
-	PM 016 467-T	-	-	PM 016 467-T	-
-	PM 016 466-T	-	-	PM 016 466-T	-
-	-	PF 505 003-T	-	-	PF 505 003-T
-	-	PF 507 003-T	-	-	PF 507 003-T

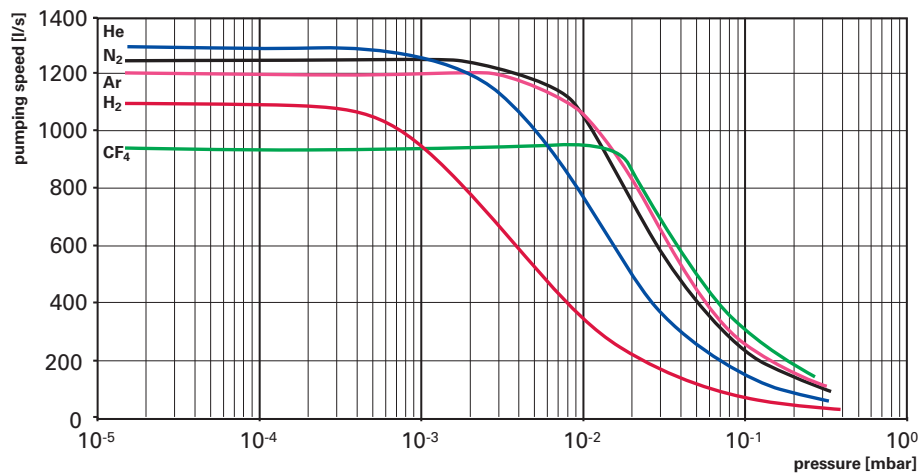
Turbomolecular pumps with pumping speed up to 1500 l/s

TPH/U 1201 / 1501

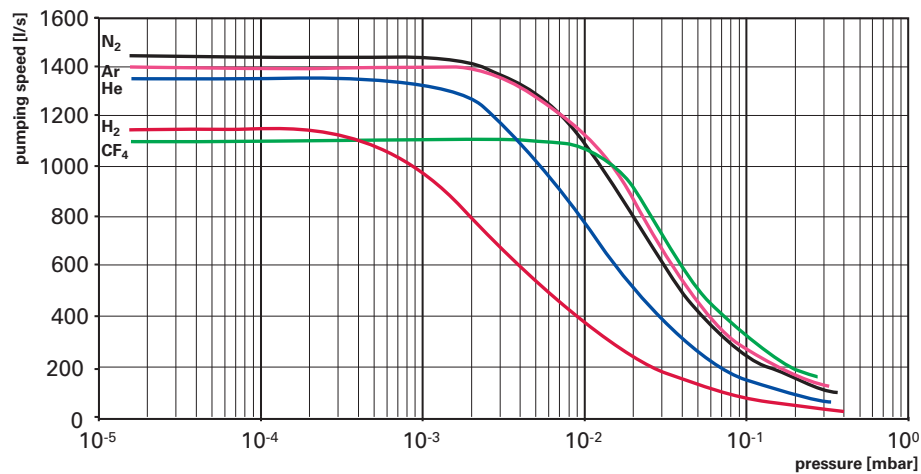


- ▶ High volume flow rates for light and heavy gases
- ▶ Able to withstand high particulate applications
- ▶ High gas throughput also for heavy gases
- ▶ Rugged rotor bearing for highest reliability
- ▶ Internal drive unit TC 750
- ▶ Integrated power supply available (N types)
- ▶ Versions for handling corrosive gases are available (C types)
- ▶ Pumps available for upside-down operation (U types)
- ▶ Corrosion resistant lubricant on all pumps
- ▶ Optimum lubricant supply through an oil pump system
- ▶ Integrated sealing gas system
- ▶ Type of cooling: Water cooling
- ▶ Interfaces: RS-485, Remote, Profibus optional

Pumping speed

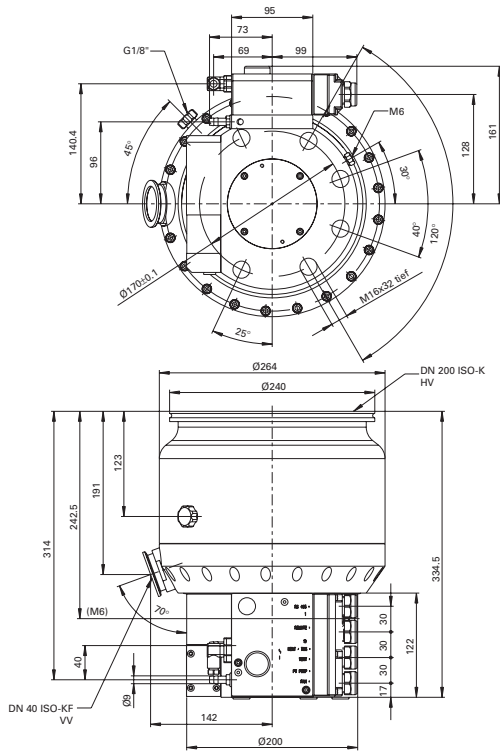


TPH 1201, DN 200

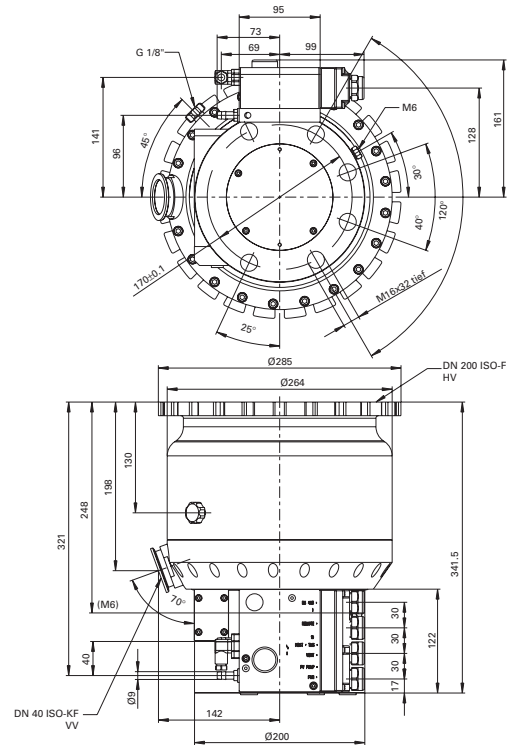


TPH 1501, DN 250

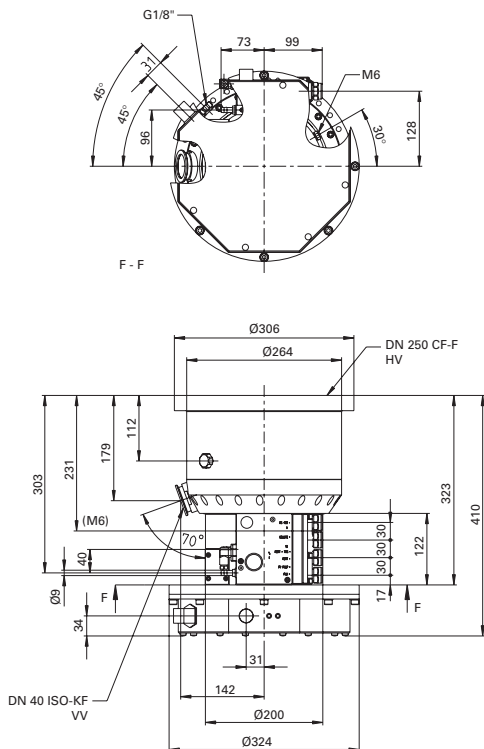
Dimensions (in mm)



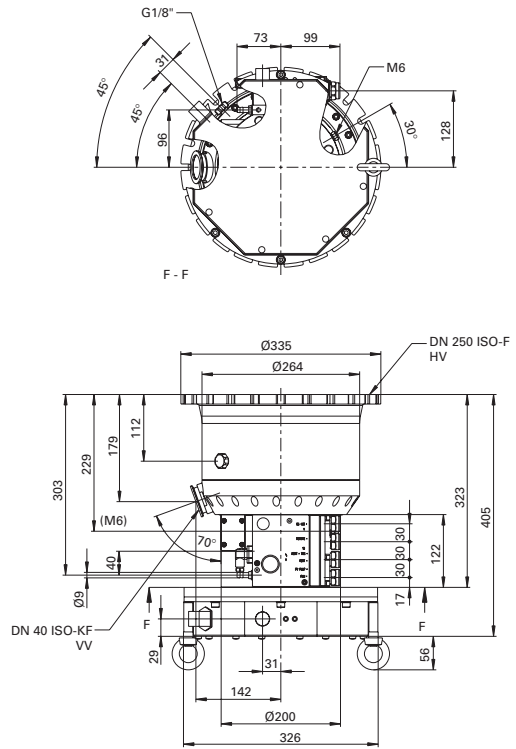
TPH 1201 P, DN 200 ISO-K



TPH 1201 UPC, DN 200 ISO-F



TPU 1501 P N, DN 250 CF-F



TPH 1501 UP N, DN 250 ISO-F

Technical data - TPH/U 1201 / 1501

	TPH/U 1201 P/PN DN 200 ISO-K/ ISO-F/CF-F	TPH/U 1201 UP/UPN DN 200 ISO-K/ ISO-F	TPH/U 1201 PC/PCN DN 200 ISO-K/ ISO-F/CF-F	TPH/U 1201 UPC/UPCN DN 200 ISO-K/ ISO-F
Connection nominal diameter				
Flange (in)	DN 200	DN 200	DN 200	DN 200
Flange (out)	DN 40 ISO-KF	DN 40 ISO-KF	DN 40 ISO-KF	DN 40 ISO-KF
Venting connection	G 1/8"	G 1/8"	G 1/8"	G 1/8"
Pumping speed [l/s]				
Hydrogen H ₂	1100	1100	1100	1100
Helium He	1300	1300	1300	1300
Nitrogen N ₂	1250	1250	1250	1250
Argon Ar	1200	1200	1200	1200
CF ₄	-	-	950	950
Compression ratio				
Hydrogen H ₂	6·10 ³	6·10 ³	6·10 ³	6·10 ³
Helium He	2·10 ⁵	2·10 ⁵	2·10 ⁵	2·10 ⁵
Nitrogen N ₂	>10 ⁸	>10 ⁸	>10 ⁸	>10 ⁸
Argon Ar	>10 ⁹	>10 ⁹	>10 ⁹	>10 ⁹
CF ₄	-	-	>10 ⁹	>10 ⁹
Max. fore vacuum pressure for N₂ [mbar]	2.0	2.0	2.0	2.0
Max. gas throughput at 0.1 mbar HV [mbar l/s]				
Hydrogen H ₂	8	8	8	8
Helium He	22	22	22	22
Nitrogen N ₂	34	34	34	34
Argon Ar	34	34	34	34
CF ₄	-	-	36	36
Max. gas throughput at nom. rotation speed [mbar l/s]				
Pumping speed of used backing pump	65 m ³ /h	65 m ³ /h	65 m ³ /h	65 m ³ /h
Hydrogen H ₂	>30	>30	>30	>30
Helium He	>30	>30	>30	>30
Nitrogen N ₂	20	20	20	20
Argon Ar	11	11	11	11
CF ₄	-	-	12	12
Ultimate pressure (see page 144) [mbar]	<5·10 ⁻¹⁰	<10 ⁻⁷	<10 ⁻⁸	<10 ⁻⁷
Rotational speed [1/min]	37800	37800	37800	37800
Run-up time [min]	5	5	5	5
Cooling method, standard	Water	Water	Water	Water
Cooling water consumption [l/h]	100	100	100	100
Max. cooling water temperature [°C]	25	25	25	25
Weight [kg]	47	47	47	47
Ordering number pump				
with drive unit TC 750	ISO-K	PM P03 616	PM P03 611	PM P03 618
	ISO-F	PM P03 686	PM P03 681	PM P03 688
	CF-F	PM P03 696	-	PM P03 698
with drive unit TC 750 and integrated power supply	ISO-K	PM P03 750	PM P03 755	PM P03 760
	ISO-F	PM P03 751	PM P03 756	PM P03 761
	CF-F	PM P03 752	-	-



TPH/U 1501 P/PN DN 250 ISO-K/ ISO-F/CF-F	TPH/U 1501 UP/UPN DN 250 ISO-K/ ISO-F	TPH/U 1501 PC/PCN DN 250 ISO-K/ ISO-F/CF-F	TPH/U 1501 UPC/UPCN DN 250 ISO-K/ ISO-F
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DN 250	DN 250	DN 250	DN 250
DN 40 ISO-KF	DN 40 ISO-KF	DN 40 ISO-KF	DN 40 ISO-KF
G 1/8"	G 1/8"	G 1/8"	G 1/8"

1150	1150	1150	1150
1350	1350	1350	1350
1450	1450	1450	1450
1400	1400	1400	1400
		1100	1100

$6 \cdot 10^3$	$6 \cdot 10^3$	$6 \cdot 10^3$	$6 \cdot 10^3$
$2 \cdot 10^5$	$2 \cdot 10^5$	$2 \cdot 10^5$	$2 \cdot 10^5$
$>10^8$	$>10^8$	$>10^8$	$>10^8$
$>10^9$	$>10^9$	$>10^9$	$>10^9$
		$>10^9$	$>10^9$
2.0	2.0	2.0	2.0

8	8	8	8
22	22	22	22
34	34	34	34
34	34	34	34
		36	36

65 m ³ /h	65 m ³ /h	65 m ³ /h	65 m ³ /h
>30	>30	>30	>30
>30	>30	>30	>30
20	20	20	20
11	11	11	11
		12	12

$<5 \cdot 10^{-10}$	$<10^{-7}$	$<1 \cdot 10^{-8}$	$<10^{-7}$
37800	37800	37800	37800
5	5	5	5
Water	Water	Water	Water
100	100	100	100
25	25	25	25
49	49	49	49

PM P03 615	PM P03 610	PM P03 617	PM P03 612
PM P03 685	PM P03 680	PM P03 687	PM P03 682
PM P03 695	-	PM P03 697	-
PM P03 770	PM P03 775	PM P03 780	PM P03 785
PM P03 771	PM P03 776	PM P03 781	PM P03 786
PM P03 772	-	-	-

Ordering numbers power supplies and cables - TPH/U 1201 / 1501

	TPH/U 1201 P/PN		
	DN 200 ISO-K	DN 200 ISO-F	DN 200 CF-F
Ordering number pump			
with drive unit TC 750	PM P03 616	PM P03 686	PM P03 696
with drive unit TC 750 and integrated power supply	PM P03 750	PM P03 751	PM P03 752
	TPH/U 1501 P/PN		
	DN 250 ISO-K	DN 250 ISO-F	DN 250 CF-F
Ordering number pump			
with drive unit TC 750	PM P03 615	PM P03 685	PM P03 695
with drive unit TC 750 and integrated power supply	PM P03 770	PM P03 771	PM P03 772
Power supplies/power¹⁾	750 W	750 W	750 W
not needed for on Board NT "N-Type"			
DCU 600 power supply incl. Display control unit	PM C01 697	PM C01 697	PM C01 697
TPS 600 mains pack for wall/standard rail fitting	PM 041 815-T	PM 041 815-T	PM 041 815-T
TPS 601 mains pack 19" rack module 3 HE	PM 041 821-T	PM 041 821-T	PM 041 821-T
Control units			
DCU 001 Display Control Unit	PM 041 816-T	PM 041 816-T	PM 041 816-T
HPU 001 Handheld Programming Unit	PM 051 510-T	PM 051 510-T	PM 051 510-T
Accessorie for HPU (Power supply, software, PC-cable)	PM 061 005-T	PM 061 005-T	PM 061 005-T
Mains cable DCU/TPS, length 3 m¹⁾			
with safety plug (230 V AC)	P 4564 309 ZA	P 4564 309 ZA	P 4564 309 ZA
with UL plug (115 V AC)	P 4564 309 ZE	P 4564 309 ZE	P 4564 309 ZE
with UL plug (208 V AC)	P 4564 309 ZF	P 4564 309 ZF	P 4564 309 ZF
Mains cable for pumps with integrated power supply, 3 m			
with safety plug (230 V AC)	P 4564 309 HA	P 4564 309 HA	P 4564 309 HA
with UL plug (208 V AC)	P 4564 309 HB	P 4564 309 HB	P 4564 309 HB
Connection cable, length 3 m for¹⁾			
TC 750 - TPS/DCU 600	PM 051 103-T	PM 051 103-T	PM 051 103-T

¹⁾ not for pumps with integrated power supply "N-Types"



TPH/U 1201 UP/UPN		TPH/U 1201 PC/PCN			TPH 1201 UPC/UPCN	
DN 200 ISO-K	DN 200 ISO-F	DN 200 ISO-K	DN 200 ISO-F	DN 200 CF-F	DN 200 ISO-K	DN 200 ISO-F
PM P03 611	PM P03 681	PM P03 618	PM P03 688	PM P03 698	PM P03 613	PM P03 683
PM P03 755	PM P03 756	PM P03 760	PM P03 761	-	PM P03 765	PM P03 766
TPH/U 1501 UP/UPN		TPH/U 1501 PC/PCN			TPH 1501 UPC/UPCN	
DN 250 ISO-K	DN 250 ISO-F	DN 250 ISO-K	DN 250 ISO-F	DN 250 CF-F	DN 250 ISO-K	DN 250 ISO-F
PM P03 610	PM P03 680	PM P03 617	PM P03 687	PM P03 697	PM P03 612	PM P03 682
PM P03 775	PM P03 776	PM P03 780	PM P03 781	-	PM P03 785	PM P03 786
750 W	750 W	750 W	750 W	750 W	750 W	750 W
PM C01 697	PM C01 697	PM C01 697	PM C01 697	PM C01 697	PM C01 697	PM C01 697
PM 041 815-T	PM 041 815-T	PM 041 815-T	PM 041 815-T	PM 041 815-T	PM 041 815-T	PM 041 815-T
PM 041 821-T	PM 041 821-T	PM 041 821-T	PM 041 821-T	PM 041 821-T	PM 041 821-T	PM 041 821-T
PM 041 816-T	PM 041 816-T	PM 041 816-T	PM 041 816-T	PM 041 816-T	PM 041 816-T	PM 041 816-T
PM 051 510-T	PM 051 510-T	PM 051 510-T	PM 051 510-T	PM 051 510-T	PM 051 510-T	PM 051 510-T
PM 061 005-T	PM 061 005-T	PM 061 005-T	PM 061 005-T	PM 061 005-T	PM 061 005-T	PM 061 005-T
P 4564 309 ZA	P 4564 309 ZA	P 4564 309 ZA	P 4564 309 ZA	P 4564 309 ZA	P 4564 309 ZA	P 4564 309 ZA
P 4564 309 ZE	P 4564 309 ZE	P 4564 309 ZE	P 4564 309 ZE	P 4564 309 ZE	P 4564 309 ZE	P 4564 309 ZE
P 4564 309 ZF	P 4564 309 ZF	P 4564 309 ZF	P 4564 309 ZF	P 4564 309 ZF	P 4564 309 ZF	P 4564 309 ZF
P 4564 309 HA	P 4564 309 HA	P 4564 309 HA	P 4564 309 HA	P 4564 309 HA	P 4564 309 HA	P 4564 309 HA
P 4564 309 HB	P 4564 309 HB	P 4564 309 HB	P 4564 309 HB	P 4564 309 HB	P 4564 309 HB	P 4564 309 HB
PM 051 103-T	PM 051 103-T	PM 051 103-T	PM 051 103-T	PM 051 103-T	PM 051 103-T	PM 051 103-T

Ordering numbers accessories - TPH/U 1201

	DN 200 ISO-K	TPH/U 1201 P/PN	
		DN 200 ISO-F	DN 200 CF-F
Ordering number pump			
with drive unit TC 750	PM P03 616	PM P03 686	PM P03 696
with drive unit TC 750 and integrated power supply	PM P03 750	PM P03 751	PM P03 752
Venting units and components			
Venting valve TVF 005	PM Z01 135	PM Z01 135	PM Z01 135
Air drier TTV 001	PM Z00 121	PM Z00 121	PM Z00 121
Cooling accessories			
Water cooling unit TZK 2000 230V/50Hz	PM Z01 240	PM Z01 240	PM Z01 240
Heating accessories			
Heating jacket 208/230 V AC, integral safety plug	-	-	PM 061 140-T
Heating jacket 115 V AC, UL plug	-	-	PM 061 142-T
Backing pump control			
Relay box, 1-phase 5 A (Diaphragm pump)	PM 041 937-T	PM 041 937-T	PM 041 937-T
Relay box, 1-phase 20 A (Rotary vane pump)	PM 041 938-T	PM 041 938-T	PM 041 938-T
General accessories			
Sealing gas valve	PM Z01 142	PM Z01 142	PM Z01 142
Coated centering ring	PM 016 220-U	PM 016 220-U	-
Coated centering ring with protection screen	PM 016 222-U	PM 016 222-U	-
Protection screen	-	-	PM 016 342
Coated centering ring with integrated splinter shield	PM 016 221-U	PM 016 221-U	-
Splinter shield	-	-	PM 016 321
Vibration damper	PM 006 668-X	PM 006 668-X	PM 006 669-X
Brake unit for TC 600/750	PM 051 368-T	PM 051 368-T	PM 051 368-T
PWM-box, pre-switching unit for rotation speed control	PM 051 028-U	PM 051 028-U	PM 051 028-U
Serial Interface Converter RS-232-485	PM 051 054-T	PM 051 054-T	PM 051 054-T
Profibus - Gateway TIC 250	PM 051 257-T	PM 051 257-T	PM 051 257-T
Mounting materials			
Coated centering ring, bracket screws	PM 016 390-T	-	-
Coated centering ring with protect. screen, bracket screws	PM 016 392-T	-	-
Coated centering ring with splinter shield, bracket screws	PM 016 391-T	-	-
Coated centering ring, hexagonal bolts	-	PM 016 470-T	-
Coated centering ring with protect. screen, hexagonal bolts	-	PM 016 472-T	-
Coated centering ring with splinter shield, hexagonal bolts	-	PM 016 471-T	-
Coated centering ring, stud screws	-	PM 016 475-T	-
Coated centering ring with protection screen, stud screws	-	PM 016 477-T	-
Coated centering ring with splinter shield, stud screws	-	PM 016 476-T	-
Set of hexagonal bolts for CF-flanges	-	-	PF 505 004-T
Set of stud screws for CF-flanges	-	-	PF 507 004-T



TPH/U 1201 UP/UPN		TPH/U 1201 PC/PCN			TPH 1201 UPC/UPCN	
DN 200 ISO-K	DN 200 ISO-F	DN 200 ISO-K	DN 200 ISO-F	DN 200 CF-F	DN 200 ISO-K	DN 200 ISO-F
PM P03 611	PM P03 681	PM P03 618	PM P03 688	PM P03 698	PM P03 613	PM P03 683
PM P03 755	PM P03 756	PM P03 760	PM P03 761	-	PM P03 765	PM P03 766
PM Z01 135	PM Z01 135	PM Z01 135	PM Z01 135	PM Z01 135	PM Z01 135	PM Z01 135
PM Z00 121	PM Z00 121	PM Z00 121	PM Z00 121	PM Z00 121	PM Z00 121	PM Z00 121
PM Z01 240	PM Z01 240	PM Z01 240	PM Z01 240	PM Z01 240	PM Z01 240	PM Z01 240
-	-	-	-	PM 061 140-T	-	-
-	-	-	-	PM 061 142-T	-	-
PM 041 937-T	PM 041 937-T	PM 041 937-T	PM 041 937-T	PM 041 937-T	PM 041 937-T	PM 041 937-T
PM 041 938-T	PM 041 938-T	PM 041 938-T	PM 041 938-T	PM 041 938-T	PM 041 938-T	PM 041 938-T
PM Z01 142	PM Z01 142	PM Z01 142	PM Z01 142	PM Z01 142	PM Z01 142	PM Z01 142
PM 016 220-U	PM 016 220-U	PM 016 220-U	PM 016 220-U	-	PM 016 220-U	PM 016 220-U
PM 016 222-U	PM 016 222-U	PM 016 222-U	PM 016 222-U	-	PM 016 222-U	PM 016 222-U
-	-	-	-	PM 016 342	-	-
PM 016 221-U	PM 016 221-U	PM 016 221-U	PM 016 221-U	-	PM 016 221-U	PM 016 221-U
-	-	-	-	PM 016 321	-	-
PM 006 668-X	PM 006 668-X	PM 006 668-X	PM 006 668-X	PM 006 669-X	PM 006 668-X	PM 006 668-X
PM 051 368-T	PM 051 368-T	PM 051 368-T	PM 051 368-T	PM 051 368-T	PM 051 368-T	PM 051 368-T
PM 051 028-U	PM 051 028-U	PM 051 028-U	PM 051 028-U	PM 051 028-U	PM 051 028-U	PM 051 028-U
PM 051 054-T	PM 051 054-T	PM 051 054-T	PM 051 054-T	PM 051 054-T	PM 051 054-T	PM 051 054-T
PM 051 257-T	PM 051 257-T	PM 051 257-T	PM 051 257-T	PM 051 257-T	PM 051 257-T	PM 051 257-T
PM 016 390-T	-	PM 016 390-T	-	-	PM 016 390-T	-
PM 016 392-T	-	PM 016 392-T	-	-	PM 016 392-T	-
PM 016 391-T	-	PM 016 391-T	-	-	PM 016 391-T	-
-	PM 016 470-T	-	PM 016 470-T	-	-	PM 016 470-T
-	PM 016 472-T	-	PM 016 472-T	-	-	PM 016 472-T
-	PM 016 471-T	-	PM 016 471-T	-	-	PM 016 471-T
-	PM 016 475-T	-	PM 016 475-T	-	-	PM 016 475-T
-	PM 016 477-T	-	PM 016 477-T	-	-	PM 016 477-T
-	PM 016 476-T	-	PM 016 476-T	-	-	PM 016 476-T
-	-	-	-	PF 505 004-T	-	-
-	-	-	-	PF 507 004-T	-	-

Ordering numbers accessories - TPH/U 1501

	DN 250 ISO-K	TPH/U 1501 P/PN	
		DN 250 ISO-F	DN 250 CF-F
Ordering number pump			
with drive unit TC 750	PM P03 615	PM P03 685	PM P03 695
with drive unit TC 750 and integrated power supply	PM P03 770	PM P03 771	PM P03 772
Venting units and components			
Venting valve TVF 005	PM Z01 135	PM Z01 135	PM Z01 135
Air drier TTV 001	PM Z00 121	PM Z00 121	PM Z00 121
Cooling accessories			
Water cooling unit TZK 2000 230V/50Hz	PM Z01 240	PM Z01 240	PM Z01 240
Heating accessories			
Heating jacket 208/230 V AC, integral safety plug	-	-	PM 061 140-T
Heating jacket 115 V AC, UL plug	-	-	PM 061 142-T
Backing pump control			
Relay box, 1-phase 5 A (Diaphragm pump)	PM 041 937-T	PM 041 937-T	PM 041 937-T
Relay box, 1-phase 20 A (Rotary vane pump)	PM 041 938-T	PM 041 938-T	PM 041 938-T
General accessories			
Sealing gas valve	PM Z01 142	PM Z01 142	PM Z01 142
Coated centering ring	PM 016 225-U	PM 016 225-U	-
Coated centering ring with protection screen	PM 016 227-U	PM 016 227-U	-
Protection screen	-	-	PM 016 345
Coated centering ring with integrated splinter shield	PM 016 226-U	PM 016 226-U	-
Splinter shield	-	-	PM 016 324
Vibration damper	PM 006 670-X	PM 006 670-X	PM 006 671-X
Brake unit for TC 600/750	PM 051 368-T	PM 051 368-T	PM 051 368-T
PWM-box, pre-switching unit for rotation speed control	PM 051 028-U	PM 051 028-U	PM 051 028-U
Serial Interface Converter RS-232-485	PM 051 054-T	PM 051 054-T	PM 051 054-T
Profibus - Gateway TIC 250	PM 051 257-T	PM 051 257-T	PM 051 257-T
Mounting materials			
Coated centering ring, bracket screws	PM 016 395-T	-	-
Coated centering ring with protect. screen, bracket screws	PM 016 397-T	-	-
Coated centering ring with splinter shield, bracket screws	PM 016 396-T	-	-
Coated centering ring, hexagonal bolts	-	PM 016 480-T	-
Coated centering ring with protect. screen, hexagonal bolts	-	PM 016 482-T	-
Coated centering ring with splinter shield, hexagonal bolts	-	PM 016 481-T	-
Coated centering ring, stud screws	-	PM 016 485-T	-
Coated centering ring with protection screen, stud screws	-	PM 016 487-T	-
Coated centering ring with splinter shield, stud screws	-	PM 016 486-T	-
Set of hexagonal bolts for CF-flanges	-	-	PF 505 005-T
Set of stud screws for CF-flanges	-	-	PF 507 004-T



TPH/U 1501 UP/UPN		TPH/U 1501 PC/PCN			TPH 1501 UPC/UPCN	
DN 250 ISO-K	DN 250 ISO-F	DN 250 ISO-K	DN 250 ISO-F	DN 250 CF-F	DN 250 ISO-K	DN 250 ISO-F
PM P03 610	PM P03 680	PM P03 617	PM P03 687	PM P03 697	PM P03 612	PM P03 682
PM P03 775	PM P03 776	PM P03 780	PM P03 781	-	PM P03 785	PM P03 786
PM Z01 135	PM Z01 135	PM Z01 135	PM Z01 135	PM Z01 135	PM Z01 135	PM Z01 135
PM Z00 121	PM Z00 121	PM Z00 121	PM Z00 121	PM Z00 121	PM Z00 121	PM Z00 121
PM Z01 240	PM Z01 240	PM Z01 240	PM Z01 240	PM Z01 240	PM Z01 240	PM Z01 240
-	-	-	-	PM 061 140-T	-	-
-	-	-	-	PM 061 142-T	-	-
PM 041 937-T	PM 041 937-T	PM 041 937-T	PM 041 937-T	PM 041 937-T	PM 041 937-T	PM 041 937-T
PM 041 938-T	PM 041 938-T	PM 041 938-T	PM 041 938-T	PM 041 938-T	PM 041 938-T	PM 041 938-T
PM Z01 142	PM Z01 142	PM Z01 142	PM Z01 142	PM Z01 142	PM Z01 142	PM Z01 142
PM 016 225-U	PM 016 225-U	PM 016 225-U	PM 016 225-U	-	PM 016 225-U	PM 016 225-U
PM 016 227-U	PM 016 227-U	PM 016 227-U	PM 016 227-U	-	PM 016 227-U	PM 016 227-U
-	-	-	-	PM 016 345	-	-
PM 016 226-U	PM 016 226-U	PM 016 226-U	PM 016 226-U	-	PM 016 226-U	PM 016 226-U
-	-	-	-	PM 016 324	-	-
PM 006 670-X	PM 006 670-X	PM 006 670-X	PM 006 670-X	PM 006 671-X	PM 006 670-X	PM 006 670-X
PM 051 368-T	PM 051 368-T	PM 051 368-T	PM 051 368-T	PM 051 368-T	PM 051 368-T	PM 051 368-T
PM 051 028-U	PM 051 028-U	PM 051 028-U	PM 051 028-U	PM 051 028-U	PM 051 028-U	PM 051 028-U
PM 051 054-T	PM 051 054-T	PM 051 054-T	PM 051 054-T	PM 051 054-T	PM 051 054-T	PM 051 054-T
PM 051 257-T	PM 051 257-T	PM 051 257-T	PM 051 257-T	PM 051 257-T	PM 051 257-T	PM 051 257-T
PM 016 395-T	-	PM 016 395-T	-	-	PM 016 395-T	-
PM 016 397-T	-	PM 016 397-T	-	-	PM 016 397-T	-
PM 016 396-T	-	PM 016 396-T	-	-	PM 016 396-T	-
-	PM 016 480-T	-	PM 016 480-T	-	-	PM 016 480-T
-	PM 016 482-T	-	PM 016 482-T	-	-	PM 016 482-T
-	PM 016 481-T	-	PM 016 481-T	-	-	PM 016 481-T
-	PM 016 485-T	-	PM 016 485-T	-	-	PM 016 485-T
-	PM 016 487-T	-	PM 016 487-T	-	-	PM 016 487-T
-	PM 016 486-T	-	PM 016 486-T	-	-	PM 016 486-T
-	-	-	-	PF 505 005-T	-	-
-	-	-	-	PF 507 004-T	-	-

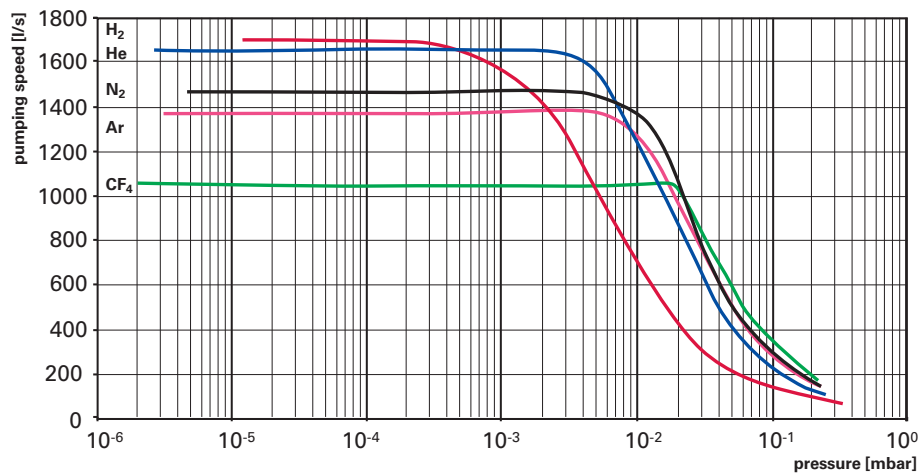
Turbomolecular pumps with pumping speed up to 2000 l/s

TPH 1801 / TPH/U 2301

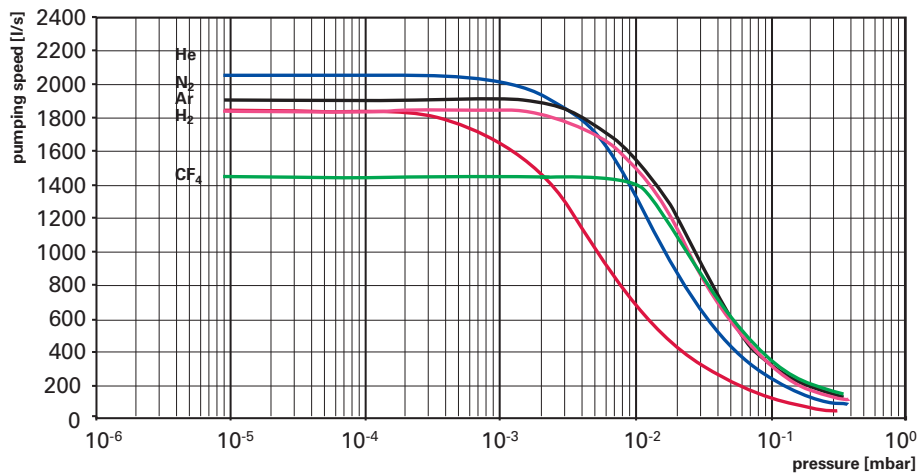


- ▶ High volume flow rate for light and heavy gases
- ▶ High gas throughputs also for heavy gases
- ▶ Able to withstand high particulate applications
- ▶ Rugged rotor bearing for highest reliability
- ▶ Integrated drive unit TC 750
- ▶ Integrated power supply available (N types)
- ▶ Versions for handling corrosive gases are available (C types)
- ▶ Pumps available for upside-down operation (U types)
- ▶ Corrosion resistant lubricant on all pumps
- ▶ Optimum lubricant supply through an oil pump system
- ▶ Integrated sealing gas system
- ▶ Type of cooling: Water cooling
- ▶ Interfaces: RS-485, Remote, Profibus optional

Pumping speed

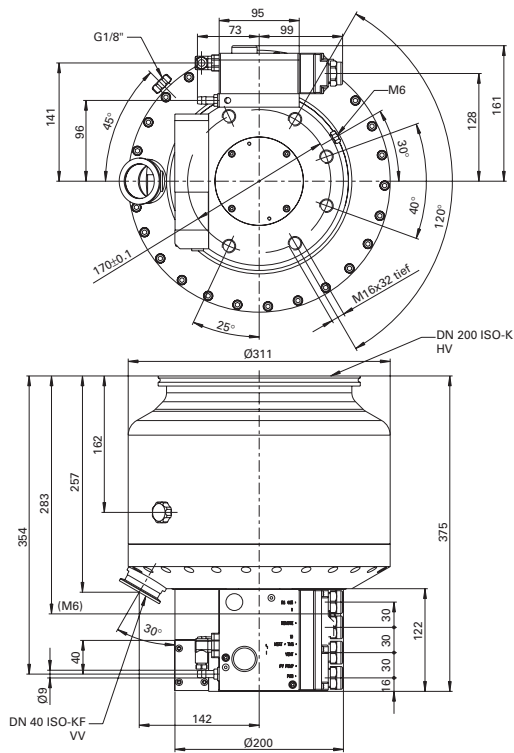


TPH 1801, DN 200

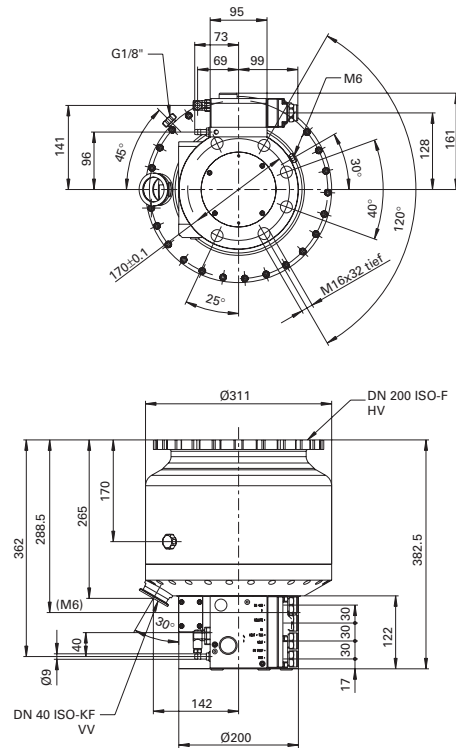


TPH 2301, DN 250

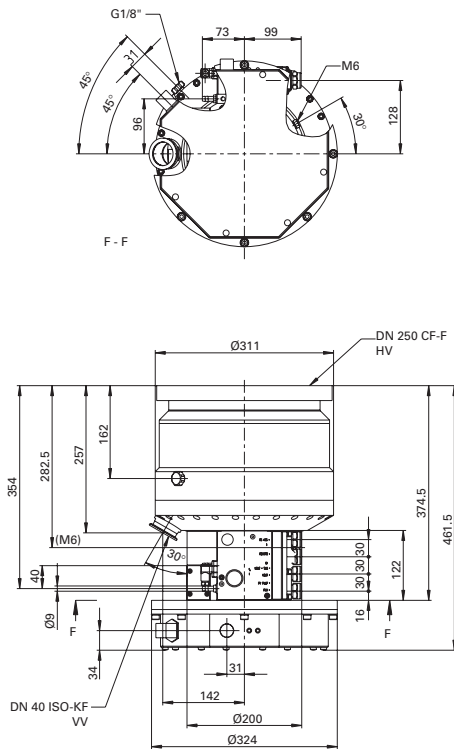
Dimensions (in mm)



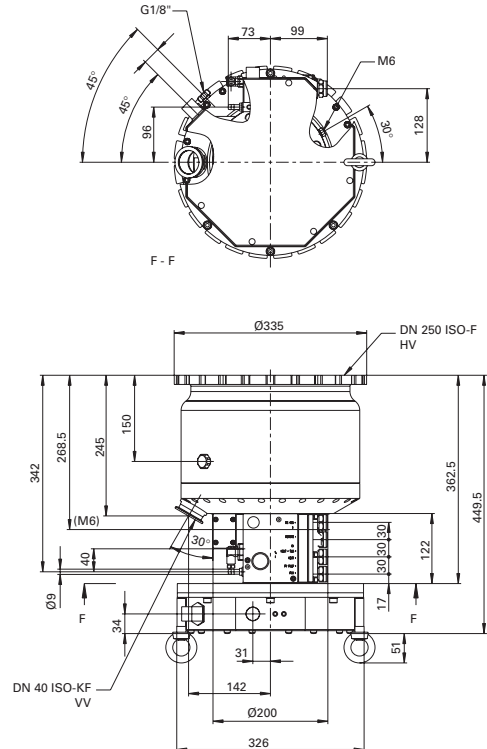
TPH 1801 P, DN 200 ISO-K



TPH 1801 UPC, DN 200 ISO-F



TPU 2301 P N, DN 250 CF-F



TPH 2301 UP N, DN 250 ISO-F

Technical data - TPH 1801 / TPH/U 2301

	TPH 1801 P/PN DN 200 ISO-K/ ISO-F	TPH 1801 UP/UPN DN 200 ISO-K/ ISO-F	TPH 1801 PC/PCN DN 200 ISO-K/ ISO-F	TPH 1801 UPC/UPCN DN 200 ISO-K/ ISO-F	
Connection nominal diameter					
Flange (in)	DN 200	DN 200	DN 200	DN 200	
Flange (out)	DN 40 ISO-KF	DN 40 ISO-KF	DN 40 ISO-KF	DN 40 ISO-KF	
Venting connection	G 1/8"	G 1/8"	G 1/8"	G 1/8"	
Pumping speed [l/s]					
Hydrogen H ₂	1700	1700	1700	1700	
Helium He	1650	1650	1650	1650	
Nitrogen N ₂	1450	1450	1450	1450	
Argon Ar	1370	1370	1370	1370	
CF ₄			1050	1050	
Compression ratio					
Hydrogen H ₂	4·10 ⁴	4·10 ⁴	2·10 ⁴	2·10 ⁴	
Helium He	1·10 ⁶	1·10 ⁶	3·10 ⁵	3·10 ⁵	
Nitrogen N ₂	>10 ⁸	>10 ⁸	>10 ⁸	>10 ⁸	
Argon Ar	>10 ⁸	>10 ⁸	>10 ⁸	>10 ⁸	
CF ₄	-	-	>10 ⁸	>10 ⁸	
Max. fore vacuum pressure for N ₂ [mbar]	1.8	1.8	1.8	1.8	
Max. gas throughput at 0.1 mbar HV [mbar l/s]					
Hydrogen H ₂	14	14	14	14	
Helium He	26	26	26	26	
Nitrogen N ₂	34	34	34	34	
Argon Ar	34	34	34	34	
CF ₄			38	38	
Max. gas throughput at nom. rotation speed [mbar l/s]					
Pumping speed of used backing pump	120 m ³ /h	120 m ³ /h	120 m ³ /h	120 m ³ /h	
Hydrogen H ₂	>30	>30	>30	>30	
Helium He	20	20	20	20	
Nitrogen N ₂	20	20	20	20	
Argon Ar	16	16	16	16	
CF ₄	-	-	14	14	
Ultimate pressure (see page 144) [mbar]	1·10 ⁻⁷	1·10 ⁻⁷	1·10 ⁻⁷	1·10 ⁻⁷	
Rotational speed [1/min]	31500	31500	31500	31500	
Run-up time [min]	8	8	8	8	
Cooling method, standard	Water	Water	Water	Water	
Cooling water consumption [l/h]	100	100	100	100	
Max. cooling water temperature [°C]	25	25	25	25	
Weight [kg]	50	50	50	50	
Ordering number pump					
with drive unit TC 750	ISO-K	PM P03 329	PM P03 476	PM P03 326	PM P03 478
	ISO-F	PM P03 840	PM P03 842	PM P03 841	PM P03 843
	CF-F	-	-	-	-
with drive unit TC 750 and integrated power supply	ISO-K	PM P03 790	PM P03 795	PM P03 800	PM P03 805
	ISO-F	PM P03 791	PM P03 796	PM P03 801	PM P03 806
	CF-F	-	-	-	-



TPH/U 2301 P/PN DN 250 ISO-K/ ISO-F/CF-F	TPH/U 2301 UP/UPN DN 250 ISO-K/ ISO-F	TPH/U 2301 PC/PCN DN 250 ISO-K/ ISO-F/CF-F	TPH/U 2301 UPC/UPCN DN 250 ISO-K/ ISO-F
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DN 250	DN 250	DN 250	DN 250
DN 40 ISO-KF	DN 40 ISO-KF	DN 40 ISO-KF	DN 40 ISO-KF
G 1/8"	G 1/8"	G 1/8"	G 1/8"

1850	1850	1850	1850
2050	2050	2050	2050
1900	1900	1900	1900
1850	1850	1850	1850
-	-	1450	1450

$2 \cdot 10^4$	$2 \cdot 10^4$	$2 \cdot 10^4$	$2 \cdot 10^4$
$3 \cdot 10^5$	$3 \cdot 10^5$	$3 \cdot 10^5$	$3 \cdot 10^5$
$>1 \cdot 10^8$	$>1 \cdot 10^8$	$>10^8$	$>10^8$
$>1 \cdot 10^8$	$>1 \cdot 10^8$	$>10^8$	$>10^8$
-	-	$>10^8$	$>10^8$
1.8	1.8	1.8	1.8

14	14	14	14
26	26	26	26
34	34	34	34
34	34	34	34
-	-	38	38

120 m ³ /h	120 m ³ /h	120 m ³ /h	120 m ³ /h
>30	>30	>30	>30
20	20	20	20
20	20	20	20
16	16	16	16
-	-	14	14

$<5 \cdot 10^{-10}$	$<1 \cdot 10^{-7}$	$<1 \cdot 10^{-8}$	$<1 \cdot 10^{-7}$
31500	31500	31500	31500
8	8	8	8
Water	Water	Water	Water
100	100	100	100
25	25	25	25
55	55	55	55

PM P03 328	PM P03 475	PM P03 325	PM P03 477
PM P03 845	PM P03 847	PM P03 846	PM P03 848
PM P03 560	-	PM P03 323	-
PM P03 810	PM P03 815	PM P03 820	PM P03 825
PM P03 811	PM P03 816	PM P03 821	PM P03 826
PM P03 812	-	-	-

Ordering numbers power supplies and cables - TPH 1801 / TPH/U 2301

	DN 200 ISO-K	TPH 1801 P/PN DN 200 ISO-F	
Ordering number pump			
with drive unit TC 750	PM P03 329	PM P03 840	-
with drive unit TC 750 and integrated power supply	PM P03 790	PM P03 791	-
	DN 250 ISO-K	TPH/U 2301 P/PN DN 250 ISO-F DN 250 CF-F	
Bestellnummer Pumpe			
mit Antrieb TC 750	PM P03 328	PM P03 845	PM P03 560
mit Antrieb TC 750 und integriertem Netzteil	PM P03 810	PM P03 811	PM P03 812
Power supplies/power ¹⁾	750 W	750 W	750 W
DCU 600 power supply incl. Display control unit	PM C01 697	PM C01 697	PM C01 697
TPS 600 mains pack for wall/standard rail fitting	PM 041 815-T	PM 041 815-T	PM 041 815-T
TPS 601 mains pack 19" rack module 3 HE	PM 041 821-T	PM 041 821-T	PM 041 821-T
Control units			
DCU 001 Display Control Unit	PM 041 816-T	PM 041 816-T	PM 041 816-T
HPU 001 Handheld Programming Unit	PM 051 510-T	PM 051 510-T	PM 051 510-T
Accessorie for HPU (Power supply, software, PC-cable)	PM 061 005-T	PM 061 005-T	PM 061 005-T
Mains cable DCU/TPS, length 3 m ¹⁾			
with safety plug (230 V AC)	P 4564 309 ZA	P 4564 309 ZA	P 4564 309 ZA
with UL plug (115 V AC)	P 4564 309 ZE	P 4564 309 ZE	P 4564 309 ZE
with UL plug (208 V AC)	P 4564 309 ZF	P 4564 309 ZF	P 4564 309 ZF
Mains cable for pumps with integrated power supply, 3 m			
with safety plug (230 V AC)	P 4564 309 HA	P 4564 309 HA	P 4564 309 HA
with UL plug (208 V AC)	P 4564 309 HB	P 4564 309 HB	P 4564 309 HB
Connection cable, length 3 m for ¹⁾			
TC 750 - TPS/DCU 600	PM 051 103-T	PM 051 103-T	PM 051 103-T

¹⁾ not for pumps with integrated power supply "N-Types"

TPH 1801 UP/UPN			TPH 1801 PC/PCN		TPH 1801 UPC/UPCN	
DN 200 ISO-K	DN 200 ISO-F	DN 200 ISO-K	DN 200 ISO-F		DN 200 ISO-K	DN 200 ISO-F
PM P03 476	PM P03 842	PM P03 326	PM P03 841	-	PM P03 478	PM P03 843
PM P03 795	PM P03 796	PM P03 800	PM P03 801	-	PM P03 805	PM P03 806
TPH 2301 UP/UPN			TPH 2301 PC/PCN		TPH 2301 UPC/UPCN	
DN 250 ISO-K	DN 250 ISO-F	DN 250 ISO-K	DN 250 ISO-F	DN 250 CF-F	DN 250 ISO-K	DN 250 ISO-F
PM P03 475	PM P03 847	PM P03 325	PM P03 846	PM P03 323	PM P03 477	PM P03 848
PM P03 815	PM P03 816	PM P03 820	PM P03 821	-	PM P03 825	PM P03 826
750 W	750 W	750 W	750 W	750 W	750 W	750 W
PM C01 697	PM C01 697	PM C01 697	PM C01 697	PM C01 697	PM C01 697	PM C01 697
PM 041 815-T	PM 041 815-T	PM 041 815-T	PM 041 815-T	PM 041 815-T	PM 041 815-T	PM 041 815-T
PM 041 821-T	PM 041 821-T	PM 041 821-T	PM 041 821-T	PM 041 821-T	PM 041 821-T	PM 041 821-T
PM 041 816-T	PM 041 816-T	PM 041 816-T	PM 041 816-T	PM 041 816-T	PM 041 816-T	PM 041 816-T
PM 051 510-T	PM 051 510-T	PM 051 510-T	PM 051 510-T	PM 051 510-T	PM 051 510-T	PM 051 510-T
PM 061 005-T	PM 061 005-T	PM 061 005-T	PM 061 005-T	PM 061 005-T	PM 061 005-T	PM 061 005-T
P 4564 309 ZA	P 4564 309 ZA	P 4564 309 ZA	P 4564 309 ZA	P 4564 309 ZA	P 4564 309 ZA	P 4564 309 ZA
P 4564 309 ZE	P 4564 309 ZE	P 4564 309 ZE	P 4564 309 ZE	P 4564 309 ZE	P 4564 309 ZE	P 4564 309 ZE
P 4564 309 ZF	P 4564 309 ZF	P 4564 309 ZF	P 4564 309 ZF	P 4564 309 ZF	P 4564 309 ZF	P 4564 309 ZF
P 4564 309 HA	P 4564 309 HA	P 4564 309 HA	P 4564 309 HA	P 4564 309 HA	P 4564 309 HA	P 4564 309 HA
P 4564 309 HB	P 4564 309 HB	P 4564 309 HB	P 4564 309 HB	P 4564 309 HB	P 4564 309 HB	P 4564 309 HB
PM 051 103-T	PM 051 103-T	PM 051 103-T	PM 051 103-T	PM 051 103-T	PM 051 103-T	PM 051 103-T

Ordering numbers accessories - TPH 1801

	TPH 1801 P/PN		TPH 1801 UP/UPN	
	DN 200 ISO-K	DN 200 ISO-F	DN 200 ISO-K	DN 200 ISO-F
Ordering number pump				
with drive unit TC 750	PM P03 329	PM P03 840	PM P03 476	PM P03 842
with drive unit TC 750 and integrated power supply	PM P03 790	PM P03 791	PM P03 795	PM P03 796
Venting units and components				
Venting valve TVF 005	PM Z01 135	PM Z01 135	PM Z01 135	PM Z01 135
Air drier TTV 001	PM Z00 121	PM Z00 121	PM Z00 121	PM Z00 121
Cooling accessories				
Water cooling unit TZK 2000 230V/50Hz	PM Z01 240	PM Z01 240	PM Z01 240	PM Z01 240
Backing pump control				
Relay box, 1-phase 5 A (Diaphragm pump)	PM 041 937-T	PM 041 937-T	PM 041 937-T	PM 041 937-T
Relay box, 1-phase 20 A (Rotary vane pump)	PM 041 938-T	PM 041 938-T	PM 041 938-T	PM 041 938-T
General accessories				
Sealing gas valve	PM Z01 142	PM Z01 142	PM Z01 142	PM Z01 142
Coated centering ring	PM 016 220-U	PM 016 220-U	PM 016 220-U	PM 016 220-U
Coated centering ring with protection screen	PM 016 222-U	PM 016 222-U	PM 016 222-U	PM 016 222-U
Coated centering ring with integrated splinter shield	PM 016 221-U	PM 016 221-U	PM 016 221-U	PM 016 221-U
Vibration damper	PM 006 668-X	PM 006 668-X	PM 006 668-X	PM 006 668-X
Brake unit for TC 600/750	PM 051 368-T	PM 051 368-T	PM 051 368-T	PM 051 368-T
PWM-box, pre-switching unit for rotation speed control	PM 051 028-U	PM 051 028-U	PM 051 028-U	PM 051 028-U
Serial Interface Converter RS-232-485	PM 051 054-T	PM 051 054-T	PM 051 054-T	PM 051 054-T
Profibus - Gateway TIC 250	PM 051 257-T	PM 051 257-T	PM 051 257-T	PM 051 257-T
Mounting materials				
Coated centering ring, bracket screws	PM 016 410-T	-	PM 016 410-T	-
Coated centering ring with protect. screen, bracket screws	PM 016 412-T	-	PM 016 412-T	-
Coated centering ring with splinter shield, bracket screws	PM 016 411-T	-	PM 016 411-T	-
Coated centering ring, hexagonal bolts	-	PM 016 470-T	-	PM 016 470-T
Coated centering ring with protect. screen, hexagonal bolts	-	PM 016 472-T	-	PM 016 472-T
Coated centering ring with splinter shield, hexagonal bolts	-	PM 016 471-T	-	PM 016 471-T
Coated centering ring, stud screws	-	PM 016 475-T	-	PM 016 475-T
Coated centering ring with protection screen, stud screws	-	PM 016 477-T	-	PM 016 477-T
Coated centering ring with splinter shield, stud screws	-	PM 016 476-T	-	PM 016 476-T
Set of hexagonal bolts for CF-flanges	-	-	-	-
Set of stud screws for CF-flanges	-	-	-	-

TPH 1801 PC/PCN		TPH 1801 UPC/UPCN	
DN 200 ISO-K	DN 200 ISO-F	DN 200 ISO-K	DN 200 ISO-F

PM P03 326	PM P03 841	PM P03 478	PM P03 843
PM P03 800	PM P03 801	PM P03 805	PM P03 806

PM Z01 135	PM Z01 135	PM Z01 135	PM Z01 135
PM Z00 121	PM Z00 121	PM Z00 121	PM Z00 121

PM Z01 240	PM Z01 240	PM Z01 240	PM Z01 240
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PM 041 937-T	PM 041 937-T	PM 041 937-T	PM 041 937-T
PM 041 938-T	PM 041 938-T	PM 041 938-T	PM 041 938-T

PM Z01 142	PM Z01 142	PM Z01 142	PM Z01 142
PM 016 220-U	PM 016 220-U	PM 016 220-U	PM 016 220-U
PM 016 222-U	PM 016 222-U	PM 016 222-U	PM 016 222-U
PM 016 221-U	PM 016 221-U	PM 016 221-U	PM 016 221-U
PM 006 668-X	PM 006 668-X	PM 006 668-X	PM 006 668-X
PM 051 368-T	PM 051 368-T	PM 051 368-T	PM 051 368-T
PM 051 028-U	PM 051 028-U	PM 051 028-U	PM 051 028-U
PM 051 054-T	PM 051 054-T	PM 051 054-T	PM 051 054-T
PM 051 257-T	PM 051 257-T	PM 051 257-T	PM 051 257-T

PM 016 410-T	-	PM 016 410-T	-
PM 016 412-T	-	PM 016 412-T	-
PM 016 411-T	-	PM 016 411-T	-
-	PM 016 470-T	-	PM 016 470-T
-	PM 016 472-T	-	PM 016 472-T
-	PM 016 471-T	-	PM 016 471-T
-	PM 016 475-T	-	PM 016 475-T
-	PM 016 477-T	-	PM 016 477-T
-	PM 016 476-T	-	PM 016 476-T
-	-	-	-
-	-	-	-

Ordering numbers accessories - TPH/U 2301

	TPH/U 2301 P/PN		
	DN 250 ISO-K	DN 250 ISO-F	DN 250 CF-F
Ordering number pump			
with drive unit TC 750	PM P03 328	PM P03 845	PM P03 560
with drive unit TC 750 and integrated power supply	PM P03 810	PM P03 811	PM P03 812
Venting units and components			
Venting valve TVF 005	PM Z01 135	PM Z01 135	PM Z01 135
Air drier TTV 001	PM Z00 121	PM Z00 121	PM Z00 121
Cooling accessories			
Water cooling unit TZK 2000 230V/50Hz	PM Z01 240	PM Z01 240	PM Z01 240
Heating accessories			
Heating jacket 208/230 V AC, integral safety plug	-	-	PM 051 663-T
Heating jacket 115 V AC, UL plug	-	-	PM 051 665-T
Backing pump control			
Relay box, 1-phase 5 A (Diaphragm pump)	PM 041 937-T	PM 041 937-T	PM 041 937-T
Relay box, 1-phase 20 A (Rotary vane pump)	PM 041 938-T	PM 041 938-T	PM 041 938-T
General accessories			
Sealing gas valve	PM Z01 142	PM Z01 142	PM Z01 142
Coated centering ring	PM 016 225-U	PM 016 225-U	-
Coated centering ring with protection screen	PM 016 227-U	PM 016 227-U	-
Protection screen	-	-	PM 016 345
Coated centering ring with integrated splinter shield	PM 016 226-U	PM 016 226-U	-
Splinter shield	-	-	PM 016 324
Vibration damper	PM 006 670-X	PM 006 670-X	PM 006 671-X
Brake unit for TC 600/750	PM 051 368-T	PM 051 368-T	PM 051 368-T
PWM-box, pre-switching unit for rotation speed control	PM 051 028-U	PM 051 028-U	PM 051 028-U
Serial Interface Converter RS-232-485	PM 051 054-T	PM 051 054-T	PM 051 054-T
Profibus - Gateway TIC 250	PM 051 257-T	PM 051 257-T	PM 051 257-T
Mounting materials			
Coated centering ring, bracket screws	PM 016 415-T	-	-
Coated centering ring with protect. screen, bracket screws	PM 016 417-T	-	-
Coated centering ring with splinter shield, bracket screws	PM 016 416-T	-	-
Coated centering ring, hexagonal bolts	-	PM 016 480-T	-
Coated centering ring with protect. screen, hexagonal bolts	-	PM 016 482-T	-
Coated centering ring with splinter shield, hexagonal bolts	-	PM 016 481-T	-
Coated centering ring, stud screws	-	PM 016 485-T	-
Coated centering ring with protection screen, stud screws	-	PM 016 487-T	-
Coated centering ring with splinter shield, stud screws	-	PM 016 486-T	-
Set of hexagonal bolts for CF-flanges	-	-	PF 505 005-T
Set of stud screws for CF-flanges	-	-	PF 507 004-T



TPH 2301 UP/UPN			TPH 2301 PC/PCN		TPH 2301 UPC/UPCN	
DN 250 ISO-K	DN 250 ISO-F	DN 250 ISO-K	DN 250 ISO-F	250 CF-F	DN 250 ISO-K	DN 250 ISO-F
PM P03 475	PM P03 847	PM P03 325	PM P03 846	PM P03 323	PM P03 477	PM P03 848
PM P03 815	PM P03 816	PM P03 820	PM P03 821	-	PM P03 825	PM P03 826
PM Z01 135	PM Z01 135	PM Z01 135	PM Z01 135	PM Z01 135	PM Z01 135	PM Z01 135
PM Z00 121	PM Z00 121	PM Z00 121	PM Z00 121	PM Z00 121	PM Z00 121	PM Z00 121
PM Z01 240	PM Z01 240	PM Z01 240	PM Z01 240	PM Z01 240	PM Z01 240	PM Z01 240
-	-	-	-	PM 051 663-T	-	-
-	-	-	-	PM 051 665-T	-	-
PM 041 937-T	PM 041 937-T	PM 041 937-T	PM 041 937-T	PM 041 937-T	PM 041 937-T	PM 041 937-T
PM 041 938-T	PM 041 938-T	PM 041 938-T	PM 041 938-T	PM 041 938-T	PM 041 938-T	PM 041 938-T
PM Z01 142	PM Z01 142	PM Z01 142	PM Z01 142	PM Z01 142	PM Z01 142	PM Z01 142
PM 016 225-U	PM 016 225-U	PM 016 225-U	PM 016 225-U	-	PM 016 225-U	PM 016 225-U
PM 016 227-U	PM 016 227-U	PM 016 227-U	PM 016 227-U	-	PM 016 227-U	PM 016 227-U
-	-	-	-	PM 016 345	-	-
PM 016 226-U	PM 016 226-U	PM 016 226-U	PM 016 226-U	-	PM 016 226-U	PM 016 226-U
-	-	-	-	PM 016 324	-	-
PM 006 670-X	PM 006 670-X	PM 006 670-X	PM 006 670-X	PM 006 671-X	PM 006 670-X	PM 006 670-X
PM 051 368-T	PM 051 368-T	PM 051 368-T	PM 051 368-T	PM 051 368-T	PM 051 368-T	PM 051 368-T
PM 051 028-U	PM 051 028-U	PM 051 028-U	PM 051 028-U	PM 051 028-U	PM 051 028-U	PM 051 028-U
PM 051 054-T	PM 051 054-T	PM 051 054-T	PM 051 054-T	PM 051 054-T	PM 051 054-T	PM 051 054-T
PM 051 257-T	PM 051 257-T	PM 051 257-T	PM 051 257-T	PM 051 257-T	PM 051 257-T	PM 051 257-T
PM 016 415-T	-	PM 016 415-T	-	-	PM 016 415-T	-
PM 016 417-T	-	PM 016 417-T	-	-	PM 016 417-T	-
PM 016 416-T	-	PM 016 416-T	-	-	PM 016 416-T	-
-	PM 016 480-T	-	PM 016 480-T	-	-	PM 016 480-T
-	PM 016 482-T	-	PM 016 482-T	-	-	PM 016 482-T
-	PM 016 481-T	-	PM 016 481-T	-	-	PM 016 481-T
-	PM 016 485-T	-	PM 016 485-T	-	-	PM 016 485-T
-	PM 016 487-T	-	PM 016 487-T	-	-	PM 016 487-T
-	PM 016 486-T	-	PM 016 486-T	-	-	PM 016 486-T
-	-	-	-	PF 505 005-T	-	-
-	-	-	-	PF 507 004-T	-	-



**The maintenance-free high-performance turbopumps
for all applications in analytics, industry and research**

MagneticTurbo™

Your advantages

The second full turbopump series from Pfeiffer Vacuum are the **MagneticTurbo™** pumps.

The flexibility and broad usability of the MagneticTurbo™ provide significant benefits to the user.

- ▶ Low operating costs through maintenance-free operation
- ▶ Operation which is free of contamination and vibrations
- ▶ Maximum operational reliability through integrated sealing gas system
- ▶ Installation independent orientation
- ▶ Optional temperature management system for optimum adaptation to the operating conditions
- ▶ Low system costs through the use of small backing pumps

For different applications and processes with the MagneticTurbo™, necessary and optional accessories are available.

As an aid for selecting the right product, information is provided below on the usage of the accessories:

- ▶ **Drive electronics and power supplies**
- ▶ **Control units**
- ▶ **Accessories**

and ordering examples are provided at the end of this introduction.

Drive electronics/power supply units

In the case of the MagneticTurbo™ pumps from the series 200 M, 400 M, 1000 M and 1600 M, the magnetic bearing electronics **TCM 1601** provide drive, monitoring and control of the entire pump. Comprehensive parameterizations allow the pump to be

adapted to any process. With the TCM 1601, the four pump types mentioned may be operated using connection cables up to 50 meters long without any alignment or other activities by the user.

The **HiMag™ 2400** is the first magnetically suspended turbopump worldwide with integrated magnetic bearing and drive electronics – the logical step next with the concept so successfully begun with the CompactTurbo™. The HiMag™ is available with either an integrated power supply or a separate power supply unit **TPS 1400**.



Control units

Whereas within the compact magnetic bearing electronics TCM 1601, all control options have been integrated. The modular philosophy of the CompactTurbo series has in the case of the HiMag™, been logically developed further.

For these pump types, the **DCU 001** and **HPU 001** may be used for external control and monitoring, without higher level controllers.

Accessories

For operating the MagneticTurbo™, a wide variety of accessories may be used. For cooling the pump, various units are available. For safe operation, various mesh guards and comprehensive mounting materials can be ordered.

For trouble-free integration within a pumping station, the pumping station controller **TCS 180** is available. Accessories are also available for heating or controlling of backing pumps including various field bus systems.

For the allocation of the accessory items with respect to the individual pumps, please refer to the accessories overviews for the individual pump groups.

Ordering examples:

**Customer's requirement: TMH 400 MP, DN 160 ISO-K, (230 V),
air cooling, splinter shield, pumping station control unit**

Item	Order.-No.	Description
1	PM P02 740	TMH 400 MP, DN 160 ISO-K incl. venting valve
2	PM 051 003 -T	Connecting cable pump-TCM 1601
3	PM C01 675	TCM 1601
4	P 4564 309 ZA	Mains cable 230 V (EURO)
5	PM Z01 260	Air cooling (208/230 V)
6	PM 016 365 -T	Mounting kit (splinter shield + centering ring + bracket screws)
7	PM C01 655	TCS 180

**Customer's requirement: HiMag™ 2400, DN 250 ISO-K, water cooling,
power supply for 19 in. rack (230 V), control unit HPU**

Item	Order.-No.	Description
1	PM P03 490	HiMag™ 2400, DN ISO-K incl. TM 3000, water cooling, venting valve
2	PM 051 983 -T	Connection cable TM 3000-TPS 1401
3	PM C01 761	TPS 1401 (for 19-in. rack)
4	P 4564 309 HA	Mains cable 230 V (EURO)
5	PM 051 726 -T	Connecting cable TM 3000-DCU/HPU
6	PM 051 510 -T	HPU 001
7	PM 061 005 -T	Accessories package for HPU
8	PM 016 420 -T	Mounting kit (centering ring + bracket screws)





MagneticTurbo™ series

TurboDrag pumps with pumping speed up to 400 l/s

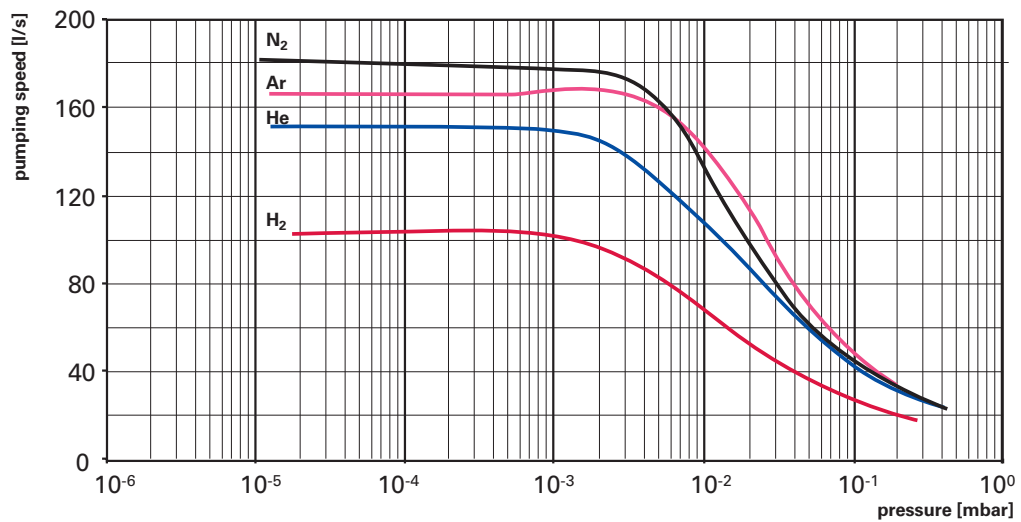
TMH/U 200 M / TMH/U 400 M



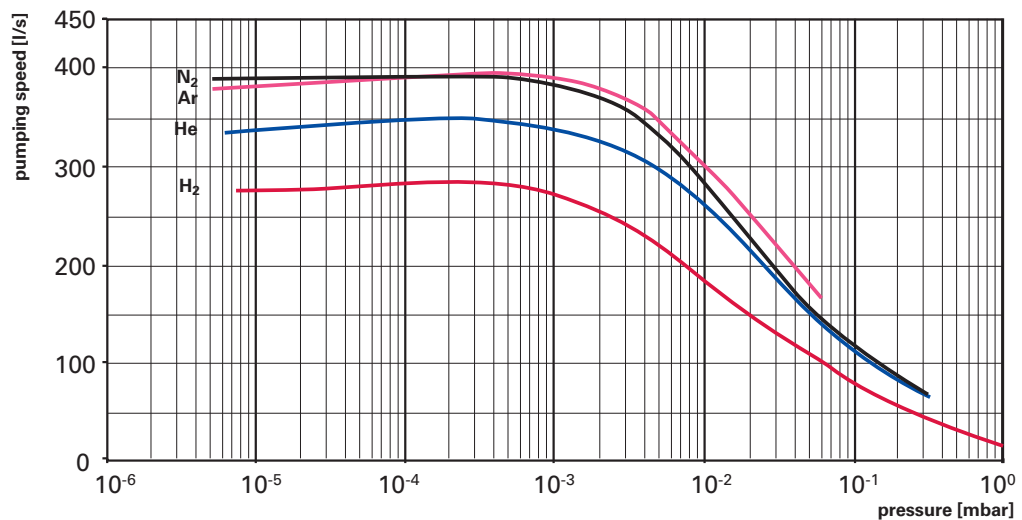
- Magnetic bearing system with 3 active and 2 passive axes, with the following benefits: maintenance-free, free of hydrocarbons, for installation in any orientation, low vibration and noise levels
- High gas throughput also in the case of low volume flow rates of the backing pump
- High critical backing pressure
- Short run-up time, fast and reliable venting through integrated and patented venting method
- Type of cooling: Air/water cooling



Pumping speed

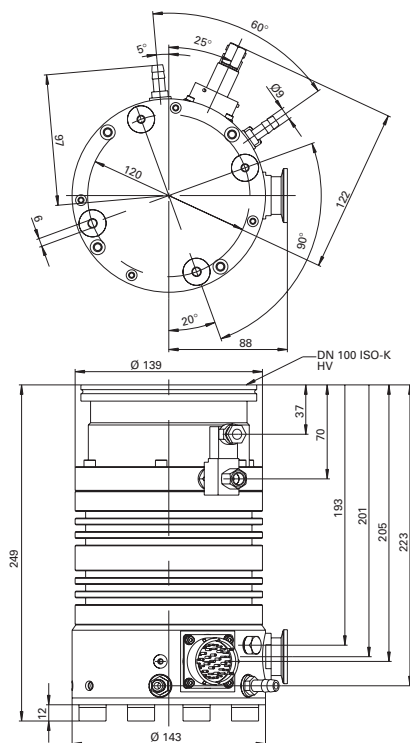


TMH 200 MP, DN 100

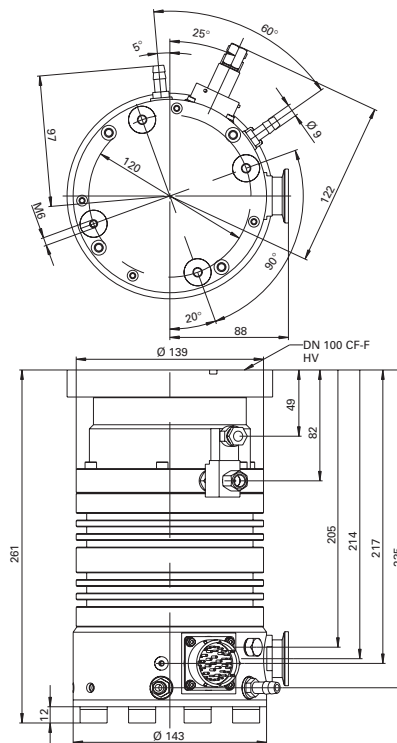


TMU 400 MP, DN 160

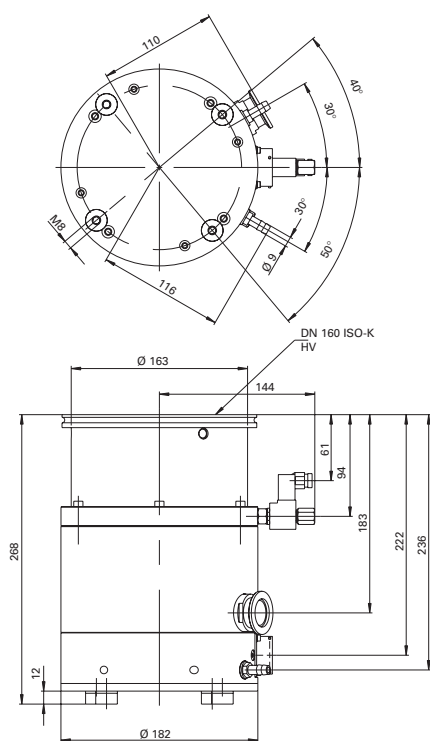
Dimensions (in mm)



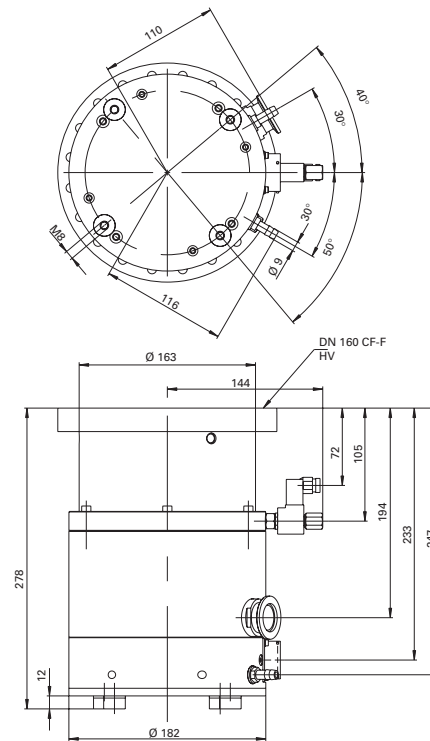
TMH 200 MP, DN 100 ISO-K



TMU 200 MP, DN 100 CF-F



TMH 400 MP, DN 160 ISO-K



TMU 400 MP, DN 160 CF-F

Technical data - TMH/U 200 M / TMH/U 400 M

	TMH/U 200 MP DN 100 ISO-K/ CF-F	TMH/U 400 MP DN 160 ISO-K/ CF-F
Connection nominal diameter		
Flange (in)	DN 100 ISO-K	DN 160 ISO-K
Flange (out)	DN 25 ISO-KF	DN 25 ISO-KF
Venting connection at integrated venting valve	G 1/8"	G 1/8"
Pumping speed [l/s]		
Hydrogen H ₂	105	280
Helium He	150	350
Nitrogen N ₂	180	400
Argon Ar	170	390
Compression ratio		
Hydrogen H ₂	$5 \cdot 10^5$	$5 \cdot 10^4$
Helium He	$3 \cdot 10^7$	$3 \cdot 10^6$
Nitrogen N ₂	$> 1 \cdot 10^{10}$	$> 1 \cdot 10^{10}$
Argon Ar	$> 2 \cdot 10^9$	$> 1 \cdot 10^{10}$
Max. fore vacuum pressure for N₂ [mbar]	12	13
Max. gas throughput at 0.1 mbar HV [mbar l/s]		
Hydrogen H ₂	3	8
Helium He	4	12
Nitrogen N ₂	4	13
Argon Ar	5	11
Max. gas throughput at nom. rotation speed [mbar l/s]		
Pumping speed of used backing pump	7 m ³ /h	30 m ³ /h
Hydrogen H ₂	> 32	20
Helium He	32	15
Nitrogen N ₂	17	10
Argon Ar	5	5
Ultimate pressure (see page 144) [mbar]	$< 5 \cdot 10^{-10}$	$< 5 \cdot 10^{-10}$
Rotational speed [1/min]	50000	39600
Run-up time [min]	1.5	2.5
Cooling method, standard	Water	Water
Cooling water consumption [l/h]	120	50
Max. cooling water temperature [°C]	25	25
Weight [kg]	12.6	21
Ordering number pump		
ISO-K	PM P03 400	PM P02 740
CF-F	PM P03 405	PM P02 745

Ordering numbers power supplies, cables - TMH/U 200 M / TMH/U 400 M

	TMH/U 200 MP		TMH/U 400 MP	
	DN 100 ISO-K	DN 100 CF-F	DN 160 ISO-K	DN 160 CF-F
Ordering number pump				
	PM P03 400	PM P03 405	PM P02 740	PM P02 745
Magnetic drive electronic				
TCM 1601 magnetic drive electronic	PM C01 677	PM C01 677	PM C01 677	PM C01 677
Control units				
HPU 001 Handheld Programming Unit	PM 051 510-T	PM 051 510-T	PM 051 510-T	PM 051 510-T
Accessorie for HPU (Power supply, software, PC-cable)	PM 061 005-T	PM 061 005-T	PM 061 005-T	PM 061 005-T
Mains cable, length 3 m				
for TCM 1601 with safety plug (230 V AC)	P 4564 309 ZA	P 4564 309 ZA	P 4564 309 ZA	P 4564 309 ZA
for TCM 1601 with UL plug (208 V AC)	P 4564 309 ZF	P 4564 309 ZF	P 4564 309 ZF	P 4564 309 ZF
for TCM 1601 with UL plug (115 V AC)	P 4564 309 ZE	P 4564 309 ZE	P 4564 309 ZE	P 4564 309 ZE
Connection cable, length 3 m for				
Turbo - TCM 1601	PM 041 816-T	PM 041 816-T	PM 041 816-T	PM 041 816-T



Ordering numbers accessories - TMH/U 200 M / TMH/U 400 M

	TMH/U 200 MP		TMH/U 400 MP	
	DN 100 ISO-K	DN 100 CF-F	DN 160 ISO-K	DN 160 CF-F
Ordering number pump	PM P03 400	PM P03 405	PM P02 740	PM P02 745
Cooling accessories				
Air cooling unit with safety plug (230/208 V)	PM Z01 280	PM Z01 280	PM Z01 260	PM Z01 260
Air cooling unit with UL plug (115 V)	PM Z01 282	PM Z01 282	PM Z01 261	PM Z01 261
Water cooling unit TZK 400 230V/50Hz	PM Z01 245	PM Z01 245	PM Z01 245	PM Z01 245
Heating accessories				
Heating jacket 230 V AC, safety plug	PM 041 903-T	PM 041 903-T	PM 051 096-T	PM 051 096-T
Heating jacket 208 V AC, UL plug	PM 041 904-T	PM 041 904-T	PM 051 097-T	PM 051 097-T
Heating jacket 115 V AC, UL plug	PM 041 905-T	PM 041 905-T	PM 051 098-T	PM 051 098-T
Backing pump control				
Pumping station control TCS 180	PM C01 655	PM C01 655	PM C01 655	PM C01 655
Fore vacuum safety valve TVV 001, DN 16 ISO-KF 230 V AC	PM Z01 205	PM Z01 205	PM Z01 205	PM Z01 205
Fore vacuum safety valve TVV 001, DN 16 ISO-KF 115 V AC	PM Z01 206	PM Z01 206	PM Z01 206	PM Z01 206
General accessories				
Air drier TTV 001	PM Z00 121	PM Z00 121	PM Z00 121	PM Z00 121
Sealing gas valve	PM Z01 142	PM Z01 142	PM Z01 142	PM Z01 142
Coated centering ring	PM 016 210-U	-	PM 016 216-U	-
Coated centering ring with protection screen	PM 016 212-U	-	PM 016 218-U	-
Protection screen	-	PM 016 336	-	PM 016 339
Coated centering ring with integrated splinter shield	PM 016 211-U	PM 016 211-U	PM 016 211-U	PM 016 211-U
Splinter shield	-	PM 016 315	-	PM 016 318
Vibration damper	PM 006 459-X	PM 006 488-X	PM 006 492-X	PM 006 493-X
PWM-box, pre-switching unit for rotation speed control	PM 051 028-U	PM 051 028-U	PM 051 028-U	PM 051 028-U
Battery box TBB 001	PM K01 712	PM K01 712	PM K01 712	PM K01 712
Serial Interface Converter RS-232-485	PM 051 054-T	PM 051 054-T	PM 051 054-T	PM 051 054-T
Profibus - Gateway TIC 250	PM 051 257-T	PM 051 257-T	PM 051 257-T	PM 051 257-T
Mounting materials				
Coated centering ring, bracket screws	PM 016 365-T	-	PM 016 375-T	-
Coated centering ring with protect. screen, bracket screws	PM 016 367-T	-	PM 016 377-T	-
Coated centering ring with splinter shield, bracket screws	PM 016 366-T	-	PM 016 376-T	-
Coated centering ring, hexagonal bolts	-	-	-	-
Coated centering ring with protect. screen, hexagonal bolts	-	-	-	-
Coated centering ring with splinter shield, hexagonal bolts	-	-	-	-
Coated centering ring, stud screws	-	-	-	-
Coated centering ring with protection screen, stud screws	-	-	-	-
Coated centering ring with splinter shield, stud screws	-	-	-	-
Set of hexagonal bolts for CF-flanges	-	PF 505 003-T	-	PF 505 003-T
Set of stud screws for CF-flanges	-	PF 507 003-T	-	PF 507 003-T



TurboDrag pumps with pumping speed up to 1500 l/s

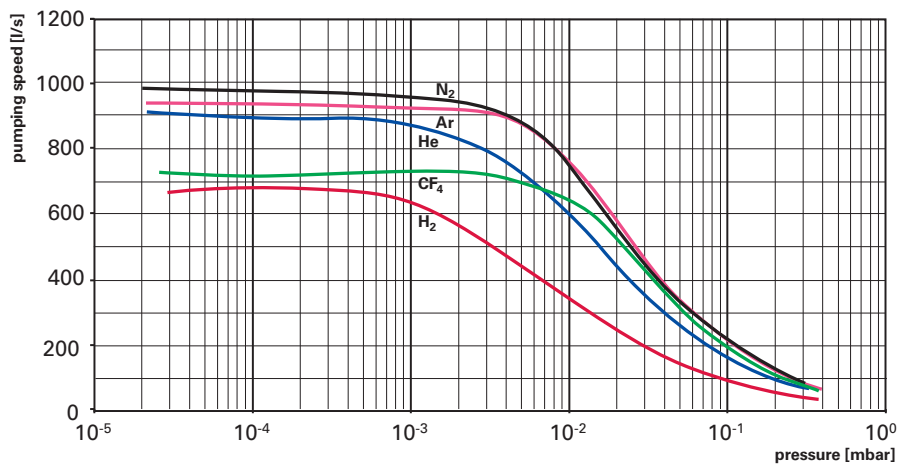
TMH/U 1000 M / TMH/U 1600 M



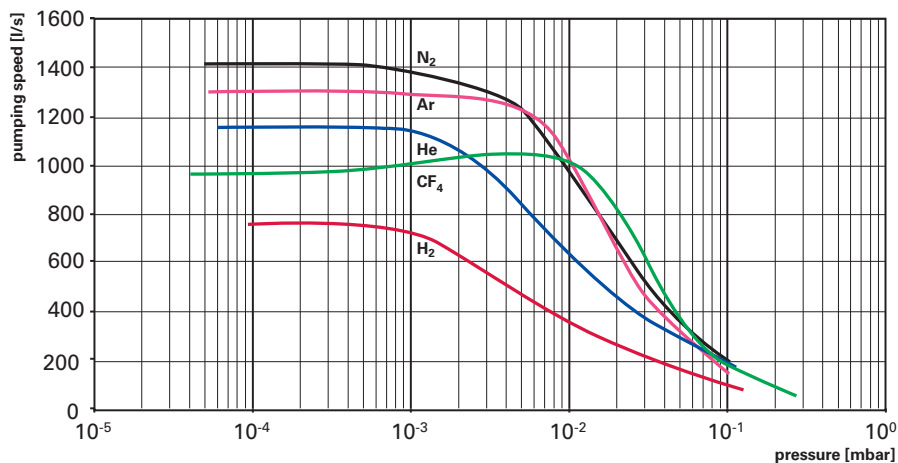
- ▶ Magnetic bearing system with 3 active and 2 passive axes, with the following benefits: maintenance-free, free of hydrocarbons, for installation in any orientation, low vibration and noise levels
- ▶ High gas throughput also in the case of low volume flow rates of the backing pump
- ▶ Versions for handling corrosive gases are available (C types)
- ▶ Integrated sealing gas system
- ▶ High critical backing pressure
- ▶ Fast and reliable venting through integrated and patented venting method
- ▶ Type of cooling: Air/water cooling



Pumping speed

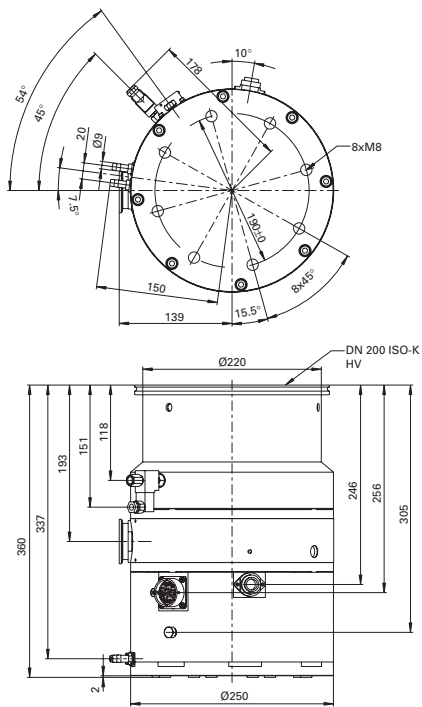


TMH 1000 M, DN 200

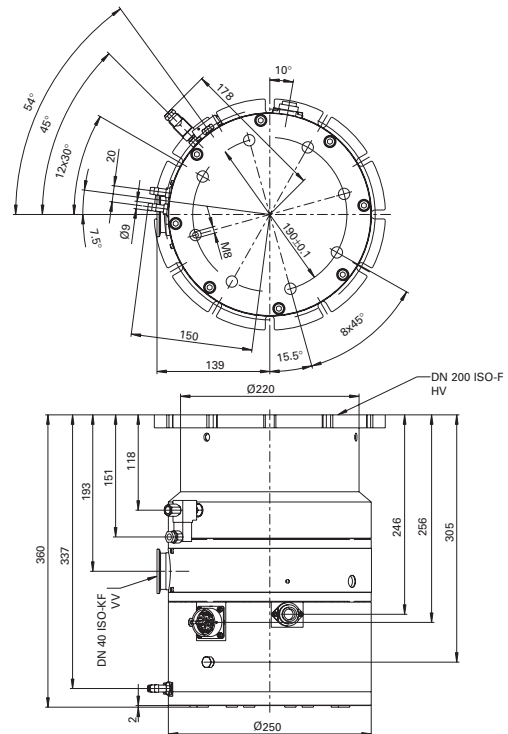


TMH 1600 M, DN 250

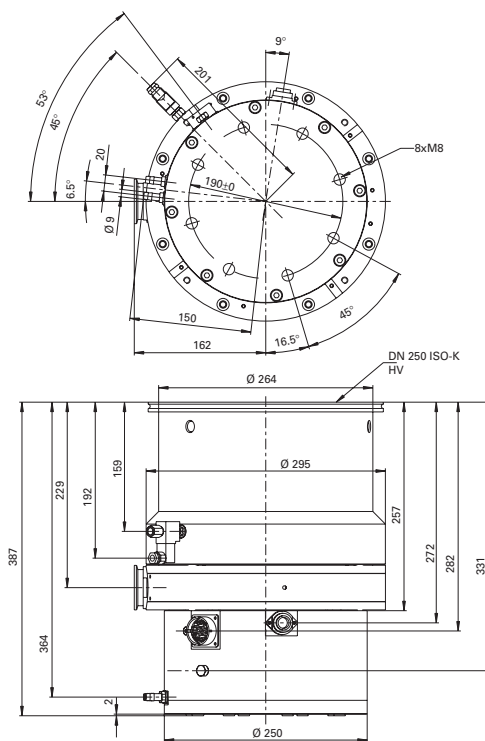
Dimensions (in mm)



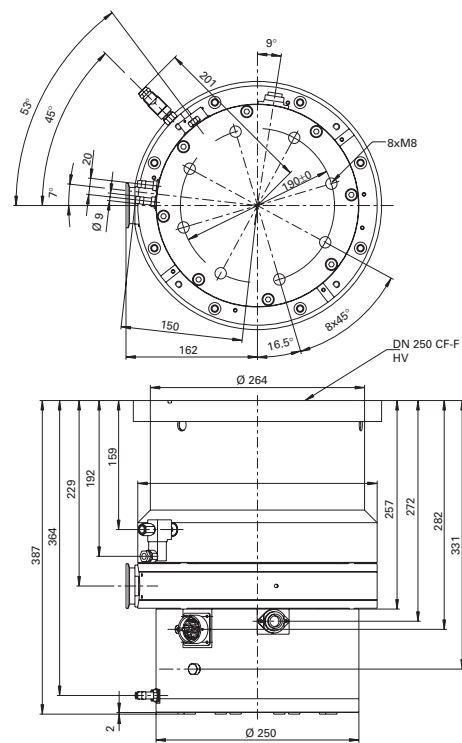
TMH 1000 MP, DN 200 ISO-K



TMH 1000 MPC, DN 200 ISO-F



TMH 1600 MPCH, DN 250 ISO-K



TMU 1600 MP, DN 250 CF-F

Technical data - TMH/U 1000 M / TMH/U 1600 M

	TMH/U 1000 MP DN 200 ISO-K/ ISO-F/CF-F	TMH/U 1000 MPC DN 200 ISO-K/ ISO-F	TMH/U 1000 MPCT DN 200 ISO-K/ ISO-F
Connection nominal diameter			
Flange (in)	DN 200 ISO-K	DN 200 ISO-K	DN 200 ISO-K
Flange (out)	DN 40 ISO-KF	DN 40 ISO-KF	DN 40 ISO-KF
Venting connection at integrated venting valve	G 1/8"	G 1/8"	G 1/8"
Pumping speed [l/s]			
Hydrogen H ₂	680	680	680
Helium He	870	870	870
Nitrogen N ₂	980	980	980
Argon Ar	930	930	930
CF ₄	-	730	730
Compression ratio			
Hydrogen H ₂	$>4 \cdot 10^4$	$>4 \cdot 10^4$	$>4 \cdot 10^4$
Helium He	$>3 \cdot 10^6$	$>3 \cdot 10^6$	$>3 \cdot 10^6$
Nitrogen N ₂	$>1 \cdot 10^8$	$>1 \cdot 10^8$	$>1 \cdot 10^8$
Argon Ar	$>4 \cdot 10^8$	$>4 \cdot 10^8$	$>4 \cdot 10^8$
CF ₄	-	$>1 \cdot 10^8$	$>1 \cdot 10^8$
Max. fore vacuum pressure for N₂ [mbar]	11	11	11
Max. gas throughput at 0.1 mbar HV [mbar l/s]			
Hydrogen H ₂	10	10	10
Helium He	17	17	17
Nitrogen N ₂	20	20	20
Argon Ar	20	20	20
CF ₄	-	20	20
Max. gas throughput at nom. rotation speed [mbar l/s]			
Pumping speed of used backing pump	65 m ³ /h	65 m ³ /h	65 m ³ /h
Hydrogen H ₂	>18	>18	>18
Helium He	18	18	18
Nitrogen N ₂	12	12	12
Argon Ar	9	9	9
CF ₄	-	8	8
Ultimate pressure (see page 144) [mbar]	$<5 \cdot 10^{-10}$	$<1 \cdot 10^{-8}$	$<1 \cdot 10^{-8}$
Rotational speed [1/min]	39600	39600	39600
Run-up time [min]	4	4	4
Cooling method, standard	Water	Water	Water
Cooling water consumption [l/h]	100	100	100
Max. cooling water temperature [°C]	25	25	25
Weight [kg]	53	53	53
Ordering number pump			
ISO-K	PM P03 350	PM P03 352	PM P03 355
ISO-F	PM P03 351	PM P03 353	PM P03 357
CF-F	PM P03 360	-	-



TMH/U 1600 MP DN 250 ISO-K/ ISO-F/CF-F	TMH/U 1600 MPCH DN 250 ISO-K/ ISO-F	TMH/U 1600 MPCHT DN 250 ISO-K/ ISO-F
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DN 250 ISO-K	DN 250 ISO-K	DN 250 ISO-K
DN 40 ISO-KF	DN 40 ISO-KF	DN 40 ISO-KF
G 1/8"	G 1/8"	G 1/8"

780	850	850
1180	1230	1230
1400	1400	1400
1300	1300	1300
-	1000	1000

$>1 \cdot 10^4$	$>1 \cdot 10^3$	$>1 \cdot 10^3$
$>3 \cdot 10^5$	$>2 \cdot 10^4$	$>2 \cdot 10^4$
$>1 \cdot 10^{10}$	$>1 \cdot 10^8$	$>1 \cdot 10^8$
$>1 \cdot 10^8$	$>1 \cdot 10^8$	$>1 \cdot 10^8$
-	$>1 \cdot 10^8$	$>1 \cdot 10^8$
10	4	4

10	10	10
20	20	20
20	23	23
16	20	20
-	20	20

65 m ³ /h	65 m ³ /h	65 m ³ /h
>20	19	19
18	20	20
14	18	18
8	10	10
-	9	9

$<5 \cdot 10^{-10}$	$<1 \cdot 10^{-8}$	$<1 \cdot 10^{-8}$
36000	36000	36000
6	7	7
Water	Water	Water
100	100	100
25	25	25
65	65	65

PM P03 370	PM P03 373	PM P03 376
PM P03 372	PM P03 375	PM P03 378
PM P03 380	-	-

Ordering numbers power supplies and cables - TMH/U 1000 M / TMH/U 1600 M

	DN 200 ISO-K	TMH/U 1000 MP	
		DN 200 ISO-F	DN 200 CF-F
Ordering number pump			
	PM P03 350	PM P03 351	PM P03 360
	DN 250 ISO-K	TMH/U 1600 MP	
		DN 250 ISO-F	DN 250 CF
Ordering number pump			
	PM P03 370	PM P03 372	PM P03 380
Magnetic drive electronic			
TCM 1601 magnetic drive electronic	PM C01 677	PM C01 677	PM C01 677
Control units			
HPU 001 Handheld Programming Unit	PM 051 510-T	PM 051 510-T	PM 051 510-T
Accessorie for HPU (Power supply, software, PC-cable)	PM 061 005-T	PM 061 005-T	PM 061 005-T
Mains cable, length 3 m			
for TCM 1601 with safety plug (230 V AC)	P 4564 309 ZA	P 4564 309 ZA	P 4564 309 ZA
for TCM 1601 with UL plug (208 V AC)	P 4564 309 ZF	P 4564 309 ZF	P 4564 309 ZF
for TCM 1601 with UL plug (115 V AC)	P 4564 309 ZE	P 4564 309 ZE	P 4564 309 ZE
Connection cable, length 3 m for			
Turbo - TCM 1601	PM 041 816-T	PM 041 816-T	PM 041 816-T



TMH 1000 MPC
DN 200 ISO-K DN 200 ISO-F

PM P03 352 PM P03 353

TMH 1000 MPCT
DN 200 ISO-K DN 200 ISO-F

PM P03 355 PM P03 357

TMH 1600 MPCH
DN 250 ISO-K DN 250 ISO-F

PM P03 373 PM P03 375

TMH 1600 MPCHT
DN 250 ISO-K DN 250 ISO-F

PM P03 376 PM P03 378

PM C01 677 PM C01 677

PM C01 677 PM C01 677

PM 051 510-T PM 051 510-T
PM 061 005-T PM 061 005-T

PM 051 510-T PM 051 510-T
PM 061 005-T PM 061 005-T

P 4564 309 ZA P 4564 309 ZA
P 4564 309 ZF P 4564 309 ZF
P 4564 309 ZE P 4564 309 ZE

P 4564 309 ZA P 4564 309 ZA
P 4564 309 ZF P 4564 309 ZF
P 4564 309 ZE P 4564 309 ZE

PM 041 816-T PM 041 816-T

PM 041 816-T PM 041 816-T



Ordering numbers accessories - TMH/U 1000 M

	DN 200 ISO-K	TMH/U 1000 MP	
		DN 200 ISO-F	DN 200 CF-F
Ordering number pump	PM P03 350	PM P03 351	PM P03 360
Cooling accessories			
Air cooling unit with safety plug (230/208 V)	PM Z01 250	PM Z01 250	PM Z01 250
Air cooling unit with UL plug (115 V)	PM Z01 256	PM Z01 256	PM Z01 256
Water cooling unit TZK 400 230V/50Hz	PM Z01 245	PM Z01 245	PM Z01 245
Heating accessories			
Heating jacket 230 V AC, safety plug	PM 041 909-T	PM 041 909-T	PM 041 909-T
Heating jacket 208 V AC, UL plug	PM 041 910-T	PM 041 910-T	PM 041 910-T
Heating jacket 115 V AC, UL plug	PM 041 911-T	PM 041 911-T	PM 041 911-T
Backing pump control			
Pumping station control TCS 180	PM C01 655	PM C01 655	PM C01 655
Fore vacuum safety valve TVV 001, DN 16 ISO-KF 230 V AC	PM Z01 205	PM Z01 205	PM Z01 205
Fore vacuum safety valve TVV 001, DN 16 ISO-KF 115 V AC	PM Z01 206	PM Z01 206	PM Z01 206
General accessories			
Air drier TTV 001	PM Z00 121	PM Z00 121	PM Z00 121
Sealing gas valve	PM Z01 142	PM Z01 142	PM Z01 142
Coated centering ring	PM 016 220-U	PM 016 220-U	-
Coated centering ring with protection screen	PM 016 222-U	PM 016 222-U	-
Protection screen	-	-	PM 016 342
Coated centering ring with integrated splinter shield	PM 016 221-U	PM 016 221-U	
Splinter shield	-	-	PM 016 321
Vibration damper	PM 006 668-X	PM 006 668-X	PM 006 669-X
PWM-box, pre-switching unit for rotation speed control	PM 051 028-U	PM 051 028-U	PM 051 028-U
Battery box TBB 001	PM K01 712	PM K01 712	PM K01 712
Serial Interface Converter RS-232-485	PM 051 054-T	PM 051 054-T	PM 051 054-T
Profibus - Gateway TIC 250	PM 051 257-T	PM 051 257-T	PM 051 257-T
Mounting materials			
Coated centering ring, bracket screws	PM 016 390-T	-	-
Coated centering ring with protect. screen, bracket screws	PM 016 392-T	-	-
Coated centering ring with splinter shield, bracket screws	PM 016 391-T	-	-
Coated centering ring, hexagonal bolts	-	PM 016 470-T	-
Coated centering ring with protect. screen, hexagonal bolts	-	PM 016 472-T	-
Coated centering ring with splinter shield, hexagonal bolts	-	PM 016 471-T	-
Coated centering ring, stud screws	-	PM 016 475-T	-
Coated centering ring with protection screen, stud screws	-	PM 016 477-T	-
Coated centering ring with splinter shield, stud screws	-	PM 016 476-T	-
Set of hexagonal bolts for CF-flanges	-	-	PF 505 004-T
Set of stud screws for CF-flanges	-	-	PF 507 004-T



TMH 1000 MPC
DN 200 ISO-K DN 200 ISO-F

TMH 1000 MPCT
DN 200 ISO-K DN 200 ISO-F

PM P03 352 PM P03 353

PM P03 355 PM P03 357

PM Z01 250 PM Z01 250
PM Z01 256 PM Z01 256
PM Z01 245 PM Z01 245

PM Z01 250 PM Z01 250
PM Z01 256 PM Z01 256
PM Z01 245 PM Z01 245

PM 041 909-T PM 041 909-T
PM 041 910-T PM 041 910-T
PM 041 911-T PM 041 911-T

PM 041 909-T PM 041 909-T
PM 041 910-T PM 041 910-T
PM 041 911-T PM 041 911-T

PM C01 655 PM C01 655
PM Z01 205 PM Z01 205
PM Z01 206 PM Z01 206

PM C01 655 PM C01 655
PM Z01 205 PM Z01 205
PM Z01 206 PM Z01 206

PM Z00 121 PM Z00 121
PM Z01 142 PM Z01 142
PM 016 220-U PM 016 220-U
PM 016 222-U PM 016 222-U
- -
PM 016 221-U PM 016 221-U
- -
PM 006 668-X PM 006 668-X
PM 051 028-U PM 051 028-U
PM K01 712 PM K01 712
PM 051 054-T PM 051 054-T
PM 051 257-T PM 051 257-T

PM Z00 121 PM Z00 121
PM Z01 142 PM Z01 142
PM 016 220-U PM 016 220-U
PM 016 222-U PM 016 222-U
- -
PM 016 221-U PM 016 221-U
- -
PM 006 668-X PM 006 668-X
PM 051 028-U PM 051 028-U
PM K01 712 PM K01 712
PM 051 054-T PM 051 054-T
PM 051 257-T PM 051 257-T

PM 016 390-T -
PM 016 392-T -
PM 016 391-T -
- PM 016 470-T
- PM 016 472-T
- PM 016 471-T
- PM 016 475-T
- PM 016 477-T
- PM 016 476-T
- -
- -

PM 016 390-T -
PM 016 392-T -
PM 016 391-T -
- PM 016 470-T
- PM 016 472-T
- PM 016 471-T
- PM 016 475-T
- PM 016 477-T
- PM 016 476-T
- -
- -

Ordering numbers accessories - TMH/U 1600 M

	DN 250 ISO-K	TMH/U 1600 MP	
		DN 250 ISO-F	DN 250 CF-F
Ordering number pump	PM P03 370	PM P03 372	PM P03 380
Cooling accessories			
Air cooling unit with safety plug (230/208 V)	PM Z01 250	PM Z01 250	PM Z01 250
Air cooling unit with UL plug (115 V)	PM Z01 256	PM Z01 256	PM Z01 256
Water cooling unit TZK 400 230V/50Hz	PM Z01 245	PM Z01 245	PM Z01 245
Heating accessories			
Heating jacket 230 V AC, safety plug	PM 041 912-T	PM 041 912-T	PM 041 912-T
Heating jacket 208 V AC, UL plug	PM 041 913-T	PM 041 913-T	PM 041 913-T
Heating jacket 115 V AC, UL plug	PM 041 914-T	PM 041 914-T	PM 041 914-T
Backing pump control			
Pumping station control TCS 180	PM C01 655	PM C01 655	PM C01 655
Fore vacuum safety valve TVV 001, DN 16 ISO-KF 230 V AC	PM Z01 205	PM Z01 205	PM Z01 205
Fore vacuum safety valve TVV 001, DN 16 ISO-KF 115 V AC	PM Z01 206	PM Z01 206	PM Z01 206
General accessories			
Air drier TTV 001	PM Z00 121	PM Z00 121	PM Z00 121
Sealing gas valve	PM Z01 142	PM Z01 142	PM Z01 142
Coated centering ring	PM 016 225-U	PM 016 225-U	-
Coated centering ring with protection screen	PM 016 227-U	PM 016 227-U	-
Protection screen	-	-	PM 016 345
Coated centering ring with integrated splinter shield	PM 016 226-U	PM 016 226-U	-
Splinter shield	-	-	PM 016 324
Vibration damper	PM 006 670-X	PM 006 670-X	PM 006 671-X
PWM-box, pre-switching unit for rotation speed control	PM 051 028-U	PM 051 028-U	PM 051 028-U
Battery box TBB 001	PM K01 712	PM K01 712	PM K01 712
Serial Interface Converter RS-232-485	PM 051 054-T	PM 051 054-T	PM 051 054-T
Profibus - Gateway TIC 250	PM 051 257-T	PM 051 257-T	PM 051 257-T
Mounting materials			
Coated centering ring, bracket screws	PM 016 415-T	-	-
Coated centering ring with protect. screen, bracket screws	PM 016 417-T	-	-
Coated centering ring with splinter shield, bracket screws	PM 016 416-T	-	-
Coated centering ring, hexagonal bolts	-	PM 016 480-T	-
Coated centering ring with protect. screen, hexagonal bolts	-	PM 016 482-T	-
Coated centering ring with splinter shield, hexagonal bolts	-	PM 016 481-T	-
Coated centering ring, stud screws	-	PM 016 485-T	-
Coated centering ring with protection screen, stud screws	-	PM 016 487-T	-
Coated centering ring with splinter shield, stud screws	-	PM 016 486-T	-
Set of hexagonal bolts for CF-flanges	-	-	PF 505 005-T
Set of stud screws for CF-flanges	-	-	PF 507 004-T

TMH 1600 MPCH
DN 250 ISO-K DN 250 ISO-F

TMH 1600 MPCHT
DN 250 ISO-K DN 250 ISO-F

PM P03 373

PM P03 375

PM P03 376

PM P03 378

PM Z01 250

PM Z01 250

PM Z01 250

PM Z01 250

PM Z01 256

PM Z01 256

PM Z01 256

PM Z01 256

PM Z01 245

PM Z01 245

PM Z01 245

PM Z01 245

PM 041 912-T

PM 041 912-T

PM 041 912-T

PM 041 912-T

PM 041 913-T

PM 041 913-T

PM 041 913-T

PM 041 913-T

PM 041 914-T

PM 041 914-T

PM 041 914-T

PM 041 914-T

PM C01 655

PM C01 655

PM C01 655

PM C01 655

PM Z01 205

PM Z01 205

PM Z01 205

PM Z01 205

PM Z01 206

PM Z01 206

PM Z01 206

PM Z01 206

PM Z00 121

PM Z00 121

PM Z00 121

PM Z00 121

PM Z01 142

PM Z01 142

PM Z01 142

PM Z01 142

PM 016 225-U

PM 016 225-U

PM 016 225-U

PM 016 225-U

PM 016 227-U

PM 016 227-U

PM 016 227-U

PM 016 227-U

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PM 016 226-U

PM 016 226-U

PM 016 226-U

PM 016 226-U

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PM 006 670-X

PM 006 670-X

PM 006 670-X

PM 006 670-X

PM 051 028-U

PM 051 028-U

PM 051 028-U

PM 051 028-U

PM K01 712

PM K01 712

PM K01 712

PM K01 712

PM 051 054-T

PM 051 054-T

PM 051 054-T

PM 051 054-T

PM 051 257-T

PM 051 257-T

PM 051 257-T

PM 051 257-T

PM 016 415-T

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PM 016 415-T

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PM 016 417-T

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PM 016 417-T

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PM 016 416-T

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PM 016 416-T

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-

PM 016 480-T

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PM 016 480-T

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PM 016 482-T

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PM 016 482-T

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PM 016 481-T

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PM 016 481-T

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PM 016 485-T

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PM 016 485-T

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PM 016 487-T

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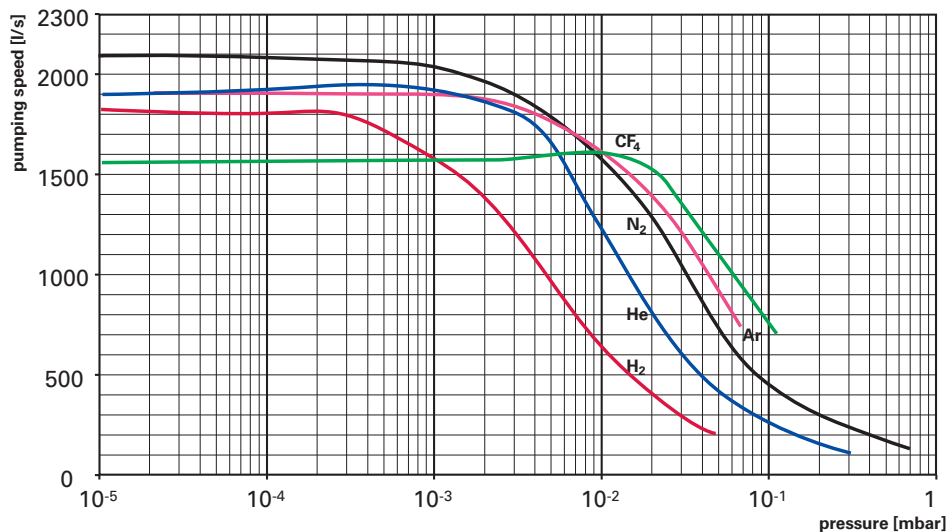
Turbomolecular pump with pumping speed up to 2100 l/s

HiMag™ 2400



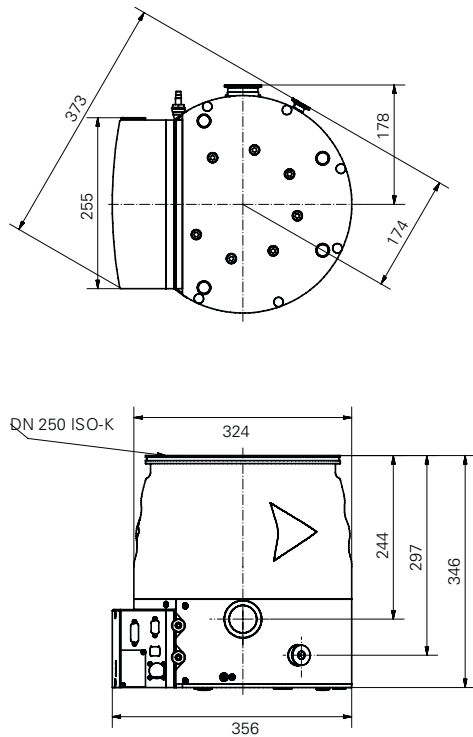
- ▶ Active five axes magnetic bearing system with the following benefits: maintenance-free, free of hydrocarbons, for installation in any orientation, very low vibration and noise levels
- ▶ Unmatched combination of specifications:
 - High volume flow rate for all gases
 - High compression for light gases
 - High gas throughput for heavy gases
- ▶ Version for handling corrosive gases, suited for all applications, unaffected by particles, with integrated sealing gas system
- ▶ Very easy to install due to integrated electronics, integrated power supply optional (N types), IP 54 protection
- ▶ Interfaces: RS-485, Remote, Profibus (optional), DeviceNet (optional)
- ▶ Short run-up time, fast and reliable venting through integrated and patented venting method
- ▶ Type of cooling: Water cooling

Pumping speed

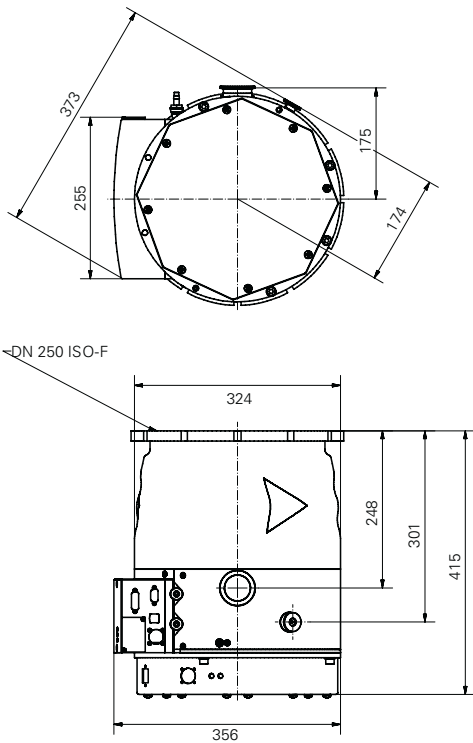


HiMag™ 2400, DN 250

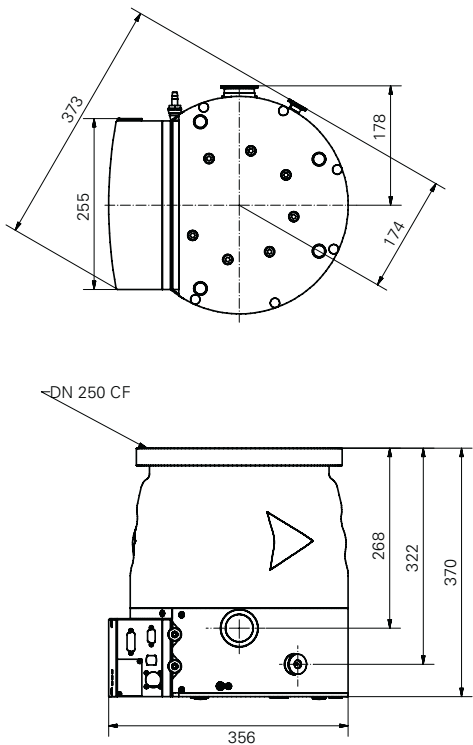
Dimensions (in mm)



HiMag™ 2400, DN 250 ISO-K



HiMag™ 2400, DN 250 ISO-F



HiMag™ 2400, DN 250 CF-F



Technical data - HiMag™ 2400

	HiMag™ 2400 DN 250 ISO-K/ ISO-F/CF-F	HiMag™ 2400 DN 250 ISO-K/ ISO-F/CF-F
Connection nominal diameter		
Flange (in)	DN 250 ISO-K	DN 250 ISO-K
Flange (out)	DN 40 ISO-KF	DN 40 ISO-KF
Venting connection at integrated venting valve	DN 10 ISO-KF	DN 10 ISO-KF
Pumping speed [l/s]		
Hydrogen H ₂	1800	1800
Helium He	1900	1900
Nitrogen N ₂	2100	2100
Argon Ar	1900	1900
CF ₄	1600	1600
Compression ratio		
Hydrogen H ₂	1·10 ⁴	1·10 ⁴
Helium He	2·10 ⁵	2·10 ⁵
Nitrogen N ₂	>1·10 ⁹	>1·10 ⁹
Argon Ar	>1·10 ⁹	>1·10 ⁹
CF ₄	>1·10 ⁹	>1·10 ⁹
Max. fore vacuum pressure for N₂ [mbar]	3	1.5
Max. gas throughput at 0.1 mbar HV [mbar l/s]		
Hydrogen H ₂	15	15
Helium He	25	25
Nitrogen N ₂	45	45
Argon Ar	45	45
CF ₄	45	45
Max. gas throughput at nom. rotation speed [mbar l/s]		
Pumping speed of used backing pump	250 m ³ /h	250 m ³ /h
Hydrogen H ₂	>70	>70
Helium He	70	70
Nitrogen N ₂	50	50
Argon Ar	30	30
CF ₄	23	23
Ultimate pressure (see page 144) [mbar]	<1·10 ⁻⁹	<1·10 ⁻⁹
Rotational speed [1/min]	29400	29400
Run-up time [min]	6	7
Cooling method, standard	Water	Water
Cooling water consumption [l/h]	100	100
Max. cooling water temperature [°C]	25	25
Weight [kg]	75	81
Ordering number pump		
with actuator TM 3000	ISO-K	PM P03 490
	ISO-F	PM P03 491
	CF-F	PM P03 492
with actuator TM 3000 and integrated power supply	ISO-K	-
	ISO-F	-
	CF-F	-
	-	-
		PM P03 710
		PM P03 711
		PM P03 712

Ordering numbers power supplies and cables - HiMag™ 2400

	HiMag™ 2400		
	DN 250 ISO-K	DN 250 ISO-F	DN 250 CF-F
Ordering number pump			
with actuator TM 3000	PM P03 490	PM P03 491	PM P03 492
with actuator TM 3000 and integrated power supply	PM P03 710	PM P03 711	PM P03 712
Power supplies			
TPS 1400 mains pack for wall/standard rail fitting	PM C01 760	PM C01 760	PM C01 760
TPS 1401 mains pack 19" rack module 3 HE	PM C01 761	PM C01 761	PM C01 761
Control units			
DCU 001 Display Control Unit	PM 041 816-T	PM 041 816-T	PM 041 816-T
HPU 001 Handheld Programming Unit	PM 051 510-T	PM 051 510-T	PM 051 510-T
Accessorie for HPU (Power supply, software, PC-cable)	PM 061 005-T	PM 061 005-T	PM 061 005-T
Mains cable, length 3 m			
for TPS 1400 with safety plug (230 V AC)	P 4564 309 HA	P 4564 309 HA	P 4564 309 HA
for TPS 1400 with safety plug (208 V AC)	P 4564 309 HB	P 4564 309 HB	P 4564 309 HB
Connection cable, length 3 m for			
TM 3000 - TPS 1400/1401	PM 051 510-T	PM 051 510-T	PM 051 510-T
TM 3000 - DCU 001/HPU 001	PM 051 510-T	PM 051 510-T	PM 051 510-T



Ordering numbers accessories - HiMag™ 2400

	HiMag™ 2400		
	DN 250 ISO-K	DN 250 ISO-F	DN 250 CF-F
Ordering number pump			
with actuator TM 3000	PM P03 490	PM P03 491	PM P03 492
with actuator TM 3000 and integrated power supply	PM P03 710	PM P03 711	PM P03 712
Cooling accessories			
Water cooling unit TZK 2000 230V/50Hz	PM Z01 240	PM Z01 240	PM Z01 240
Heating accessories			
Heating jacket 208/230 V AC, integral safety plug	PM 061 150-T	PM 061 150-T	PM 061 150-T
Backing pump control			
Relay box, 1-phase 5 A (Diaphragm pump)	PM 041 937-T	PM 041 937-T	PM 041 937-T
Relay box, 1-phase 20 A (Rotary vane pump)	PM 041 938-T	PM 041 938-T	PM 041 938-T
Connection cable relay box - TM 3000	PM 061 144-X	PM 061 144-X	PM 061 144-X
Fore vacuum safety valve TVV 001, DN 16 ISO-KF 230 V AC	PM Z01 205	PM Z01 205	PM Z01 205
Fore vacuum safety valve TVV 001, DN 16 ISO-KF 115 V AC	PM Z01 206	PM Z01 206	PM Z01 206
General accessories			
Air drier TTV 001	PM Z00 121	PM Z00 121	PM Z00 121
Coated centering ring	PM 016 225-U	PM 016 225-U	-
Coated centering ring with protection screen	PM 016 227-U	PM 016 227-U	-
Protection screen	-	-	PM 016 345
Coated centering ring with integrated splinter shield	PM 016 226-U	PM 016 226-U	-
Splinter shield	-	-	PM 016 324
Vibration damper	PM 006 670-X	PM 006 670-X	PM 006 671-X
Serial Interface Converter RS-232-485	PM 051 054-T	PM 051 054-T	PM 051 054-T
Mounting materials			
Coated centering ring, bracket screws	PM 016 420-T	-	-
Coated centering ring with protect. screen, bracket screws	PM 016 422-T	-	-
Coated centering ring with splinter shield, bracket screws	PM 016 421-T	-	-
Coated centering ring, hexagonal bolts	-	PM 016 480-T	-
Coated centering ring with protect. screen, hexagonal bolts	-	PM 016 482-T	-
Coated centering ring with splinter shield, hexagonal bolts	-	PM 016 481-T	-
Coated centering ring, stud screws	-	PM 016 485-T	-
Coated centering ring with protection screen, stud screws	-	PM 016 487-T	-
Coated centering ring with splinter shield, stud screws	-	PM 016 486-T	-
Set of hexagonal bolts for CF-flanges	-	-	PF 505 005-T
Set of stud screws for CF-flanges	-	-	PF 507 004-T

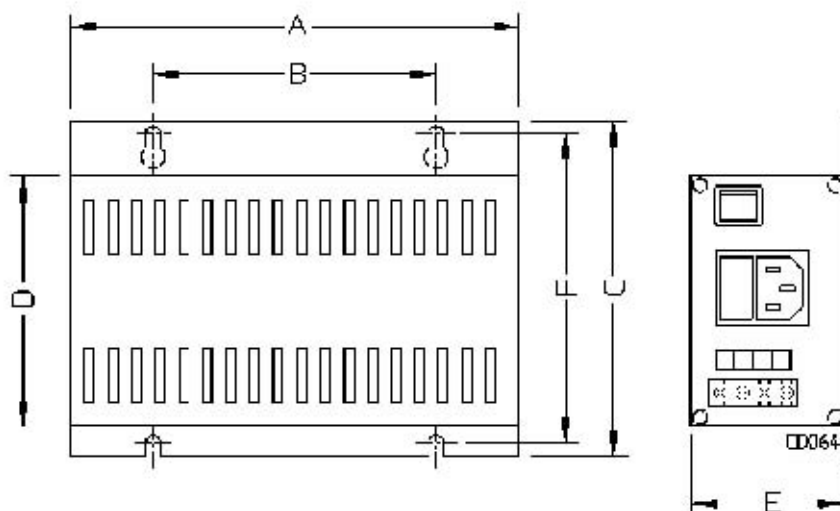


Power supplies for wall/standard rail mounting

TPS 100, 150, 200, 300, 600

- Power supplies for powering the CompactTurbo pumpseries with integrated drive electronics TC 100, 600 and 750
- Output voltage is reliably isolated from the mains voltage in accordance with EN 60742
- The included mounting materials allow both wall and also standard rail mounting

Dimensions



	TPS 100	TPS 150	TPS 200	TPS 300	TPS 600
A:	190 mm	190 mm	190 mm	190 mm	229 mm
B:	120 mm	120 mm	120 mm	120 mm	120 mm
C:	142 mm	142 mm	142 mm	142 mm	142 mm
D:	106 mm	106 mm	106 mm	106 mm	111 mm
E:	47.6 mm	68 mm	68 mm	105 mm	140.5 mm
F:	130 mm	130 mm	130 mm	130 mm	130 mm

Technical data	TPS 100	TPS 150	TPS 200	TPS 300	TPS 600
Output voltage	24 V DC	24 V DC	48 V DC	72 V DC	140 V DC
Output current	4.1 A	5 A	4.1 A	4.1 A	5.8 A
Weight	1.2 kg	1.4 kg	1.4 kg	1.7 kg	2.5 kg
Mains requirement: Frequency (range)					
Mains requirement: power consumption	125 VA	170 VA	230 VA	350 VA	900 VA
Mains requirement: Voltage (range)	90 - 132 / 185 - 265 V AC, 50/60 Hz	90 - 132 / 185 - 265 V AC, 50/60 Hz	90 - 132 / 185 - 265 V AC, 50/60 Hz	90 - 132 / 185 - 265 V AC, 50/60 Hz	90 - 132 / 185 - 265 V AC, 50/60 Hz
Protection	IP 20	IP 20	IP 20	IP 20	IP 20
Ambient temperature	5-40 °C	5-40 °C	5-40 °C	5-40 °C	5-40 °C

Ordering Number

Power supply	PM 041 827-T	PM 051 461-T	PM 041 813-T	PM 041 814-T	PM 041 815-T
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Accessories

	Order.-No.
Mains cable, 115 V AC, UL plug NEMA 5-15P, EURO counter plug C 13 length 3 m	P 4564 309 ZE
Mains cable, 208 V AC, UL plug NEMA 6-15P, EURO counter plug C 13, length 3 m	P 4564 309 ZF
Mains cable, 230 V AC, safety plug CEE 7, EURO counter plug C 13, length 3 m	P 4564 309 ZA

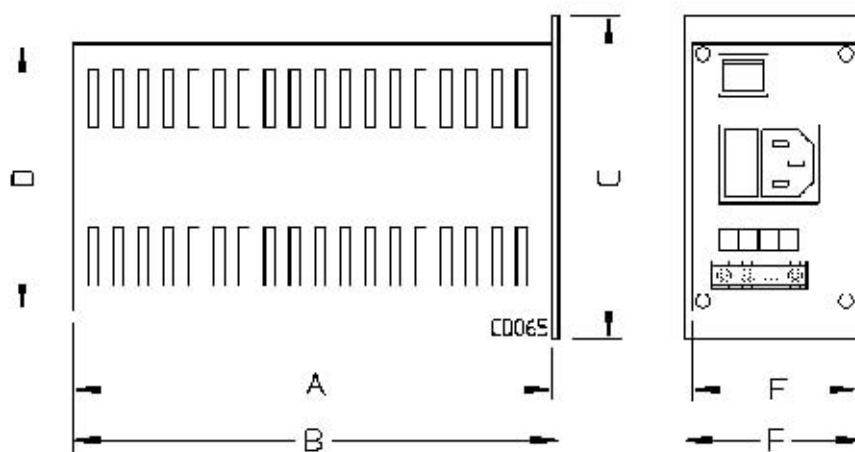


Power supply 19" rack module 3HU

TPS 101, 201, 301, 601

- Power supplies for powering the CompactTurbo pumpseries with integrated drive electronics TC 100, 600 and 750
- Output voltage is reliably isolated from the mains voltage in accordance with EN 60742

Dimensions



	TPS 101	TPS 201	TPS 301	TPS 601
A:	190 mm	190 mm	190 mm	229 mm
B:	192.5 mm	192.5 mm	192.5 mm	231.5 mm
C:	128.5 mm	128.5 mm	128.5 mm	128.5 mm
D:	106 mm	106 mm	106 mm	111 mm
E:	47.6 mm	68 mm	105 mm	140.5 mm
F:	50.4 mm	70.9 mm	106.3 mm	141.9 mm

Technical data

	TPS 101	TPS 201	TPS 301	TPS 601
Output voltage	24 V DC	48 V DC	72 V DC	140 V DC
Output current	4.1 A	4.1 A	4.1 A	5.8 A
Weight	1.2 kg	1.4 kg	1.7 kg	2.5 kg
Mains requirement: Frequency (range)				
Mains requirement: power consumption	125 VA	230 VA	350 VA	900 VA
Mains requirement: voltage (range)	90 - 132 / 185 - 265 V AC, 50/60 Hz	90 - 132 / 185 - 265 V AC, 50/60 Hz	90 - 132 / 185 - 265 V AC, 50/60 Hz	90 - 132 / 185 - 265 V AC, 50/60 Hz
Protection	IP 20	IP 20	IP 20	IP 20
Ambient temperature	5-40 °C	5-40 °C	5-40 °C	5-40 °C

Ordering Number

Power supply	PM 041 828-T	PM 041 819-T	PM 041 820-T	PM 041 821-T
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Accessories

Order.-No.

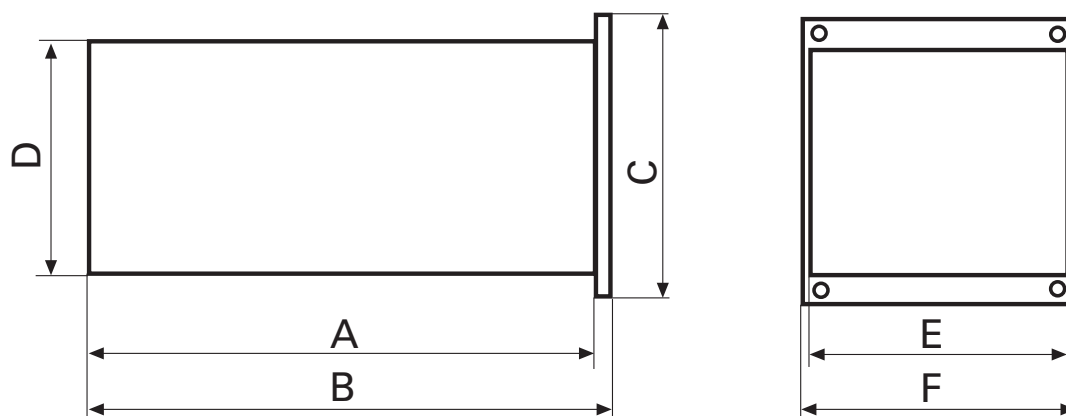
Mains cable, 115 V AC, UL plug NEMA 5-15P, EURO counter plug C 13 length 3 m	P 4564 309 ZE
Mains cable, 208 V AC, UL plug NEMA 6-15P, EURO counter plug C 13, length 3 m	P 4564 309 ZF
Mains cable, 230 V AC, safety plug CEE 7, EURO counter plug C 13, length 3 m	P 4564 309 ZA

Display Control Unit with power supply

DCU 100, 150, 200, 300, 600

- Display Control Unit with power supply TPS for powering the CompactTurbo pumpseries with integrated drive electronics TC 100, 600 and 750
- Output voltage is reliably isolated from the mains voltage in accordance with EN 60742
- DCU permits control and operation of all parameters of the drive electronics
- In addition, different pressure sensors can be connected to the DCU

Dimensions



	DCU 100	DCU 150	DCU 200	DCU 300	DCU 600
A:	231.5 mm	231.5 mm	231.5 mm	231.5 mm	229 mm
B:	234 mm	234 mm	234 mm	234 mm	231.5 mm
C:	128.5 mm	128.5 mm	128.5 mm	128.5 mm	128.5 mm
D:	106 mm	106 mm	106 mm	106 mm	111 mm
E:	105 mm	105 mm	105 mm	105 mm	140.5 mm
F:	106.3 mm	106.3 mm	106.3 mm	106.3 mm	141.9 mm

Technical data	DCU 100	DCU 150	DCU 200	DCU 300	DCU 600
Output voltage	24 V DC	24 V DC	48 V DC	72 V DC	140 V DC
Output current	4.1 A	5 A	4.1 A	4.1 A	5.8 A
Weight	1.6 kg	1.9 kg	1.9 kg	2.2 kg	2.9 kg
Mains requirement: Frequency (range)					
Mains requirement: power consumption	125 VA	170 VA	230 VA	350 VA	900 VA
Mains requirement: voltage (range)	90 - 132 / 185 - 265 V AC, 50/60 Hz	90 - 132 / 185 - 265 V AC, 50/60 Hz	90 - 132 / 185 - 265 V AC, 50/60 Hz	90 - 132 / 185 - 265 V AC, 50/60 Hz	90 - 132 / 185 - 265 V AC, 50/60 Hz
Protection	IP 20	IP 20	IP 20	IP 20	IP 20
Ambient temperature	5-40 °C	5-40 °C	5-40 °C	5-40 °C	5-40 °C

Ordering Number

Power supply with DCU	PM C01 694	PM C01 698	PM C01 695	PM C01 696	PM C01 697
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Accessories

	Order.-No.
Mains cable, 115 V AC, UL plug NEMA 5-15P, EURO counter plug C 13 length 3 m	P 4564 309 ZE
Mains cable, 208 V AC, UL plug NEMA 6-15P, EURO counter plug C 13, length 3 m	P 4564 309 ZF
Mains cable, 230 V AC, safety plug CEE 7, EURO counter plug C 13, length 3 m	P 4564 309 ZA



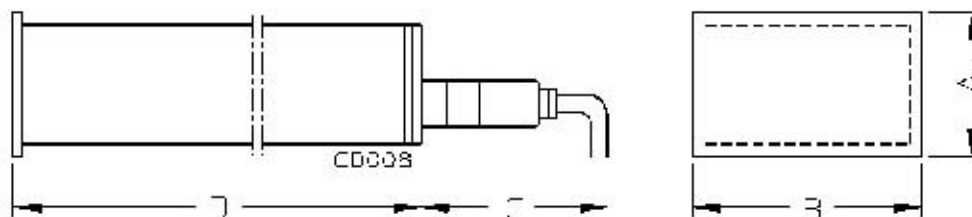
Turbo Controller

TCP 350



- ▶ Entire turbopump drive control and regulation in one unit
- ▶ Lighted LC detector with information about the operating status of the turbopump
- ▶ All necessary remote functions included
- ▶ Heating or air cooling and venting valve can be connected to the pump
- ▶ Backing pump is accessible via the remote plug by the relay box
- ▶ Gauge connection to the TCP 350
- ▶ Adapter available for existing pump cable
- ▶ Cable lengths available up to 100 m
- ▶ Version with Profibus interface TCP 350 PB

Dimensions



	TCP 350	TCP 350 PB
A:	128.5 mm	128.5 mm
B:	141.9 mm	141.9 mm
C:	120 mm	120 mm
D:	232 mm	232 mm

Technical data

	TCP 350	TCP 350 PB
Mains requirement: voltage (range)	115 / 230 V AC, -20 - +15 %, 50/60 Hz	115 / 230 V AC, -20 - +15 %, 50/60 Hz
Mains requirement: power consumption	400 VA	400 VA
max. drive power	300 W	300 W
Interface	RS-485 / RS-232 / Remote (SPS-compatible)	RS-485 / RS-232 / Remote (SPS-compatible)
Ambient temperature	5 - 40 °C	5 - 40 °C
Protection	IP 20	IP 20
Cable length Turbo-TCP-max.	100 m	100 m
Weight	2.8 kg	2.8 kg

Ordering Number

TurboController	PM C01 740	PM C01 741
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Accessories

Order.-No.

Mains cable, 230 V AC, safety plug CEE 7, EURO counter plug C 13, length 3 m	P 4564 309 ZA
Mains cable, 115 V AC, UL plug NEMA 5-15P, EURO counter plug C 13 length 3 m	P 4564 309 ZE
Mains cable, 208 V AC, UL plug NEMA 6-15P, EURO counter plug C 13, length 3 m	P 4564 309 ZF
Connection cable CompactTurbo TMH/U 071 P, 261 P, 521 P - TCP 350, length 3 m	PM 051 803-T
Connection cable CompactTurbo TMH/U 071 P, 261 P, 521 P - TCP 350, length 1 m	PM 051 801-T
Connection cable CompactTurbo TMH/U 071 P, 261 P, 521 P - TCP 350, length 2 m	PM 051 802-T
Connection cable CompactTurbo TMH/U 071 P, 261 P, 521 P - TCP 350, length 6 m	PM 051 806-T
Connection cable CompactTurbo TMH/U 071 P, 261 P, 521 P - TCP 350, length 10 m	PM 051 810-T
Connection cable CompactTurbo TMH/U 071 P, 261 P, 521 P - TCP 350, length 20 m	PM 051 811-T
Connection cable CompactTurbo TMH/U 071 P, 261 P, 521 P - TCP 350, length 30 m	PM 051 812-T
Connection cable CompactTurbo TMH/U 071 P, 261 P, 521 P - TCP 350, length 40 m	PM 051 813-T
Connection cable CompactTurbo TMH/U 071 P, 261 P, 521 P - TCP 350, length 50 m	PM 051 814-T
Connection cable TCP 350 / TM 3000 - backing pump relay box, length 2 m	PM 061 144-X

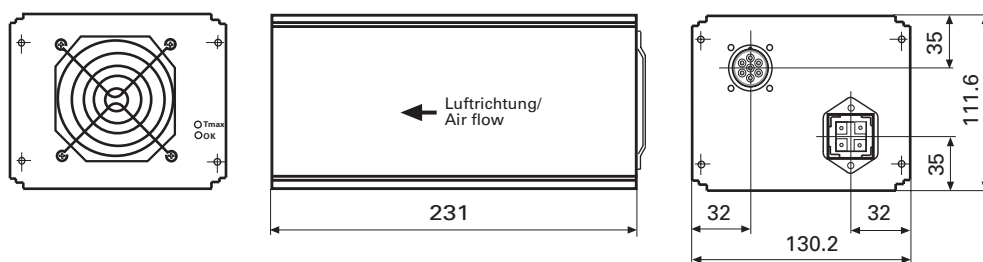
Power supply for wall/standard rail fitting - TPS 1400

Power supply 19" rack module 3 HE - TPS 1401

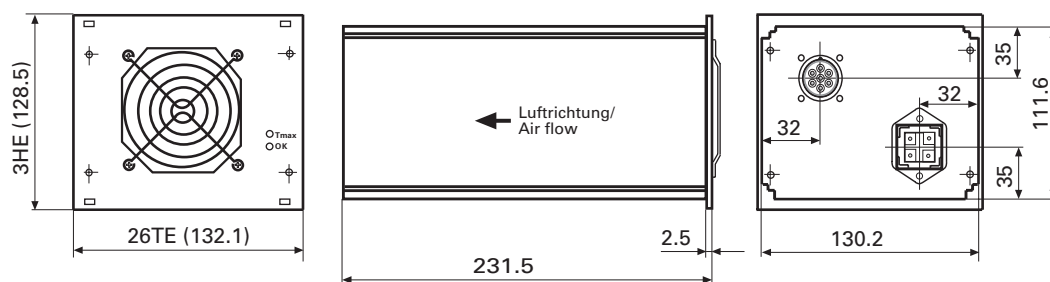


Power supply for wall/standard rail fitting is used for the voltage supply of the magnetically levitated turbopumps HiMag™ with integrated electronic and magnetic bearing drive unit TM 3000.

Dimensions (in mm)



TPS 1400



TPS 1401

Technical data

	TPS 1400	TPS 1401
Output voltage	140 V DC	140 V DC
Output current	10 A	10 A
Weight	3.4 kg	3.4 kg
Mains requirement: power consumption	1700 VA	1700 VA
Mains requirement: voltage (range)	187 - 265 V AC, 50/60 Hz	187 - 265 V AC, 50/60 Hz
Protection	IP 20	IP 20
Ambient temperature	5-40 °C	5-40 °C

Ordering Number

Power supply	PM C01 760	PM C01 761
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Accessories

	Order.-No.
Connection cable, HiMag™ - supply unit TPS 1400/1401, length 3 m	PM 051 983-T
Mains cable, for TPS 1400 / 1401 and integrated power supplies, 230 V AC, safety plug CEE 7, length 3 m	P4 564 309 HA
Mains cable, for TPS 1400 / 1401 and integrated power supplies, 208 V AC, UL plug NEMA 6-15 P, length 3 m	P4 564 309 HB

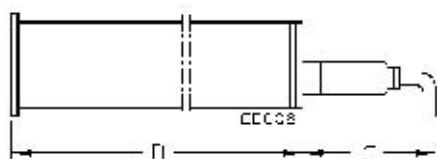
Magnetic drive electronic

TCM 1601



The TCM 1601 controls and regulates the active magnetically suspended bearing and also serves as a powerful drive unit for magnetically levitated turbopumps TMH/U 200 M, 400 M, 1000 M, 1600 M

Dimensions



A:	128.5 mm
B:	213 mm
C:	70 mm
D:	452 mm

Technical data

Mains requirement: voltage (range)	90 - 132 / 185 - 265 V AC, 50/60 Hz, automatic change-over
Mains requirement: power consumption	800 VA
max. drive power	600 W
Interface	RS-485, Remote (SPS-compatible)
Ambient temperature	5 - 40 °C
Protection	IP 20
Cable length Turbo-TCM max.	50 m
Weight	8 kg

TCM 1601

Ordering Number

Magnetic drive electronic	PM C01 677
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Accessories

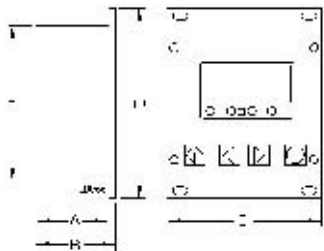
Accessories	Order.-No.
Connection cable for MagneticTurbo TMH/U 200/400/1000/1600 - TCM 1601, length 3 m (lengths 4-100 m on request)	PM 051 003-T
TIC 250, Profibus-Gateway	PM 051 257-T
Mains cable, 230 V AC, safety plug CEE 7, EURO counter plug C 13, length 3 m	P 4564 309 ZA
Mains cable, 115 V AC, UL plug NEMA 5-15P, EURO counter plug C 13 length 3 m	P 4564 309 ZE
Mains cable, 208 V AC, UL plug NEMA 6-15P, EURO counter plug C 13, length 3 m	P 4564 309 ZF
TCS 180, Pumping station control	PM C01 655
TIC 001, Serial Interface Converter RS-232/RS-485	PM 051 054-T
TBB 001, Battery Box, for TCM 1601	PM K01 712
PWM adapter box, pre-switching unit for rotation speed control	PM 051 028-U

Display Control Unit

DCU 001

- ▶ Display Control Unit for Pfeiffer Vacuum drive units
- ▶ DCU 001 permits the control of all parameters of the drive electronics
- ▶ In addition, different pressure sensors can be connected to the DCU
- ▶ Power is provided exclusively from the drive electronics

Dimensions



A:	50 mm
B:	52.5 mm
C:	128.5 mm
D:	106 mm
E:	106.3 mm

Technical data

DCU 001

Connection	12-30 V DC
Weight	0.4 kg
Power consumption	5 VA
Ambient temperature	5-40 °C
Protection	IP 20

Ordering Number

Display Control Unit	PM 041 816-T
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Accessories

Order.-No.

Connection cable, HiMag™ - HPU/DCU 001, length 3 m	PM 051 726-T
The connecting cable DCU/TC (3 m) is included. Power supply exclusively from Pfeiffer Vacuum electronic drive unit.	

Handheld Programming Unit

HPU 001



- ▶ The pump monitoring and control assistant
- ▶ Compact - Mobile - User-friendly
- ▶ Control and monitoring of pump parameters
- ▶ Administration of complete pump configurations/parameter sets
- ▶ RS-485 interface - connection to pump's electronic drive unit

Graphic display:

- ▶ Individual parameter configuration
- ▶ Illumination optional
- ▶ Battery operation possible
- ▶ Language: English/German
- ▶ Parameter set can be loaded from the PC and sent to the PC

Technical data

	HPU 001
Connection	9 - 24 V DC
Power consumption	2 W
Ambient temperature	5 - 40 °C
Protection	IP 20
Dimensions (l x w x h)	150 x 80 x 30 mm
Weight	0.23 kg

Ordering Number

Handheld Programming Unit	PM 051 510-T
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Accessories

	Order.-No.
Connection cable, HiMag™ - HPU/DCU 001, length 3 m	PM 051 726-T
Accessories package for HPU 001	PM 061 005-T

Accessories package for HPU 001



The HPU Communicator software allows displays and administration of the pump parameter sets on the PC as well as transmission of these via e-Mail.

The connecting cable HPU-PC serves the purpose of transferring the data between PC and HPU.

The power supply or an optional 9-volt battery is required to power the HPU. However, if the HPU is connected to a

pump through the RS-485 interface, the HPU is powered directly.

3 mains adapters have been included which ensures that the power supply can be used worldwide.

Shipment

CD (with software HPU Communicator)	Power supply for HPU
Connection cable HPU-PC	3x mains adapters (USA, UK, Southern Europe)

Ordering Number

Accessory package	PM 061 005-T
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Air cooling for turbomolecular pumps



- Different Compact and Magnetic-Turbopumps can be equipped with air cooling. Depending on the electrical ratings of the fans, these are powered directly with a control voltage of 24 V from the corresponding drive electronics.
- The fans of the MagneticTurbo-pumps are supplied with mains power and driven through the control voltage of the drive electronics. The required installation components are included in the delivery.

Air cooling	Mains voltage	Control voltage	Order.-No.
for TMH/U 071	24 V DC	-	PM Z01 253
for TMH/U 261/262	24 V DC	-	PM Z01 252
for TMH/U 521	24 V DC	-	PM Z01 251
for für TMH/U 200 MP, 115 V AC	115 V AC	24 V DC	PM Z01 282
for TMH/U 200 MP, 208/230 V AC	208/230 V AC	24 V DC	PM Z01 280
for TMH/U 400 MP, 115 V AC	115 V AC	24 V DC	PM Z01 261
for TMH/U 400 MP, 208/230 V AC	208/230 V AC	24 V DC	PM Z01 260
for TMH/U 1000/1600 MP, 115 V AC	115 V AC	24 V DC	PM Z01 256
for TMH/U 1000/1600 MP, 208/230 V	208/230 V AC	24 V DC	PM Z01 250

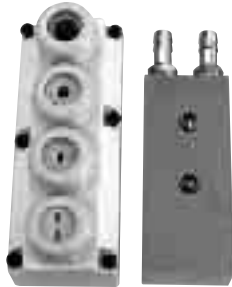
Water cooling for turbomolecular pumps

For CompactTurbo TMH/U 071, 261, 262, 521



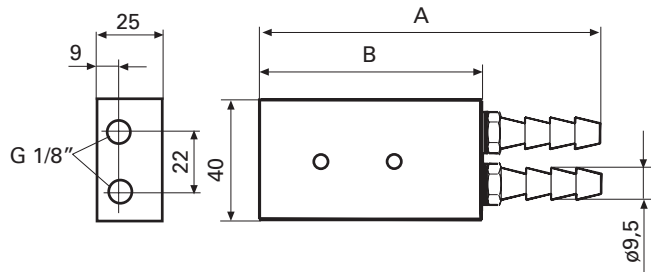
For TMH/U 071, 261, 262

- ▶ The CompactTurbopumps TMH/U 071, 261, 262, 521 may be cooled with air or also with water
- ▶ When the pump is heated, water cooling is mandatory
- ▶ The water cooling system can be fitted by means of two bolts (included in the delivery)



For TMH/U 521

Dimensions



	TMH/U 071	TMH/U 261/262	TMH/U 521
A:	90 mm	121 mm	121 mm
B:	64 mm	95 mm	95 mm

Technical data

Water connection alternatively G 1/8" female and hose nipple OD 9.5 mm.

Ordering Number

Water cooling, for TMH/U 071	PM 016 000-T	-	-
Water cooling, for TMH/U 261/521	-	PM 016 040-T	-
Water cooling, for TMH/U 521 with water protection cover for TC 600/750	-	-	PM 016 500-T

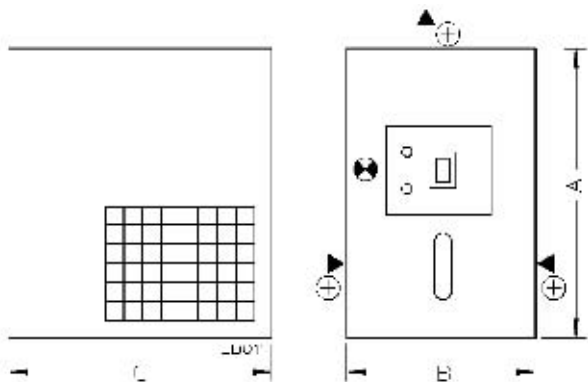
Water cooling unit

TZK 400, TZK 2000



The water cooling unit enables water cooling of the turbopump independent of the conduction mains

Dimensions



	TZK 400	TZK 2000
A:	470 mm	700 mm
B:	300 mm	430 mm
C:	430 mm	600 mm

Technical data

Weight: without water	30 kg	71.5 kg
Refrigeration capacity at +20 °C	540 W	1800 W
Power consumption	370 W	960 W
Mains requirement: voltage	230 V / 50 Hz	230 V / 50 Hz
Ambient temperature	max. 32 °C	max. 32 °C

Ordering Number

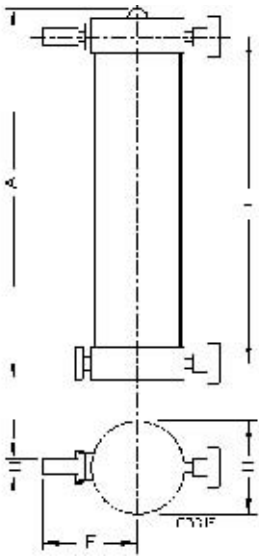
Water cooling unit	PM Z01 245	PM Z01 240
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Air drier for venting turbopumps

TTV 001

- The Zeolite filling dries the air, thus at the evacuation of the vacuum chamber, the evacuating time will be abated
- To determine the degree of saturation, surface treated zeolite with color indicator is added. The color changes from blue to beige

Dimensions



A:	235 mm
B:	59 mm
C:	206 mm
D:	9 mm
E:	57 mm

Ordering Number

Air drier for venting turbopumps	PM Z00 121
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Accessories

Order.-No.

Filling for air drier, TTV 001, approx. 260 cm ³	PM 006 786-T
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Venting valve, 24 V DC, normally closed

TVF 005

Suitable for all CompactTurbos.
Connected on the electronic drive unit TC/TCS or on cable, cable and plug included. Control is executed via pre-selected setting on the electronic drive unit.

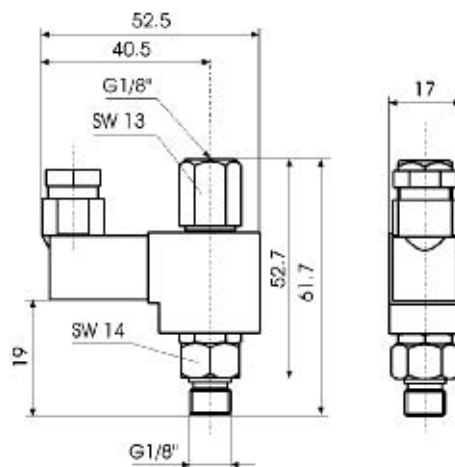
Operation without DCU/HPU/RS-485:

- Delayed venting (50 % of nominal speed), or opening/closing via remote contacts of the electronic drive unit when pump is stopped.

Operation with DCU/HPU/RS-485:

- In addition, programmable vent and delay time. Different vent modes selectable

Dimensions (in mm)



Technical data

TVF 005

Flange (in)	G 1/8"
Mains requirement: voltage	24 V DC
Leak rate	$<1 \cdot 10^{-8}$ mbar l/s
Venting gas excess pressure, max.	1.5 bar (absolute)
Weight	100 g

Ordering Number

Venting valve, 24 V DC, normally closed

PM Z01 135

Accessories

Order.-No.

TTV 001, air drier

PM Z00 121

Heating jackets for turbopumps



- Final pressures of the pump are attained faster if turbopump and apparatus are heated
- The power supply system is required for the current supply and the electronic drive unit for the control

Heating	Mains voltage	Control voltage	Power	Order.-No.
for TMU 071, 230 V AC	230 V AC	24 V DC	35 W	PM 041 900-T
for TMU 071, 208 V AC	208 V AC	24 V DC	35 W	PM 041 901-T
for TMU 071, 115 V AC	115 V AC	24 V DC	35 W	PM 041 902-T
for TMU 200 M, TPU 261, TMU 261/262, 230 V AC	230 V AC	24 V DC	100 W	PM 041 903-T
for TMU 200 M, TPU 261, TMU 261/262, 208 V AC	208 V AC	24 V DC	100 W	PM 041 904-T
for TMU 200 M, TPU 261, TMU 261/262, 115 V AC	115 V AC	24 V DC	100 W	PM 041 905-T
for TMU 400 M / TMU 521 / TPU 521, 230 V AC	230 V AC	24 V DC	100 W	PM 051 096-T
for TMU 400 M / TMU 521 / TPU 521, 208 V AC	208 V AC	24 V DC	100 W	PM 051 097-T
for TMU 400 M / TMU 521 / TPU 521, 115 V AC	115 V AC	24 V DC	100 W	PM 051 098-T
for TMU 1000 MP, 230 V AC, Schuko	230 V AC	24 V DC	140 W	PM 041 909-T
for TMU 1000 MP, 208 V AC, UL-Plug	208 V AC	24 V DC	140 W	PM 041 910-T
for TMU 1000 MP, 115 V AC, UL-Plug	115 V AC	24 V DC	140 W	PM 041 911-T
for TPU 1201 / 1501, 230/208 V	230/208 V AC	24 V DC	170 W	PM 061 140-T
for TPU 1201 / 1501, 115 V AC	115 V AC	24 V DC	170 W	PM 061 142-T
for TMU 1600 MP, 230 V AC, Schuko	230 V AC	24 V DC	170 W	PM 041 912-T
for TMU 1600 MP, 208 V AC	208 V AC	24 V DC	170 W	PM 041 913-T
for TMU 1600 MP, 115 V AC	115 V AC	24 V DC	170 W	PM 041 914-T
for TPU 2301, 230/208 V AC	208/230 V AC	24 V DC	410 W	PM 051 663-T
for TPU 2301, 115 V AC	115 V AC	24 V DC	410 W	PM 051 665-T
for HiMag™, 230/208 V AC	208/230 V AC	24 V DC	300 W	PM 061 150-T

Relay boxes for backing pumps, 1 phas. 5 A/20 A

5 A



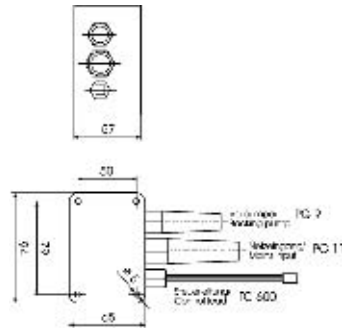
The relay box with semiconductor relay is provided for intermittent operation on diaphragm vacuum pumps.

20 A

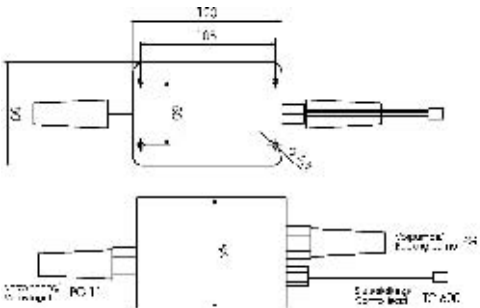


The relay box with mechanical relay is provided for the operation of larger backing pumps. The maximum relay contact load is 20 A.

Dimensions (in mm)



Relay box 5 A



Relay box 20 A

Technical data

	Relay box 5 A	Relay box 20 A
Mains requirement: voltage (range)	100-240 V AC, ±10 %, 50/60 Hz	100-240 V AC, ±10 %, 50/60 Hz
Control voltage	24 V DC	24 V DC
Contact rating	5 A	20 A

Ordering Number

Relaisbox	PM 041 937-T	PM 041 938-T
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Accessories

Connection cable TCP 350 / TM 3000 - backing pump relay box, length 2 m

Order.-No.

PM 061 144-X

Connection box

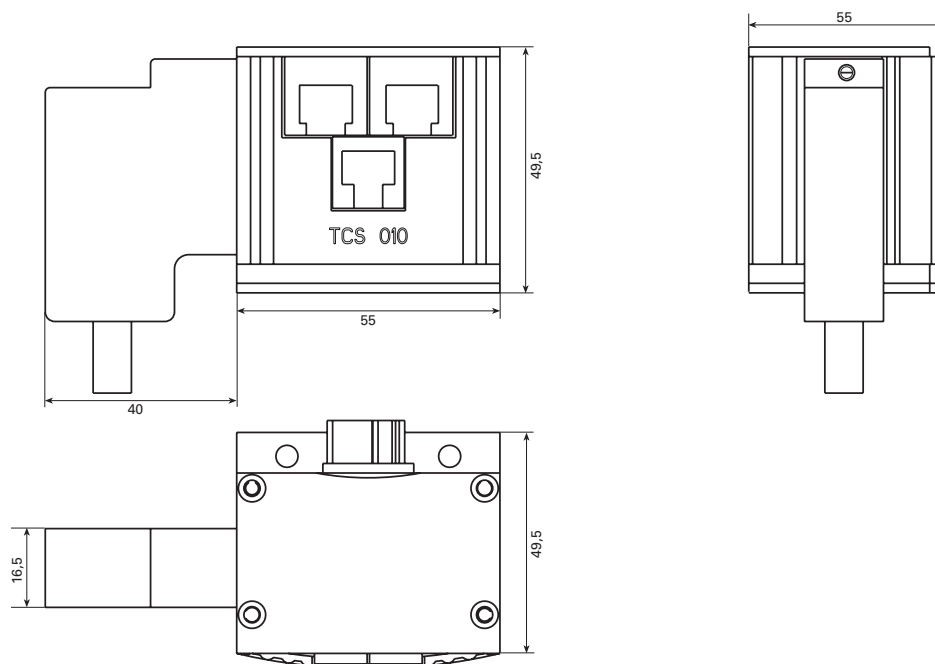
TCS 010



The TCS 010 is a connection box. It serves, in conjunction with the electronic drive unit TC 100, to control the air cooling system and the venting valve. Alternatively, it is also possible to connect a heating unit or a backing pump relay box. The operating and display unit DCU/HPU or a PC can be connected via serial interface RS-485.

In case of connecting vent valve, air cooling, heating jacket or backing pump on the TC 100 the TCS 010 will be required.

Dimensions (in mm)



Technical data

TCS 010

Voltage	24 V DC, +/- 5 %
Ambient temperature	Acceptable: 5-40 °C
Weight	0.11 kg

Ordering Number

Connection box	PM 051 460-U
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Pumping station control

TCS 180



The pumping station control unit TCS 180 is used, in conjunction with the magnetic bearing controller to control and monitor Pfeiffer Vacuum pumping stations. A magnetically suspended bearing electronic unit is required to control the turbopump, venting valve, air cooling and TMP bearing.

TCS 180 serves the following components:

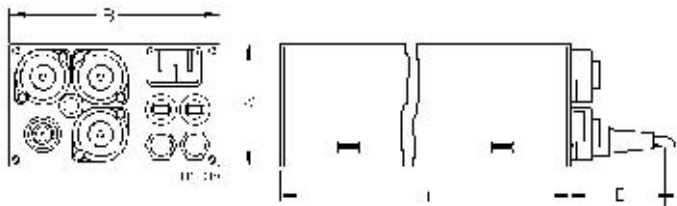
- ▶High pressure vacuum gauge TPR 280/PKR 251
- ▶High vacuum valve
- ▶Fore-vacuum safety valve TVV 001
- ▶Backing pump
- ▶Magnetci bearing controller TCM

A pressure gauge is recommended for monitoring the pressure when a high vacuum valve is being used.

The pressure gauge is operated via the connected magnetic bearing unit.



Dimensions



A:	70 mm
B:	106 mm
C:	242 mm
D:	80 mm

Technical data

Mains requirement: voltage (selectable)

Mains requirement: power consumption

Power input: Backing pump max.

Ambient temperature

Weight

TCS 180

115/230 V AC,
50/60 Hz

3000 VA

2000 VA

Acceptable:
5-40 °C

1.5 kg

Ordering Number

Pumping station control

PM C01 655

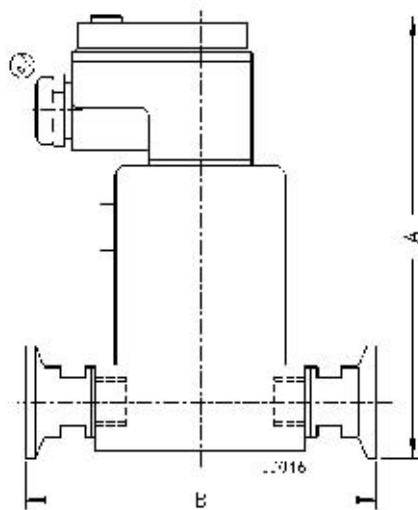
Fore vacuum safety valve

TVV 001



- ▶ The vacuum safety valve is fitted in the fore-vacuum line of pumping combinations between the turbopump and the diaphragm pump
- ▶ It is controlled with the backing pump and prevents unintentional venting of the turbopump via the fore-vacuum line when the backing pump is at rest
- ▶ When the backing pump starts, the vacuum safety valve opens delayed

Dimensions



	TVV 001	TVV 001
A:	120 mm	120 mm
B:	83 mm	83 mm

Technical data

Mains requirement: voltage	230 V AC, 50/60 Hz	115 V AC, 50/60 Hz
Permanent current	0.4 A	0.4 A
Time delay	0-25 s	0 - 25 s
Ambient temperature	0-50 °C	0-50 °C
Weight	0.4 kg	0.4 kg

Ordering Number

Fore vacuum safety valve	PM Z01 205	PM Z01 206
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Serial Interface Converter (RS-232 to RS-485)

TIC 001



The TIC 001 is a serial interface converter for converting the RS-232 signals (e. g. COM-port of the PC) into RS-485 signals. For adaption the RS-485 on a pump controller, there is no voltage supply necessary. Baud rates, type of the connection resistance and mode of the RS-232 are adjustable.

Ordering Number

Serial Interface Converter RS-232/RS-485

PM 051 054-T

Several cable lengths on request



Profibus-Gateway

TIC 250



The TIC 250 is a Gateway, which allows the connection to the drive units TC 100, TCK 100, TC 600, TC 750 and TCM 1601. For each drive unit a TIC 250 is required.

Shipment:

- ▶ 2 Din rail connections
 - ▶ 4 Fixing screw
 - ▶ 1 CD with GSD file
 - ▶ Connection cable (13 cm)
- other cable lengths on request

Ordering Number

Profibus-Gateway

PM 051 257-T

Splash water proofed version (IP 54) on request

Pre-switching unit for rotation speed control

PWM-Adapterbox



The PWM (pulse width modulation) adapter box serves as a pre-switching unit for regulating the rotation speed via the TC 600/750 or TCM 1601 remote control inputs on Pfeiffer Vacuum turbopumps.

There are three possibilities to regulate the rotation speed via the PWM adapter box:

- a) By supplying an external voltage of 2-10 V DC
- b) By supplying an external current of 4-20 mA
- c) By setting the rotation speed via an external potentiometer

Technical data

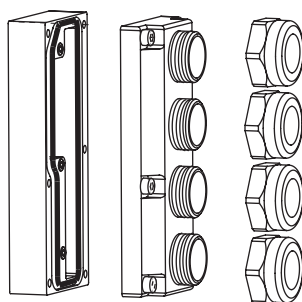
Connection	15-30 V DC
Ambient temperature	5-40 °C
Protection	IP 20
Dimensions w x h x d	68 / 24 / 57 mm

Ordering Number

Pre-switching unit for rotation speed control	PM 051 028-U
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Cover plate for the TC 600/750

Cover plate for the TC 600/750 attainable protection class IP 54



Turbopumps with the integrated electronic drive unit TC 600/TC 750 have the protection type IP 30. With the installation of the cover plate the conditions for protection type IP 54 are fulfilled.

Turbopumps larger 521 in conjunction with water cooling in delivery included.

Ordering Number

Cover plate for the TC 600/750	PM 051 327-U
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Brake unit

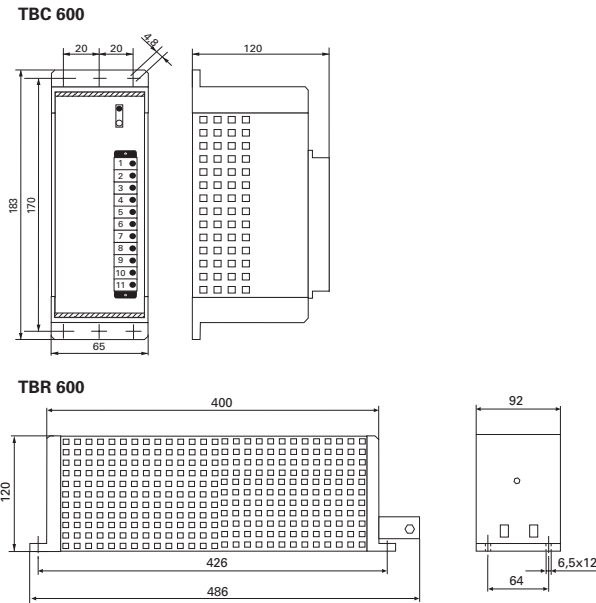
TBU 600



Electrical brake unit for a fast roation speed reduction of the tubopumps TMH/U 1201/1501/1801/2301. Installs between electronic drive unit of the turbopump and power supply pack

- Shipment:**
- Brake chopper TBC 600
 - Brake resistanc TBR 600
 - Connection cable TBC 600 - TC
 - Connection cable TBC 600 - TPS/DCU

Dimensions (in mm)



Technical data

TBU 600

Protection	IP 10 (mounted status)
Ambient temperature	0-40 °C
Weight	3 kg

Ordering Number

Brake unit	PM 051 368-T
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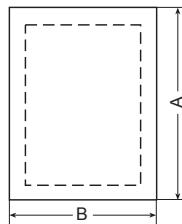
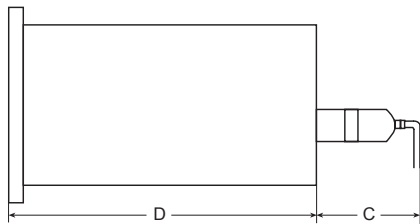
Battery Box for TCM 1601

TBB 001



The battery box serves the supply of the magnetic bearing controller TCM 1601 at power failure up to a pumping rotation speed of 0 Hz.

Dimensions



A:	128,5 mm
B:	106,3 mm
C:	70 mm
D:	230 mm

Technical data

TBB 001

Connection	Voltage insert space 90-265 V AC, 50/60 Hz
Power consumption	35 VA
Output voltage	24 V DC
Output current	1.4 A
Ambient temperature	5-40 °C
Protection	IP 20
Weight	2.6 kg

Ordering Number

Battery Box	PM K01 712
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Accessories

Order.-No.

Mains cable, 230 V AC, safety plug CEE 7, EURO counter plug C 13, length 3 m	P 4564 309 ZA
Mains cable, 115 V AC, UL plug NEMA 5-15P, EURO counter plug C 13 length 3 m	P 4564 309 ZE
Mains cable, 208 V AC, UL plug NEMA 6-15P, EURO counter plug C 13, length 3 m	P 4564 309 ZF

Protection for turbopumps

Splinter shield



- For protection against foreign objects
- Mesh 0.8 mm
- Through the reduction in conductance, the volume flow rate of the corresponding turbomolecular pump is reduced

Centering ring, with multifunction coating and integrated splinter shield

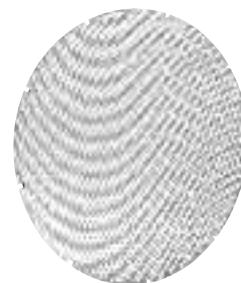
Conductance for N₂ [l/s]

Order.-No.

DN 63 ISO-K	194	PM 016 207-U
DN 100 ISO-K, -F	488	PM 016 211-U
DN 160 ISO-K, -F	1250	PM 016 217-U
DN 200 ISO-K, -F	1952	PM 016 221-U
DN 250 ISO-K, -F	3051	PM 016 226-U



DN 40 KF



CF-F

Splinter shield

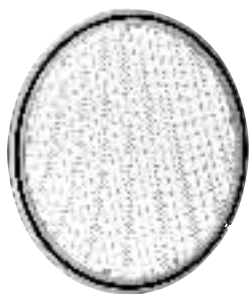
Conductance for N₂ [l/s]

Order.-No.

DN 40 KF	41	PM 006 375-X
DN 63 CF-F	194	PM 016 312
DN 100 CF-F	488	PM 016 315
DN 160 CF-F	1250	PM 016 318
DN 200 CF-F	1952	PM 016 321
DN 250 CF-F	3051	PM 016 324

Protection for turbopumps

Protective screen



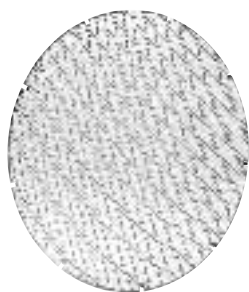
- For protection against foreign objects
- Mesh 4 mm
- Through the reduction in conductance, the volume flow rate of the corresponding turbomolecular pump is reduced

Centering ring, with multifunction coating and integrated protective screen

Conductance for N₂ [l/s]

Order.-No.

DN 63 ISO-K	303	PM 016 208-U
DN 100 ISO-K, -F	763	PM 016 212-U
DN 160 ISO-K, -F	1952	PM 016 218-U
DN 200 ISO-K, -F	3051	PM 016 222-U
DN 250 ISO-K, -F	4767	PM 016 227-U



Protective screen

Conductance for N₂ [l/s]

Order.-No.

DN 63 CF-F	303	PM 016 333
DN 100 CF-F	763	PM 016 336
DN 160 CF-F	1952	PM 016 339
DN 200 CF-F	3051	PM 016 342
DN 250 CF-F	4767	PM 016 345

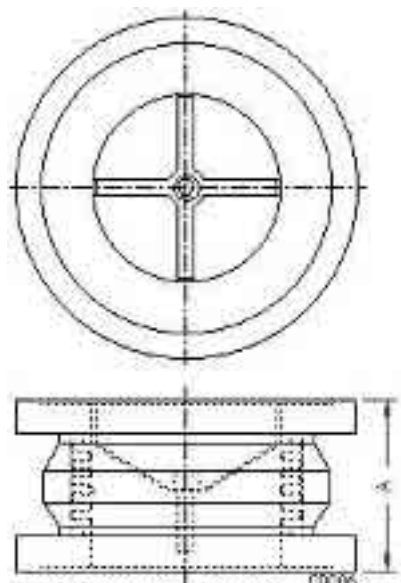
Protection for turbopumps

Vibration compensators



- These are used on the turbomolecular pumps in the case of extremely vibration sensitive systems
- Through the reduction in conductance, the volume flow rate of the corresponding turbomolecular pump is reduced

Dimensions



Flange	Conductance for N ₂ [l/s]	A	Order.-No.
DN 40 ISO-KF	150	85 mm	PM 006 799-X
DN 63 ISO-K	140	87 mm	PM 006 800-X
DN 63 CF-F	140	98 mm	PM 006 801-X
DN 100 ISO-K	470	84 mm	PM 006 459-X
DN 100 CF-F	435	99 mm	PM 006 488-X
DN 160 ISO-K	780	84 mm	PM 006 492-X
DN 160 CF-F	750	104 mm	PM 006 493-X
DN 200 ISO-K	2220	83 mm	PM 006 668-X
DN 200 CF-F	2120	108 mm	PM 006 669-X
DN 250 ISO-K	3250	84 mm	PM 006 670-X
DN 250 CF-F	3130	112 mm	PM 006 671-X

Mounting materials for turbopumps

For mounting our turbomolecular pumps, we recommend our installation material which provides an optimum degree of safety.

ISO-K connection:

For ISO-K and ISO-F flange variants, the mounting materials have been combined in kits. These consist of a specially coated centering ring and in each instance, corresponding set of bolts. Optionally, these kits are available including protective screen or splinter shield.

ISO-F connection:

For pumps equipped with an ISO-F flange, the following must be observed:
The mounting kit with hexagon screws must only be used for blind holes in the mating flange provided its strength is rated at at least 270N/mm² (steel, high-strength aluminium alloys).
For all other combinations, i.e. mating flanges with through holes or mating flanges with blind holes with a strength rating of 170-270N/mm² (standard aluminium alloys, for example) the mounting kit with stud bolts must be used.

CF-F connection:

When CF flanges are used, a hexagon screw kit is available for the through-holes mounting option and a kit of stud bolts for the blind-holes mounting option.
For technical data and ordering numbers, please refer to the Chapter CF UHV components under the heading Connection Components, page 308

Mounting materials for	Flange (in)	Number of screws	Content	Order.-No.
TMH 071	DN 63 ISO-K	4 clip-screws	inclusive centering ring coated	PM 016 360-T
TMH 071	DN 63 ISO-K	4 clip-screws	inclusive centering ring coated with splinter shield	PM 016 361-T
TMH 071	DN 63 ISO-K	4 clip-screws	inclusive centering ring coated with protection screen	PM 016 362-T
TMH 200 M, TMH 261/262, TPH 261	DN 100 ISO-K	6 clip-screws	inclusive centering ring coated	PM 016 365-T
TMH 200 M, TMH 261/262, TPH 261	DN 100 ISO-K	6 clip-screws	inclusive centering ring coated with splinter shield	PM 016 366-T
TMH 200 M, TMH 261/262, TPH 261	DN 100 ISO-K	6 clip-screws	inclusive centering ring coated with protection screen	PM 016 367-T
TMH 400 M	DN 160 ISO-K	10 clip-screws	inclusive centering ring coated	PM 016 375-T
TMH 400 M	DN 160 ISO-K	10 clip-screws	inclusive centering ring coated with splinter shield	PM 016 376-T
TMH 400 M	DN 160 ISO-K	10 clip-screws	inclusive centering ring coated with protection screen	PM 016 377-T
TPH/TMH 521	DN 100 ISO-K	16 clip-screws	inclusive centering ring coated	PM 016 380-T
TPH/TMH 521	DN 100 ISO-K	16 clip-screws	inclusive centering ring coated with splinter shield	PM 016 381-T
TPH/TMH 521	DN 100 ISO-K	16 clip-screws	inclusive centering ring coated with protection screen	PM 016 382-T
TPH/TMH 521	DN 160 ISO-K	14 clip-screws	inclusive centering ring coated	PM 016 385-T
TPH/TMH 521	DN 160 ISO-K	14 clip-screws	inclusive centering ring coated with splinter shield	PM 016 386-T
TPH/TMH 521	DN 160 ISO-K	14 clip-screws	inclusive centering ring coated with protection screen	PM 016 387-T
TMH 1000 M, TPH 1201	DN 200 ISO-K	18 clip-screws	inclusive centering ring coated	PM 016 390-T
TMH 1000 M, TPH 1201	DN 200 ISO-K	18 clip-screws	inclusive centering ring coated with splinter shield	PM 016 391-T
TMH 1000 M, TPH 1201	DN 200 ISO-K	18 clip-screws	inclusive centering ring coated with protection screen	PM 016 392-T

Mounting materials for	Flange (in)	Number of screws	Content	Order.-No.
TPH 1501	DN 250 ISO-K	14 clip-screws	inclusive centering ring coated	PM 016 395-T
TPH 1501	DN 250 ISO-K	14 clip-screws	inclusive centering ring coated with splinter shield	PM 016 396-T
TPH 1501	DN 250 ISO-K	14 clip-screws	inclusive centering ring coated with protection screen	PM 016 397-T
TPH 1801	DN 200 ISO-K	24 clip-screws	inclusive centering ring coated	PM 016 410-T
TPH 1801	DN 200 ISO-K	24 clip-screws	inclusive centering ring coated with splinter shield	PM 016 411-T
TPH 1801	DN 200 ISO-K	24 clip-screws	inclusive centering ring coated with protection screen	PM 016 412-T
TMH 1600 M, TPH 2301	DN 250 ISO-K	22 clip-screws	inclusive centering ring coated	PM 016 415-T
TMH 1600 M, TPH 2301	DN 250 ISO-K	22 clip-screws	inclusive centering ring coated with splinter shield	PM 016 416-T
TMH 1600 M, TPH 2301	DN 250 ISO-K	22 clip-screws	inclusive centering ring coated with protection screen	PM 016 417-T
HiMag™ 2400	DN 250 ISO-K	28 clip-screws	inclusive centering ring coated	PM 016 420-T
HiMag™ 2400	DN 250 ISO-K	28 clip-screws	inclusive centering ring coated with splinter shield	PM 016 421-T
HiMag™ 2400	DN 250 ISO-K	28 clip-screws	inclusive centering ring coated with protection screen	PM 016 422-T
TMH 521	DN 100 ISO-F	8 6-kt-screws	inclusive centering ring coated	PM 016 450-T
TMH 521	DN 100 ISO-F	8 6-kt-screws	inclusive centering ring coated with splinter shield	PM 016 451-T
TMH 521	DN 100 ISO-F	8 6-kt-screws	inclusive centering ring coated with protection screen	PM 016 452-T
TMH 521	DN 100 ISO-F	8 stud screws	inclusive centering ring coated	PM 016 455-T
TMH 521	DN 100 ISO-F	8 stud screws	inclusive centering ring coated with splinter shield	PM 016 456-T
TMH 521	DN 100 ISO-F	8 stud screws	inclusive centering ring coated with protection screen	PM 016 457-T
TMH 521	DN 160 ISO-F	8 6-kt-screws	inclusive centering ring coated	PM 016 460-T
TMH 521	DN 160 ISO-F	8 6-kt-screws	inclusive centering ring coated with splinter shield	PM 016 461-T
TMH 521	DN 160 ISO-F	8 6-kt-screws	inclusive centering ring coated with protection screen	PM 016 462-T
TMH 521	DN 160 ISO-F	8 stud screws	inclusive centering ring coated	PM 016 465-T
TMH 521	DN 160 ISO-F	8 stud screws	inclusive centering ring coated with splinter shield	PM 016 466-T
TMH 521	DN 160 ISO-F	8 stud screws	inclusive centering ring coated with protection screen	PM 016 467-T
TMH 1000 M, TPH 1201/1801	DN 200 ISO-F	12 6-kt-screws	inclusive centering ring coated	PM 016 470-T
TMH 1000 M, TPH 1201/1801	DN 200 ISO-F	12 6-kt-screws	inclusive centering ring coated with splinter shield	PM 016 471-T
TMH 1000 M, TPH 1201/1801	DN 200 ISO-F	12 6-kt-screws	inclusive centering ring coated with protection screen	PM 016 472-T
TMH 1000 M, TPH 1201/1801	DN 200 ISO-F	12 stud screws	inclusive centering ring coated	PM 016 475-T
TMH 1000 M, TPH 1201/1801	DN 200 ISO-F	12 stud screws	inclusive centering ring coated with splinter shield	PM 016 476-T
TMH 1000 M, TPH 1201/1801	DN 200 ISO-F	12 stud screws	inclusive centering ring coated with protection screen	PM 016 477-T



Turbo accessories

Mounting materials for	Flange (in)	Number of screws	Content	Order.-No.
TPH 1501/2301, TMH 1600 M, HiMag™ 2400	DN 250 ISO-F	12 6-kt-screws	inclusive centering ring coated	PM 016 480-T
TPH 1501/2301, TMH 1600 M, HiMag™ 2400	DN 250 ISO-F	12 6-kt-screws	inclusive centering ring coated with splinter shield	PM 016 481-T
TPH 1501/2301, TMH 1600 M, HiMag™ 2400	DN 250 ISO-F	12 6-kt-screws	inclusive centering ring coated with protection screen	PM 016 482-T
TPH 1501/2301, TMH 1600 M, HiMag™ 2400	DN 250 ISO-F	12 stud screws	inclusive centering ring coated	PM 016 485-T
TPH 1501/2301, TMH 1600 M, HiMag™ 2400	DN 250 ISO-F	12 stud screws	inclusive centering ring coated with splinter shield	PM 016 486-T
TPH 1501/1801, TMH 1600 M, HiMag™ 2400	DN 250 ISO-F	12 stud screws	inclusive centering ring coated with protection screen	PM 016 487-T



Sealing gas valve

Mechanical



The sealing gas valve fits on all Turbo-pumps with sealing gas connection. Mount flush nitrogen (N₂) as an inert gas through the sealing gas valve to avert harm materials in the sector of the

Technical data

Connection nominal diameter: Outlet	M6
Connection nominal diameter: Inlet	DN 10 ISO-KF

Ordering Number

Sealing gas valve, mechanical	PM Z01 142
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Lubricants

Lubricants	Quantity	Order.-No.
TL 011	0.25 l	PM 006 034-T
TL 011	0.5 l	PM 006 032-T
TL 011	1 l	PM 006 033-T
F3	40 ml	PM 016 144-T
F3	65 ml	PM 016 145-T
F3	250 ml	PM 006 313-T



The compact turbo drag pumping station for analytics, research and development

Your advantages

- ▶ Plug and play pumping station
- ▶ Flexible design
- ▶ Dry high vacuum system with diaphragm pump
- ▶ Combines the advantages of all systems

Applications

- ▶ Spectroscopy
- ▶ Tube manufacture
- ▶ Microbalances
- ▶ Sputtering and evaporation systems
- ▶ Surface physics
- ▶ Laboratory applications



Turbopumping station TSU 071
Economy for CO₂ gas
analysis



Economy pumping stations

Turbo-Drag Pumping Station, 90 - 132 V, 185-265 V, 50 Hz/60 Hz

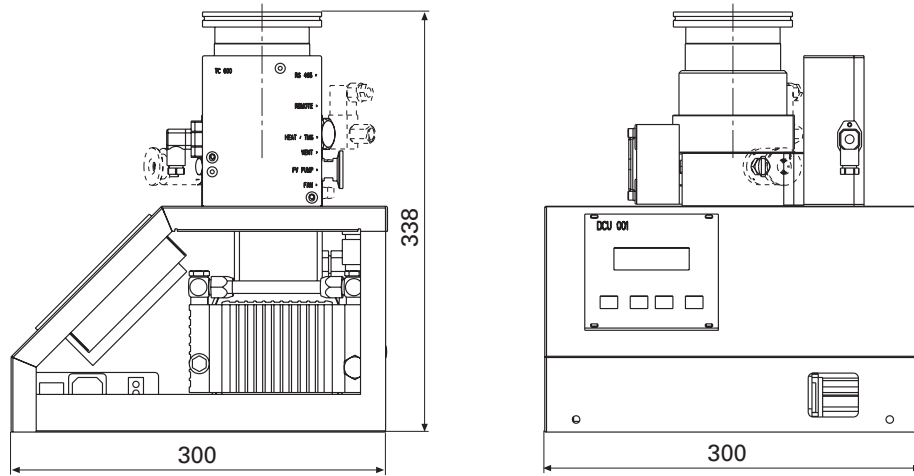


TSH 071 E, DN 40 ISO-KF

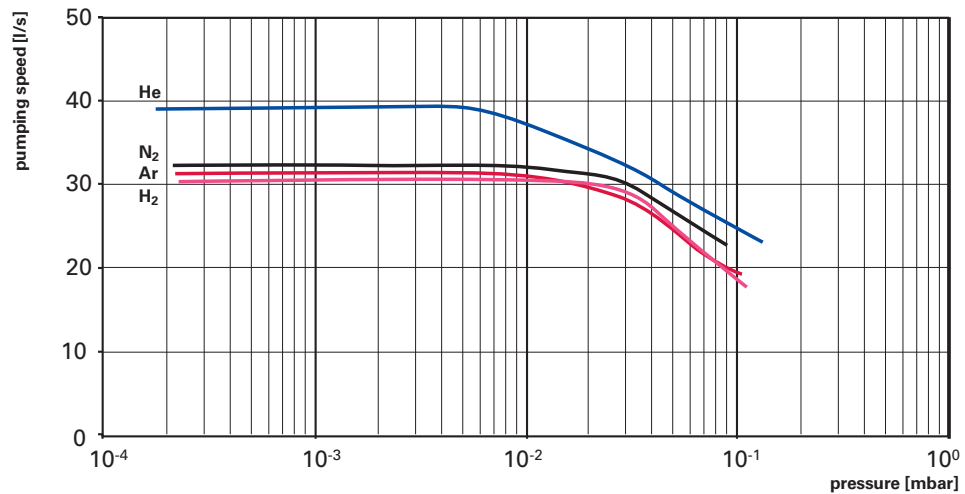
Simply connect and switch on:

- ▶ The compact serial pumping station for all applications in the high vacuum range
- ▶ Compact, air-cooled pumping station with dry diaphragm pump
- ▶ Direct connected compact gauge

Dimensions (in mm)



Pumping speed



Technical data

Flange (in)	DN 40 ISO-KF
Pumping speed: for N ₂	33 l/s
Ultimate pressure	<1·10 ⁻⁷ mbar
Pumping speed roughing pump at 50 Hz	0.9 m ³ /h
Mains requirement: voltage (range)	90-132 V, 50/60 Hz 185-265 V, 50/60 Hz
Mains requirement: power consumption	140 VA
Weight	15 kg

Pump	Pumping station components	Order.-No.
TSH 071 E	TMH 071 P, MVP 015-2, TPS 100	PM S03 522
TSH 071 E	TMH 071 P, MVP 015-2, DCU 001, TPS 100	PM S03 527

Accessories	Order.-No.
DCU 001, Display control unit	PM 041 816-T
HPU 001, Handheld programming unit	PM 051 510-T
Accessories package for HPU 001	PM 061 005-T
Mains cable, 230 V AC, safety plug CEE 7, EURO counter plug C 13, length 3 m	P 4564 309 ZA
Mains cable, 115 V AC, UL plug NEMA 5-15P, EURO counter plug C 13 length 3 m	P 4564 309 ZE
Mains cable, 208 V AC, UL plug NEMA 6-15P, EURO counter plug C 13, length 3 m	P 4564 309 ZF
TVF 005, venting valve, 24 V DC, normally closed	PM Z01 135
Water cooling, for TMH/U 071	PM 016 000-T
Sealing gas valve, mechanical	PM Z01 142
Splinter shield for turbopumps with flange DN 40 KF	PM 006 375-X
TPR 280, Compact Pirani Gauge 80 °C, DN 16 ISO-KF	PT R26 950
PKR 251, Compact FullRange™ Gauge, DN 25 ISO-KF	PT R26 000
CMR 261, Compact Capacitance Diaphragm Gauge, DN 16 ISO-KF	PT R24 501

Economy pumping stations

Turbo-Drag Pumping Station, 90 - 132 V, 185-265 V, 50 Hz/60 Hz

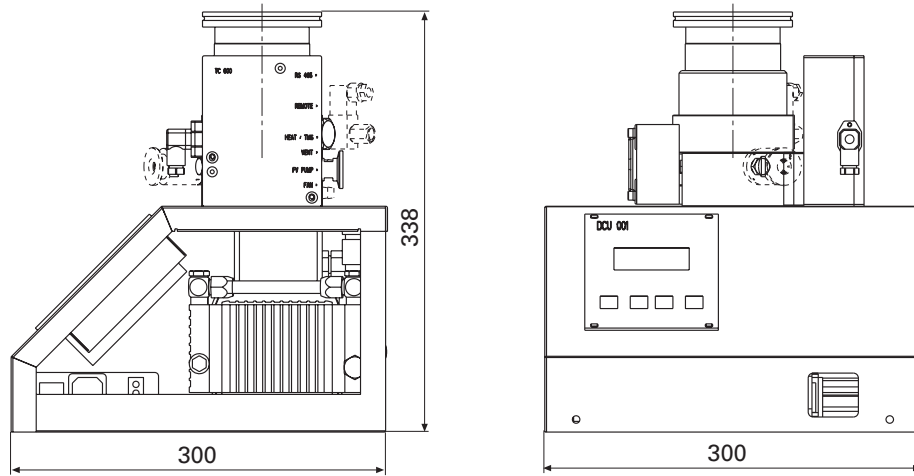


TSH/U 071 E, DN 63 CF-F

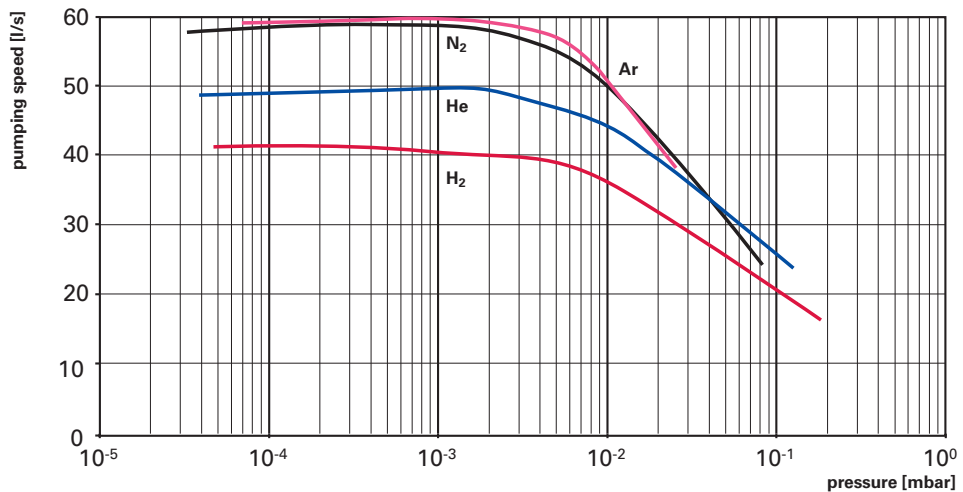
Simply connect and switch on:

- ▶ The compact serial pumping station for all applications in the high vacuum range
- ▶ Compact, air-cooled pumping station with dry diaphragm pump
- ▶ Direct connected compact gauge

Dimensions (in mm)



Pumping speed



Technical data

Flange (in)	DN 63 CF-F
Pumping speed: for N ₂	60 l/s
Ultimate pressure	<1·10 ⁻⁸ mbar
Pumping speed roughing pump at 50 Hz	0.9 m ³ /h
Mains requirement: voltage (range)	90-132 V, 50/60 Hz 185-265 V, 50/60 Hz
Mains requirement: power consumption	140 VA
Weight	16 kg

Pump	Pumping station components	Order.-No.
TSU 071 E	TMU 071 P, MVP 015-2, TPS 100	PM S03 521
TSU 071 E	TMU 071 P, MVP 015-2, DCU 001, TPS 100	PM S03 526

Accessories	Order.-No.
DCU 001, Display control unit	PM 041 816-T
HPU 001, Handheld programming unit	PM 051 510-T
Accessories package for HPU 001	PM 061 005-T
Mains cable, 230 V AC, safety plug CEE 7, EURO counter plug C 13, length 3 m	P 4564 309 ZA
Mains cable, 115 V AC, UL plug NEMA 5-15P, EURO counter plug C 13 length 3 m	P 4564 309 ZE
Mains cable, 208 V AC, UL plug NEMA 6-15P, EURO counter plug C 13, length 3 m	P 4564 309 ZF
TVF 005, venting valve, 24 V DC, normally closed	PM Z01 135
Heating jacket, for TMU 071, 115 V AC	PM 041 902-T
Heating jacket, for TMU 071, 208 V AC	PM 041 901-T
Heating jacket, for TMU 071, 230 V AC	PM 041 900-T
Water cooling, for TMH/U 071	PM 016 000-T
Sealing gas valve, mechanical	PM Z01 142
Protection screen for turbopumps with DN 63 CF-F flange	PM 016 333
Splinter shield for turbopumps with DN 63 CF-F flange	PM 016 312
TPR 280, Compact Pirani Gauge 80 °C, DN 16 ISO-KF	PT R26 950
PKR 251, Compact FullRange™ Gauge, DN 25 ISO-KF	PT R26 000
CMR 261, Compact Capacitance Diaphragm Gauge, DN 16 ISO-KF	PT R24 501

Economy pumping stations

Turbo-Drag Pumping Station, 90 - 132 V, 185-265 V, 50 Hz/60 Hz

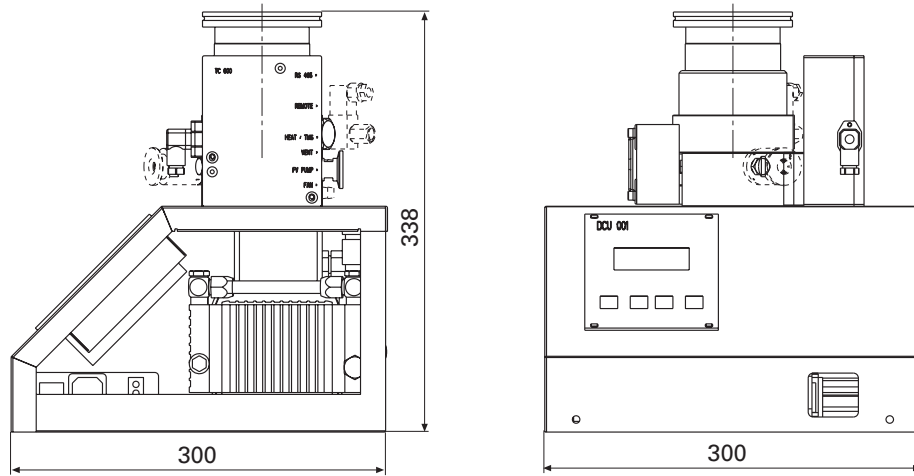


TSH/U 071 E, DN 63 ISO-K

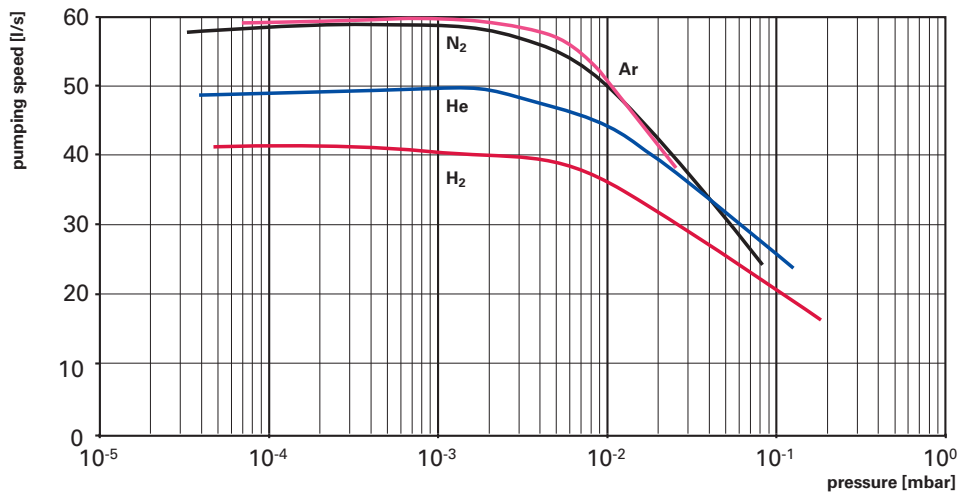
Simply connect and switch on:

- ▶ The compact serial pumping station for all applications in the high vacuum range
- ▶ Compact, air-cooled pumping station with dry diaphragm pump
- ▶ Direct connected compact gauge

Dimensions (in mm)



Pumping speed



Technical data

Flange (in)	DN 63 ISO-K
Pumping speed: for N ₂	60 l/s
Ultimate pressure	<1·10 ⁻⁷ mbar
Pumping speed roughing pump at 50 Hz	0.9 m ³ /h
Mains requirement: voltage (range)	90-132 V, 50/60 Hz 185-265 V, 50/60 Hz
Mains requirement: power consumption	140 VA
Weight	15 kg

Pump	Pumping station components	Order.-No.
TSH 071 E	TMH 071 P, MVP 015-2, TPS 100	PM S03 520
TSH 071 E	TMH 071 P, MVP 015-2, DCU 001, TPS 100	PM S03 525

Accessories	Order.-No.
DCU 001, Display control unit	PM 041 816-T
HPU 001, Handheld programming unit	PM 051 510-T
Accessories package for HPU 001	PM 061 005-T
Mains cable, 230 V AC, safety plug CEE 7, EURO counter plug C 13, length 3 m	P 4564 309 ZA
Mains cable, 115 V AC, UL plug NEMA 5-15P, EURO counter plug C 13 length 3 m	P 4564 309 ZE
Mains cable, 208 V AC, UL plug NEMA 6-15P, EURO counter plug C 13, length 3 m	P 4564 309 ZF
TVF 005, venting valve, 24 V DC, normally closed	PM Z01 135
Water cooling, for TMH/U 071	PM 016 000-T
Sealing gas valve, mechanical	PM Z01 142
Centering ring, with multifunction coating and integrated protective screen, DN 63 ISO-K, DN 63 ISO-F	PM 016 208-U
Centering ring, with multifunction coating and integrated splinter shield, DN 63 ISO-K, DN 63 ISO-F	PM 016 207-U
TPR 280, Compact Pirani Gauge 80 °C, DN 16 ISO-KF	PT R26 950
PKR 251, Compact FullRange™ Gauge, DN 25 ISO-KF	PT R26 000
CMR 261, Compact Capacitance Diaphragm Gauge, DN 16 ISO-KF	PT R24 501



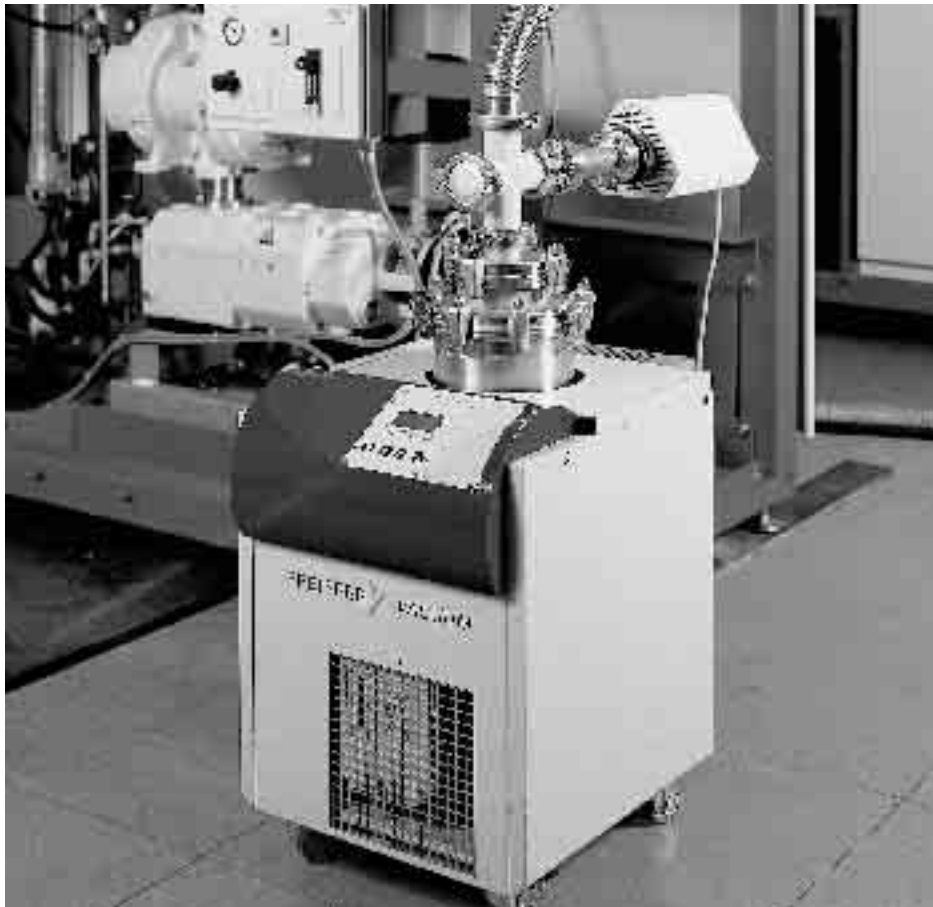
**The ideal solution for high vacuum applications.
The modular pumping station for customer specific requirements**

Your advantages

- ▶ Optimum match between turbo and backing pump
- ▶ Modular design with good accessibility of the individual components
- ▶ Turbo controller integrated
- ▶ Plug and play
- ▶ The functions can be controlled remotely
- ▶ Additional Profibus module available as an accessory
- ▶ The right pump combination for any application
- ▶ Simple conversion depending on the assignment, service friendly
- ▶ No additional controller is necessary
- ▶ No installation or cable assembly work is necessary
- ▶ Optimally usable in every application
- ▶ Integration within Profibus industrial control systems

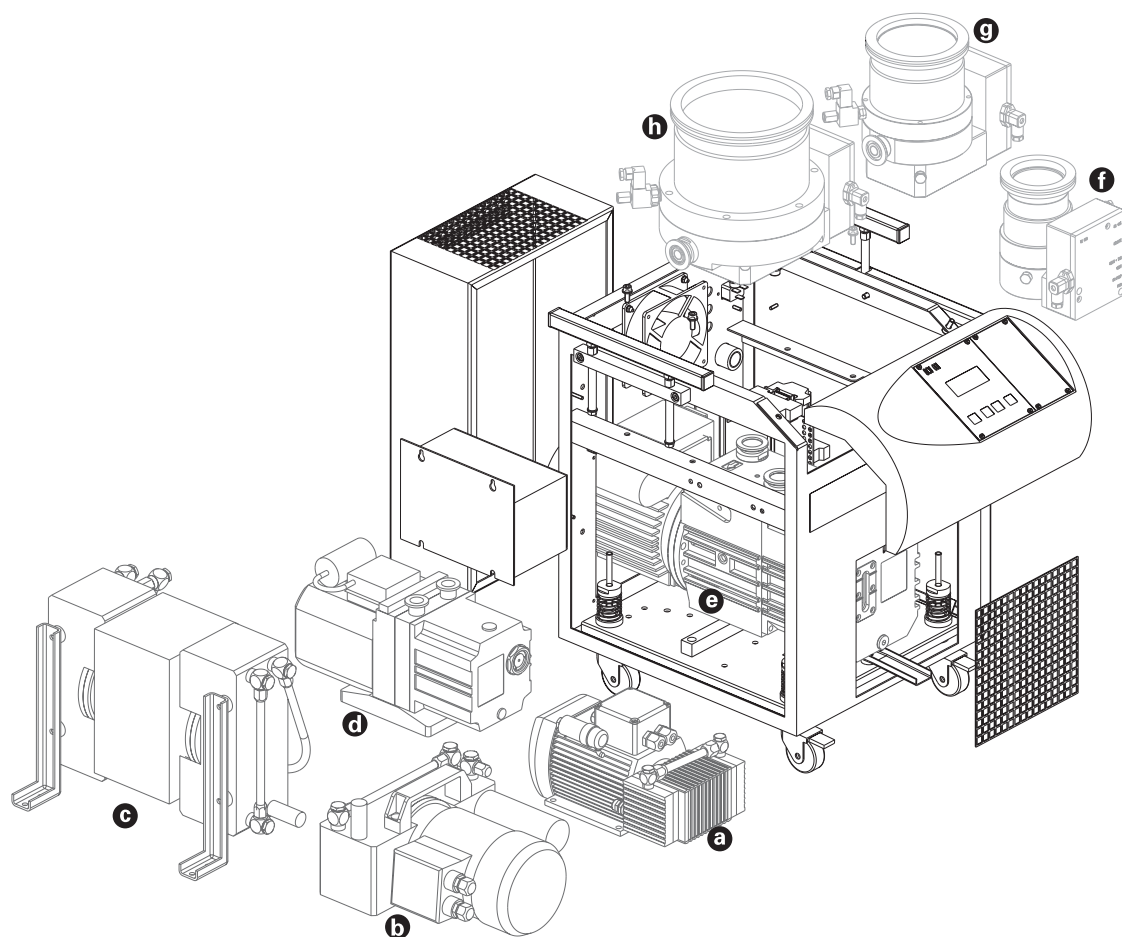
Applications

- ▶ Research and development
- ▶ Accelerators
- ▶ Analytics and surface physics
- ▶ Vacuum process engineering
- ▶ Electron beam welding
- ▶ Leak detection units



Monitoring of the gas composition in a production system

Configuration TurboCube™



Backing pump

a	Diaphragm pump MVP 015-2
b	Diaphragm pump MVP 035-2
c	Diaphragm pump MVP 055-3
d	Rotary vane pump DUO 2.5/UNO 5A
e	Rotary vane pump DUO 5/UNO 10

Turbopump with Turbo Controller

f	TMH/U 071
g	THM/U 261
h	TMH/U 521

Ordering matrix for your specific pumping station

aa			
Turbo pump with TC 600	TMH 071 P	DN 40 ISO-KF	04
	TMH 071 P	DN 63 ISO-K	05
	TMU 071 P	DN 63 CF-F	06
	TMH 261 P	DN 100 ISO-K	07
	TMU 261 P	DN 100 CF-F	08
	TMH 521 P	DN 100 ISO-K	09
	TMU 521 P	DN 100 CF-F	10
	TMH 521 P	DN 160 ISO-K	11
	TMU 521 P	DN 160 CF-F	12
w.o. Turbo	without Turbo	für TMH/U 071 YP	13*
	without Turbo	für TMH/U 261 YP	14*
	without Turbo	für TMH/U 521 YP	15*

bb				
Diaphragm Pump	MVP 015-2	90–127 V AC	50/60 Hz	01
	MVP 015-2	187–265 V AC	50/60 Hz	02
	MVP 035-2	110 V AC	60 Hz	03
	MVP 035-2	230 V AC	50/60 Hz	04
	MVP 055-3	110 V AC	60 Hz	05
	MVP 055-3	230 V AC	50/60 Hz	06
Rotary Vane Pump	DUO 2.5	110 V AC	50/60 Hz	07
	DUO 2.5	230 V AC	50/60 Hz	08
	UNO 5 A	110 V AC	50/60 Hz	09
	UNO 5 A	230 V AC	50/60 Hz	10
	DUO 5 110 V AC		50/60 Hz	11
	DUO 5 230 V AC		50/60 Hz	12
	DUO 10 110 V AC		50/60 Hz	13
	DUO 10 230 V AC		50/60 Hz	14

c/d/e		
Options	Standard, on rubber feet	0
	On rollers, 4 guiding rollers, 2 brakes	1
	Drying Unit TTV 001, with connection to the venting valve	2
	On rollers+Drying Unit TTV 001	3
	Standard	0
	Cable set, fore-vacuum line 3 m (to detach the turbo pump)	1
	Cable set, fore-vacuum line 5 m (to detach the turbo pump)	2
	Cable set, fore-vacuum line 10 m (to detach the turbo pump)	3
	Standard, air cooling	0
	Water cooling	1
	Water cooling + heating sleeve	2

Ordering Example:	Pumping station with following components:
	Turbo pump TMH 261 with air cooling and venting valve
	Backing Pump MD 4T 230 V, 50 Hz
	Pumping station on rollers, 4 guiding rollers, 2 brakes
	Cable set, fore-vacuum line 5 m (to detach the turbo pump)
	Water cooling

*For turbopumps with any mounting position
The ordering number for the TMH/U 071 YP with TC 600 on request

Ordering No.

PM Saa bbc de

Ordering No.

PM S07 061 21



Technical data TurboCube™

	TSH 071	TSH 071	TSU 071
Connection nominal diameter			
Flange (in)	DN 40 ISO-KF	DN 63 ISO-K	DN 63 CF-F
Pumping speed [l/s]			
Nitrogen N ₂	33	59	59
Final pressure mbar			
with Rotary vane pump	<1·10 ⁻⁷	<1·10 ⁻⁷	<5·10 ⁻¹⁰
with Diaphragm pump	<1·10 ⁻⁷	<1·10 ⁻⁷	<1·10 ⁻⁸
Backing pump pumping speed with main frequency 50 Hz m³/h			
Diaphragm pump MVP 015-2	0.9	0.9	0.9
Diaphragm pump MVP 035-2	2.1	2.1	2.1
Diaphragm pump MVP 055-3	3.3	3.3	3.3
Rotary vane pump DUO 2.5	2.5	2.5	2.5
Rotary vane pump UNO 5	5	5	5
Rotary vane pump DUO 5	5	5	5
Rotary vane pump DUO 10	10	10	10
Weight, pumping station kg			
with Diaphragm pump MVP 015-2	28	28	28
with Diaphragm pump MVP 035-2	32	32	32
with Diaphragm pump MVP 055-3	38	38	38
with Rotary vane pump DUO 2.5	32	32	32
with Rotary vane pump UNO 5	33	33	33
with Rotary vane pump DUO 5	44	44	44
with Rotary vane pump DUO 10	50	50	50
Mains connection power consumption VA			
Diaphragm pump MVP 015-2	220	220	220
Diaphragm pump MVP 035-2	280	280	280
Diaphragm pump MVP 055-3	300	300	300
Rotary vane pump DUO 2.5	250	250	250
Rotary vane pump UNO 5	250	250	250
Rotary vane pump DUO 5	470	470	470
Rotary vane pump DUO 10	550	550	550

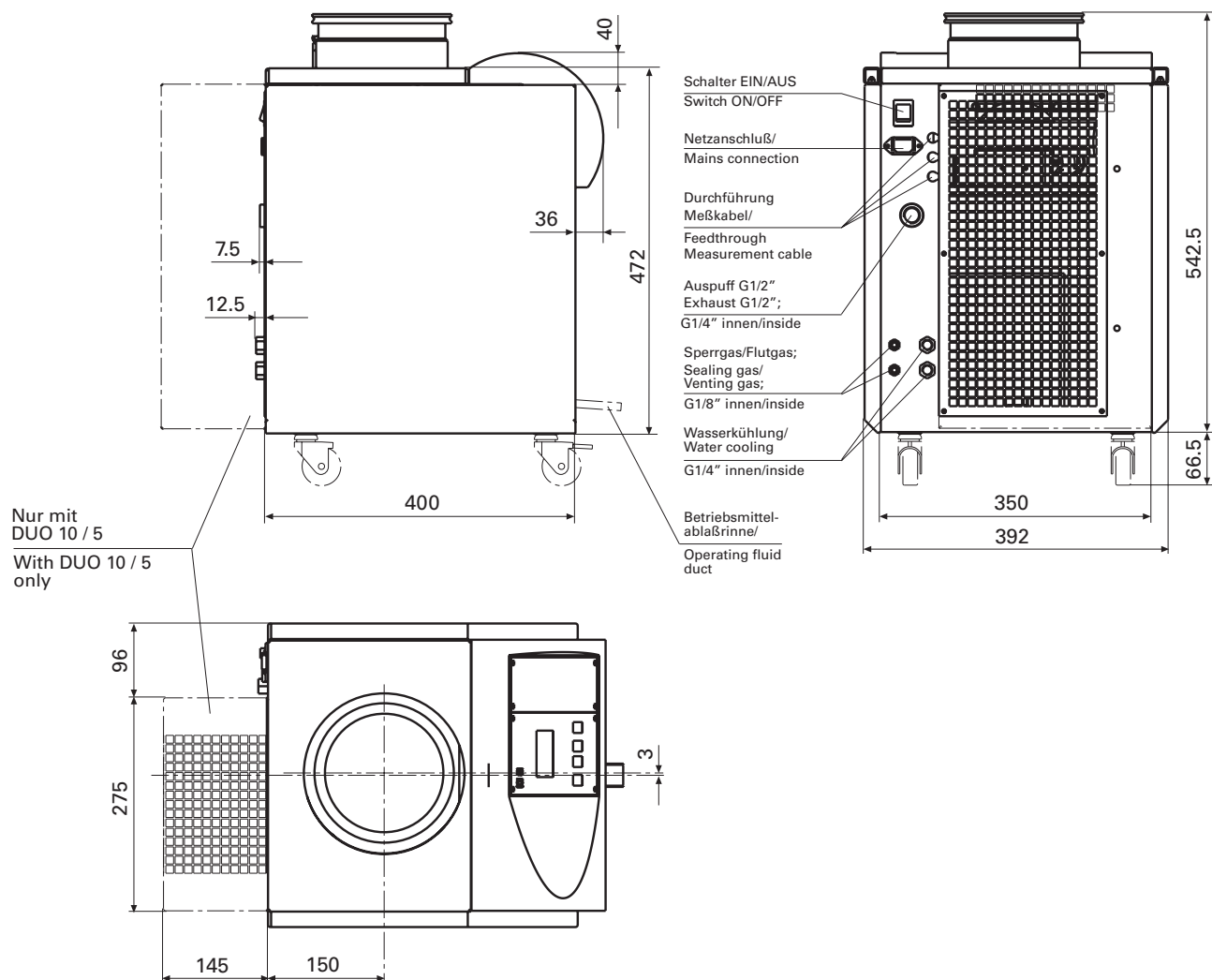
Scope of delivery

- ▶ Stable and attractive frame
- ▶ Turbopump with integrated drive
- ▶ Backing pump on vibration-free intermediate frame
- ▶ Modern mains switching unit in compliance with current standards
- ▶ Backing pump control
- ▶ Electromagnetic Venting Valve TVF 005
- ▶ Display Control Unit DCU 001
- ▶ Air cooling standard
- ▶ Oil charge included (on rotary vane vacuum pumps)

TSH 261	TSU 261	TSH 521	TSU 521	TSH 521	TSU 521
DN 100 ISO-K	DN 100 CF-F	DN 100 ISO-K	DN 100 CF-F	DN 160 ISO-K	DN 160 CF-F
210	210	290	290	510	510
$<1 \cdot 10^{-7}$	$<5 \cdot 10^{-10}$	$<5 \cdot 10^{-10}$	$<5 \cdot 10^{-10}$	$<5 \cdot 10^{-10}$	$<5 \cdot 10^{-10}$
$<1 \cdot 10^{-7}$	$<1 \cdot 10^{-8}$	$<1 \cdot 10^{-8}$	$<1 \cdot 10^{-8}$	$<1 \cdot 10^{-8}$	$<1 \cdot 10^{-8}$
-	-	-	-	-	-
2.1	2.1	2.1	2.1	2.1	2.1
3.3	3.3	3.3	3.3	3.3	3.3
2.5	2.5	2.5	2.5	2.5	2.5
5	5	5	5	5	5
5	5	5	5	5	5
10	10	10	10	10	10
-	-	-	-	-	-
42	42	-	-	-	-
47	47	56	56	56	56
42	42	51	51	51	51
42	42	51	51	51	51
54	54	63	63	63	63
60	60	69	69	69	69
-	-	-	-	-	-
380	380	-	-	-	-
400	400	500	500	500	500
350	350	450	450	450	450
350	350	450	450	450	450
570	570	670	670	670	670
650	650	750	750	750	750



Dimensions (in mm)







**Flange components and feedthroughs
for all vacuum applications**

Contents

	Page
Selection aid	280
General information	281
 Components ISO-KF	 283
Connection components	284
Seals	285
Flanges	288
Pipe components	289
Bellows	291
Adapters	293
Miscellaneous	296
 Components ISO-K	 297
Connection components	298
Seals	299
Flanges	300
Pipe components	302
Bellows	303
Adapters	304
 Components CF	 307
Connection components	308
Seals	309
Flanges	310
Pipe components	313
Bellows, adjustment piece	314
Adapters	315
Miscellaneous	317
 Feedthroughs	 318
Rotary feedthroughs	ISO-KF and ISO-K 318
Rotary feedthroughs	CF 320
Linear feedthroughs	CF 322
Rotary/linear feedthroughs	ISO-KF 324
Liquid feedthroughs	ISO-KF and CF 326
Sight glass	ISO-KF 328
Sight glass	ISO-K 330
Sight glass	ISO-F 332
Sight glass	CF 334
Electric feedthroughs	ISO-KF 336
Electric feedthroughs	CF 342
Coaxial feedthroughs	ISO-KF 346
Coaxial feedthroughs	CF 347
 Lubricants and sealants	 348

Components and feedthroughs

Selection aid

Components	Nominal diameter																Material			Seal				Page	
	10	16	25	40	50	63	100	160	200	250	320	400	500	630	800	1.000	Aluminium	Steel	Stainless steel	Neoprene	Viton®	Aluminium	Copper	Copper, silver plated	
ISO-KF																									
Connection components	●	●	●	●	●																				284
Seal	●	●	●	●	●															●	●	●			285
Flange	●	●	●	●	●												●	●	●						288
Pipe components	●	●	●	●	●												●		●						289
Bellows		●	●	●	●														●						291
Adapter	●	●	●	●	●												●		●						293
Rotary feedthrough		●	●	●																					318
Rotary/linear feedthrough		●	●	●																					324
Liquid feedthrough				●																					326
Sight glass			●	●	●																				328
Electric feedthrough		●		●																					336
Coaxial feedthrough		●																							346
ISO-K																									
Connection components						●	●	●	●	●	●	●	●	●											298
Seal						●	●	●	●	●	●	●	●	●	●	●				●	●				299
Flange						●	●	●	●	●	●	●	●	●			●	●	●						300
Pipe components						●	●	●	●	●									●						302
Bellows						●	●	●	●	●									●						303
Adapter				●	●	●	●	●	●	●							●		●						304
Rotary feedthrough						●																			318
Sight glass						●	●	●	●																330
CF-F/R																									
Connection components		●		●		●	●	●	●	●															308
Seal		●		●		●	●	●	●	●											●		●	●	309
Flange		●		●		●	●	●	●	●									●						310
Pipe components		●		●		●	●	●											●						313
Bellows		●		●		●	●	●											●						314
Adapter		●	●	●		●	●	●	●										●						315
Rotary feedthrough		●		●																					320
Linear feedthrough		●		●																					322
Liquid feedthrough				●																					326
Sight glass		●		●		●	●	●																	334
Electric feedthrough		●		●																					342
Coaxial feedthrough		●																							347

General information

Sealing material

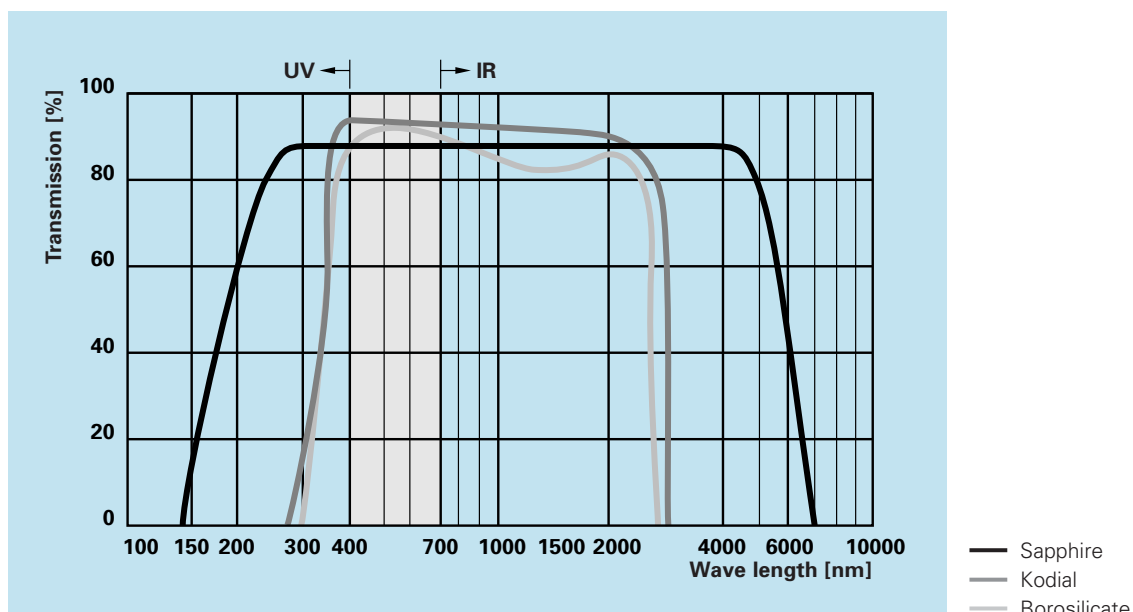
		Temperature range	Reusable
Elastomers			
	CR (Neoprene)	-40 to 100 °C	yes
	FPM (Viton®)	-15 to 150 °C	yes
Metals			
	Aluminium	-196 to 200 °C	no
	Copper	-196 to 200 °C	no
	Copper, silver plated	-270 to 450 °C	no

Pressure ranges of the flange connections

		Pressure range mbar	Pressure range bar	Leak tightness mbar l/s	Centering	Connection element
ISO-KF	Aluminium	10 ⁻⁷	2.5	10 ⁻⁸	inside	Clamping/quick clamping ring
		10 ⁻⁷	5	10 ⁻⁸	outside	Clamping/quick clamping ring
		10 ⁻⁷	10	10 ⁻⁸	outside	Tensioning chain
	Stainless Steel	10 ⁻⁸	2.5	10 ⁻⁹	inside	Clamping/quick clamping ring
		10 ⁻⁸	5	10 ⁻⁹	outside	Clamping/quick clamping ring
		10 ⁻⁸	10	10 ⁻⁹	outside	Tensioning chain
ISO-K	Stainless Steel	10 ⁻⁸	2.5	10 ⁻⁹	inside	Clamps/claws
CF	Stainless Steel	10 ⁻¹²	1	10 ⁻⁹		Screws



Transmission Curve for the sight glasses

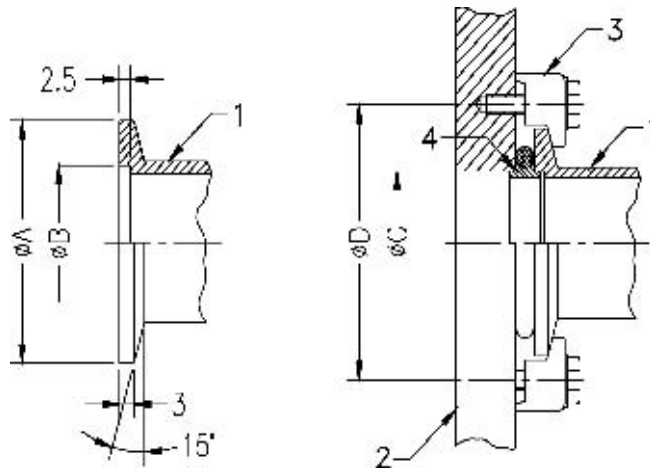




ISO-KF small flange components



Small flange components comply with
DIN 28403 or Pneurop 6606



1 small flanged port
2 threaded wall of housing

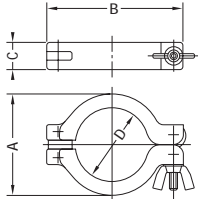
3 claws
4 centering ring

Nominal diameter	A	B	C	D	Number of claws
DN 10 ISO-KF	30	12.2	12.2	45	4
DN 16 ISO-KF	30	17.2	17.2	45	4
DN 25 ISO-KF	40	26.2	26.2	55	4
DN 40 ISO-KF	50	41.2	41.2	71	4
DN 50 ISO-KF	75	52.4	52.4	91	4

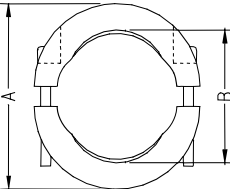
ISO-KF small flange components

Connecting elements

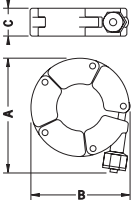
Clamping ring for elastomer seal

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Aluminium / Steel, Zinc plated	DN 10-16 ISO-KF	43	62	16	22	PF 100 316-T
	Aluminium / Steel, Zinc plated	DN 20 - 25 ISO-KF	55	72	16	32	PF 100 325-T
	Aluminium / Steel, Zinc plated	DN 32 - 40 ISO-KF	70	90	17	47	PF 100 340-T
	Aluminium / Steel, Zinc plated	DN 50 ISO-KF	93	123	24	62	PF 100 350-T

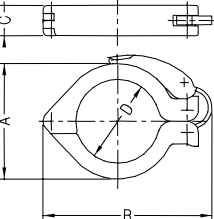
Clamping ring for metal seal

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 10 - 16 ISO-KF	55	22			PF 105 016-T
	Stainless Steel	DN 20 - 25 ISO-KF	67	32			PF 105 025-T
	Stainless Steel	DN 32 - 40 ISO-KF	83	47			PF 105 040-T
	Stainless Steel	DN 50 ISO-KF	114	62			PF 105 050-T

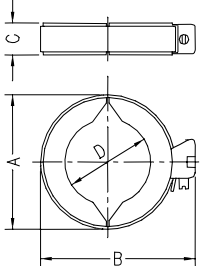
Bulkhead clamp for elastomer and metal seals

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Aluminium / Stainless Steel	DN 16-10 ISO-KF	71	52.5	18		PF 106 016-T
	Aluminium / Stainless Steel	DN 20-25 ISO-KF	82	65	18		PF 106 025-T
	Aluminium / Stainless Steel	DN 32-40 ISO-KF	98	79	18		PF 106 040-T
	Aluminium / Stainless Steel	DN 50 ISO-KF	117	97.5	20		PF 106 050-T

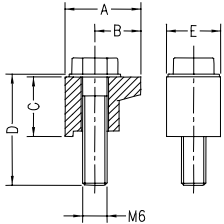
Rapid fastening clamp for elastomer seal

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Aluminium / Plastic	DN 10 - 16 ISO-KF	45	66	16	24	PF 101 016-T
	Aluminium / Plastic	DN 20 - 25 ISO-KF	55	78	16	33	PF 101 025-T
	Aluminium / Plastic	DN 32 - 40 ISO-KF	70	98	18	48.5	PF 101 040-T

Hose clip clamping ring for elastomer seals

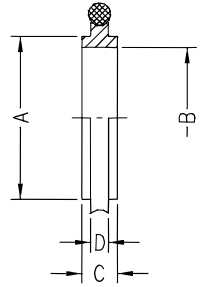
Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Aluminium / Steel	DN 10 - 16 ISO-KF	42	52.5	16	22	PF 103 016-T
	Aluminium / Steel	DN 20 - 25 ISO-KF	51	62.5	16	31	PF 103 025-T
	Aluminium / Steel	DN 32 - 40 ISO-KF	67	78	16	47	PF 103 040-T

Claw grip, 4 claw grips with screws and -washers

Dimensions	Material	Nominal diameter	A	B	C	D	E	Order. No.
	Aluminium / Stainless Steel	DN 10 - 50 ISO-KF	20	11.5	12.5	20	14	PF 104 000-T

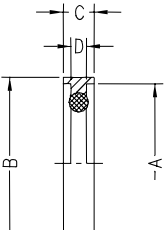
Seals

Centering ring

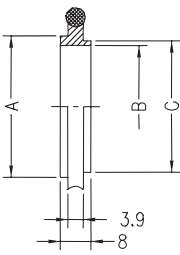
Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Neoprene / Aluminium	DN 10 ISO-KF	12	10	8	3.9	PF 110 010-T
	Neoprene / Aluminium	DN 16 ISO-KF	17	16	8	3.9	PF 110 016-T
	Neoprene / Aluminium	DN 25 ISO-KF	26	25	8	3.9	PF 110 025-T
	Neoprene / Aluminium	DN 40 ISO-KF	41	40	8	3.9	PF 110 040-T
	Neoprene / Aluminium	DN 50 ISO-KF	52	50	8	3.9	PF 110 050-T
	Viton® / Aluminium	DN 10 ISO-KF	12	10	8	3.9	PF 110 110-T
	Viton® / Aluminium	DN 16 ISO-KF	17	16	8	3.9	PF 110 116-T
	Viton® / Aluminium	DN 25 ISO-KF	26	25	8	3.9	PF 110 125-T
	Viton® / Aluminium	DN 40 ISO-KF	41	40	8	3.9	PF 110 140-T
	Viton® / Aluminium	DN 50 ISO-KF	52	50	8	3.9	PF 110 150-T
	Viton® / Stainless Steel	DN 10 ISO-KF	12	10	8	3.9	PF 110 210-T
	Viton® / Stainless Steel	DN 16 ISO-KF	17	16	8	3.9	PF 110 216-T
	Viton® / Stainless Steel	DN 25 ISO-KF	26	25	8	3.9	PF 110 225-T
	Viton® / Stainless Steel	DN 40 ISO-KF	41	40	8	3.9	PF 110 240-T
	Viton® / Stainless Steel	DN 50 ISO-KF	52	50	8	3.9	PF 110 250-T

ISO-KF small flange components

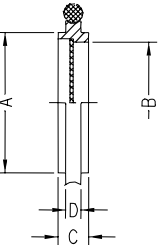
External centering ring

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Viton® / Aluminium	DN 10 - 16 ISO-KF	30	32.5	7	3.9	PF 111 116-T
	Viton® / Aluminium	DN 20 - 25 ISO-KF	40	42.5	7	3.9	PF 111 125-T
	Viton® / Aluminium	DN 32 - 40 ISO-KF	55.5	57	7	3.9	PF 111 140-T
	Viton® / Aluminium	DN 50 ISO-KF	75	77.5	7	3.9	PF 111 150-T

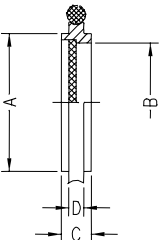
Reducing centering ring

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Neoprene / Aluminium	DN 16 - 10 ISO-KF	17	10	12		PF 112 016-T
	Neoprene / Aluminium	DN 25 - 20 ISO-KF	26	21	22		PF 112 025-T
	Neoprene / Aluminium	DN 40 - 32 ISO-KF	41	32	34		PF 112 040-T
	Viton® / Aluminium	DN 16 - 10 ISO-KF	17	10	12		PF 112 116-T
	Viton® / Aluminium	DN 25 - 20 ISO-KF	26	21	22		PF 112 125-T
	Viton® / Aluminium	DN 40 - 32 ISO-KF	41	32	34		PF 112 140-T
	Viton® / Stainless Steel	DN 16 - 10 ISO-KF	17	10	12		PF 112 216-T
	Viton® / Stainless Steel	DN 25 - 20 ISO-KF	26	21	22		PF 112 225-T
	Viton® / Stainless Steel	DN 40 - 32 ISO-KF	41	32	34		PF 112 240-T

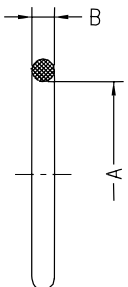
Centering ring with mesh screen, 72 mesh

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Viton®, Stainless Steel	DN 10 ISO-KF	12	8	8	3.9	PF 113 210-T
	Viton®, Stainless Steel	DN 16 ISO-KF	17	9.5	8	3.9	PF 113 216-T
	Viton®, Stainless Steel	DN 25 ISO-KF	26	19.5	8	3.9	PF 113 225-T
	Viton®, Stainless Steel	DN 40 ISO-KF	41	32	8	3.9	PF 113 240-T
	Viton®, Stainless Steel	DN 50 ISO-KF	52	43	8	3.9	PF 113 250-T

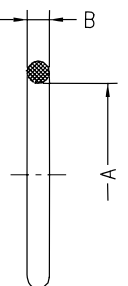
Centering ring with poral filter, pore dimension 0.02 mm

Dimensions	Material	Nominal diameter	A	B	C	D	Through-put	Order. No.
	Viton®, Stainless Steel	DN 10 ISO-KF	12	9	8	3.9	0.5 m³/h	PF 117 210-T
	Viton®, Stainless Steel	DN 16 ISO-KF	17	13	8	3.9	1.2 m³/h	PF 117 216-T
	Viton®, Stainless Steel	DN 25 ISO-KF	26	22	8	3.9	4.2 m³/h	PF 117 225-T
	Viton®, Stainless Steel	DN 40 ISO-KF	41	35.5	8	3.9	11.3 m³/h	PF 117 240-T
	Viton®, Stainless Steel	DN 50 ISO-KF	52	45.7	8	3.9	18.1 m³/h	PF 117 250-T
Throughput (Air with 20 °C, differential pressure 200 mbar)								

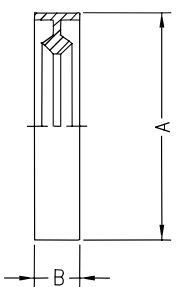
O-Ring Neoprene

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Neoprene	DN 10 ISO-KF	15	5			P 4070 262 PN
	Neoprene	DN 16 ISO-KF	18	5			P 4070 321 PN
	Neoprene	DN 25 ISO-KF	28	5			P 4070 488 PN
	Neoprene	DN 40 ISO-KF	42	5			P 4070 676 PN
	Neoprene	DN 50 ISO-KF	55	5			P 4070 837 PN

O-Ring Viton

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Viton®	DN 10 ISO-KF	15	5			P 4070 262 PV
	Viton®	DN 16 ISO-KF	18	5			P 4070 321 PV
	Viton®	DN 25 ISO-KF	28	5			P 4070 488 PV
	Viton®	DN 40 ISO-KF	42	5			P 4070 676 PV
	Viton®	DN 50 ISO-KF	55	5			P 4070 837 PV

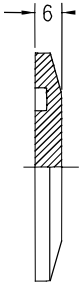
Aluminium seal

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Aluminium	DN 10 - 16 ISO-KF	32	7			PF 115 016
	Aluminium	DN 20 - 25 ISO-KF	42	7			PF 115 025
	Aluminium	DN 32 - 40 ISO-KF	57	7			PF 115 040
	Aluminium	DN 50 ISO-KF	77	7			PF 115 050

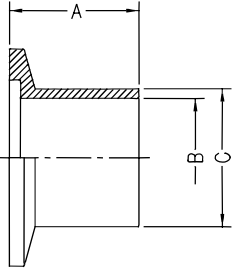
ISO-KF small flange components

Flanges

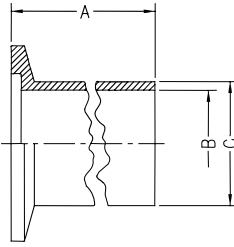
Blanking flange

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Aluminium	DN 10 ISO-KF					PF 120 010
	Aluminium	DN 16 ISO-KF					PF 120 016
	Aluminium	DN 25 ISO-KF					PF 120 025
	Aluminium	DN 40 ISO-KF					PF 120 040
	Aluminium	DN 50 ISO-KF					PF 120 050
	Stainless Steel	DN 10 ISO-KF					PF 120 210
	Stainless Steel	DN 16 ISO-KF					PF 120 216
	Stainless Steel	DN 25 ISO-KF					PF 120 225
	Stainless Steel	DN 40 ISO-KF					PF 120 240
	Stainless Steel	DN 50 ISO-KF					PF 120 250

Flange with short pipe socket

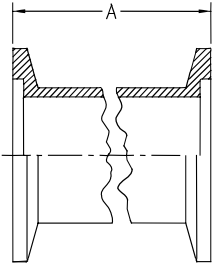
Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Steel	DN 10 ISO-KF	30	10	14		PF 121 110
	Steel	DN 16 ISO-KF	30	16	20		PF 121 116
	Steel	DN 25 ISO-KF	30	24	28		PF 121 125
	Steel	DN 40 ISO-KF	30	41.2	44.5		PF 121 140
	Steel	DN 50 ISO-KF	30	51	57		PF 121 150
	Stainless Steel 316 L	DN 10 ISO-KF	30	10	14		PF 121 210
	Stainless Steel 316 L	DN 16 ISO-KF	30	16	20		PF 121 216
	Stainless Steel 316 L	DN 25 ISO-KF	30	24	28		PF 121 225
	Stainless Steel 316 L	DN 40 ISO-KF	30	41.2	44.5		PF 121 240
	Stainless Steel 316 L	DN 50 ISO-KF	30	51	57		PF 121 250

Flange with long pipe socket

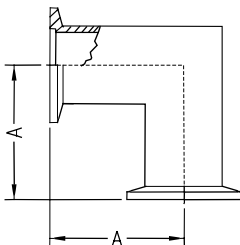
Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Steel	DN 10 ISO-KF	70	10	14		PF 122 110-X
	Steel	DN 16 ISO-KF	70	16	20		PF 122 116-X
	Steel	DN 25 ISO-KF	70	24	28		PF 122 125-X
	Steel	DN 40 ISO-KF	70	40.5	44.5		PF 122 140-X
	Steel	DN 50 ISO-KF	70	51	57		PF 122 150-X
	Stainless Steel 316 L	DN 10 ISO-KF	70	10	14		PF 122 210-X
	Stainless Steel 316 L	DN 16 ISO-KF	70	16	20		PF 122 216-X
	Stainless Steel 316 L	DN 25 ISO-KF	70	24	28		PF 122 225-X
	Stainless Steel 316 L	DN 40 ISO-KF	70	40.5	44.5		PF 122 240-X
	Stainless Steel 316 L	DN 50 ISO-KF	70	51	57		PF 122 250-X

Pipe components

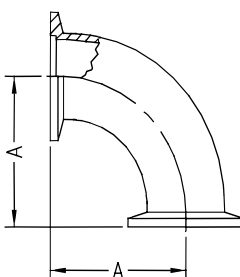
Intermediate piece

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Aluminium	DN 10 ISO-KF	60				PF 123 010
	Aluminium	DN 16 ISO-KF	80				PF 123 016
	Aluminium	DN 25 ISO-KF	100				PF 123 025
	Aluminium	DN 40 ISO-KF	130				PF 123 040
	Aluminium	DN 50 ISO-KF	140				PF 123 050
	Stainless Steel	DN 16 ISO-KF	80				PF 123 216-X
	Stainless Steel	DN 25 ISO-KF	100				PF 123 225-X
	Stainless Steel	DN 40 ISO-KF	130				PF 123 240-X
	Stainless Steel	DN 50 ISO-KF	140				PF 123 250-X

Elbow 90°, Aluminium

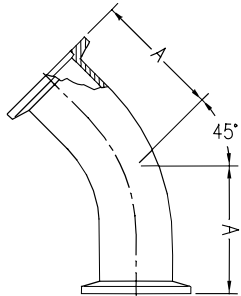
Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Aluminium	DN 10 ISO-KF	30				PF 124 010
	Aluminium	DN 16 ISO-KF	40				PF 124 016
	Aluminium	DN 25 ISO-KF	50				PF 124 025
	Aluminium	DN 40 ISO-KF	65				PF 124 040

Elbow 90°, Stainless Steel

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 10 ISO-KF	30				PF 124 210-X
	Stainless Steel	DN 16 ISO-KF	40				PF 124 216-X
	Stainless Steel	DN 25 ISO-KF	50				PF 124 225-X
	Stainless Steel	DN 40 ISO-KF	65				PF 124 240-X
	Stainless Steel	DN 50 ISO-KF	70				PF 124 250-X

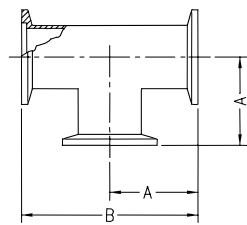
ISO-KF small flange components

Elbow 45°



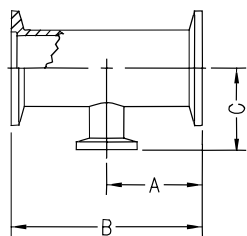
Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 10 ISO-KF	30				PF 125 210-X
	Stainless Steel	DN 16 ISO-KF	26				PF 125 216-X
	Stainless Steel	DN 25 ISO-KF	32				PF 125 225-X
	Stainless Steel	DN 40 ISO-KF	40				PF 125 240-X

T-piece



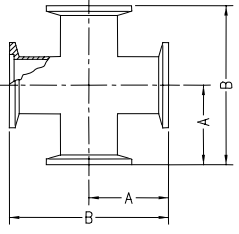
Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Aluminium	DN 10 ISO-KF	30	60			PF 126 010
	Aluminium	DN 16 ISO-KF	40	80			PF 126 016
	Aluminium	DN 25 ISO-KF	50	100			PF 126 025
	Aluminium	DN 40 ISO-KF	65	130			PF 126 040
	Stainless Steel	DN 10 ISO-KF	30	60			PF 126 210-X
	Stainless Steel	DN 16 ISO-KF	40	80			PF 126 216-X
	Stainless Steel	DN 25 ISO-KF	50	100			PF 126 225-X
	Stainless Steel	DN 40 ISO-KF	65	130			PF 126 240-X
	Stainless Steel	DN 50 ISO-KF	70	140			PF 126 250-X

Reducing T-piece

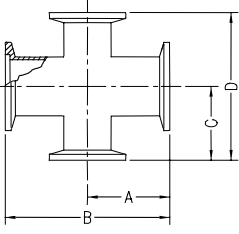


Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 25 ISO-KF	50	100	40		PF 127 232-X
	Stainless Steel	DN 40 ISO-KF	65	130	40		PF 127 242-X
	Stainless Steel	DN 40 ISO-KF	65	130	50		PF 127 243-X
	Stainless Steel	DN 50 ISO-KF	70	140	50		PF 127 252-X
	Stainless Steel	DN 50 ISO-KF	70	140	65		PF 127 253-X
	Stainless Steel	DN 50 ISO-KF	70	140	65		PF 127 254-X

Cross piece

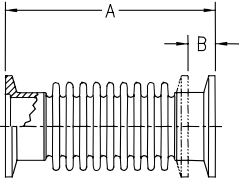
Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Aluminium	DN 10 ISO-KF	30	60			PF 128 010
	Aluminium	DN 16 ISO-KF	40	80			PF 128 016
	Aluminium	DN 25 ISO-KF	50	100			PF 128 025
	Aluminium	DN 40 ISO-KF	65	130			PF 128 040
	Stainless Steel	DN 10 ISO-KF	30	60			PF 128 210-X
	Stainless Steel	DN 16 ISO-KF	40	80			PF 128 216-X
	Stainless Steel	DN 25 ISO-KF	50	100			PF 128 225-X
	Stainless Steel	DN 40 ISO-KF	65	130			PF 128 240-X
	Stainless Steel	DN 50 ISO-KF	70	140			PF 128 250-X

Reducing cross piece

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 25 - 16 ISO-KF	50	100	40	80	PF 129 232-X
	Stainless Steel	DN 40 - 16 ISO-KF	65	130	40	80	PF 129 242-X
	Stainless Steel	DN 40 - 25 ISO-KF	65	130	50	100	PF 129 243-X
	Stainless Steel	DN 50 - 16 ISO-KF	70	140	40	80	PF 129 252-X
	Stainless Steel	DN 50 - 25 ISO-KF	70	140	50	100	PF 129 253-X
	Stainless Steel	DN 50 - 40 ISO-KF	70	140	65	130	PF 129 254-X

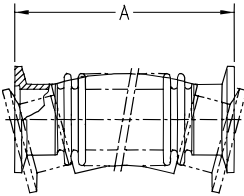
Bellows

Bellows, Stainless Steel

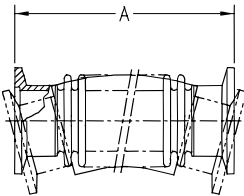
Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 16 ISO-KF	123	21			PF 130 216-X
	Stainless Steel	DN 25 ISO-KF	123	21			PF 130 225-X
	Stainless Steel	DN 40 ISO-KF	123	21			PF 130 240-X
	Stainless Steel	DN 50 ISO-KF	123	21			PF 130 250-X

ISO-KF small flange components

Flexible metal hose, standard

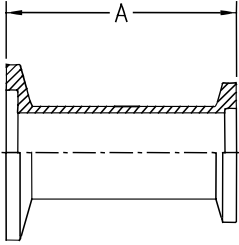
Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 16 ISO-KF	250				PF 131 225-X
	Stainless Steel	DN 16 ISO-KF	500				PF 131 250-X
	Stainless Steel	DN 16 ISO-KF	750				PF 131 275-X
	Stainless Steel	DN 16 ISO-KF	1000				PF 131 210-X
	Stainless Steel	DN 25 ISO-KF	250				PF 131 325-X
	Stainless Steel	DN 25 ISO-KF	500				PF 131 350-X
	Stainless Steel	DN 25 ISO-KF	750				PF 131 375-X
	Stainless Steel	DN 25 ISO-KF	1000				PF 131 310-X
	Stainless Steel	DN 40 ISO-KF	250				PF 131 425-X
	Stainless Steel	DN 40 ISO-KF	500				PF 131 450-X
	Stainless Steel	DN 40 ISO-KF	750				PF 131 475-X
	Stainless Steel	DN 40 ISO-KF	1000				PF 131 410-X
	Stainless Steel	DN 50 ISO-KF	250				PF 131 525-X
	Stainless Steel	DN 50 ISO-KF	500				PF 131 550-X
	Stainless Steel	DN 50 ISO-KF	750				PF 131 575-X
	Stainless Steel	DN 50 ISO-KF	1000				PF 131 510-X

High flexible metal hose

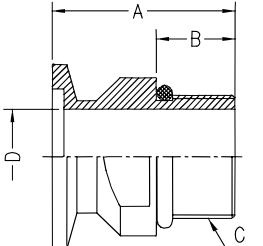
Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 16 ISO-KF	250				PF 139 225-X
	Stainless Steel	DN 16 ISO-KF	500				PF 139 250-X
	Stainless Steel	DN 16 ISO-KF	750				PF 139 275-X
	Stainless Steel	DN 16 ISO-KF	1000				PF 139 210-X
	Stainless Steel	DN 25 ISO-KF	250				PF 139 325-X
	Stainless Steel	DN 25 ISO-KF	500				PF 139 350-X
	Stainless Steel	DN 25 ISO-KF	750				PF 139 375-X
	Stainless Steel	DN 25 ISO-KF	1000				PF 139 310-X
	Stainless Steel	DN 40 ISO-KF	250				PF 139 425-X
	Stainless Steel	DN 40 ISO-KF	500				PF 139 450-X
	Stainless Steel	DN 40 ISO-KF	750				PF 139 475-X
	Stainless Steel	DN 40 ISO-KF	1000				PF 139 410-X

Adaptors

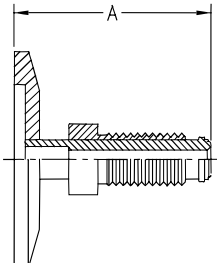
Reducing intermediate piece

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Aluminium	DN 25-10 ISO-KF	40				PF 140 031
	Aluminium	DN 25-16 ISO-KF	40				PF 140 032
	Aluminium	DN 40-10 ISO-KF	40				PF 140 041
	Aluminium	DN 40-16 ISO-KF	40				PF 140 042
	Aluminium	DN 40-25 ISO-KF	40				PF 140 043
	Aluminium	DN 50-40 ISO-KF	40				PF 140 054
	Stainless Steel	DN 25-16 ISO-KF	40				PF 140 232-X
	Stainless Steel	DN 40-16 ISO-KF	40				PF 140 242-X
	Stainless Steel	DN 40-25 ISO-KF	40				PF 140 243-X
	Stainless Steel	DN 50-16 ISO-KF	40				PF 140 252-X
	Stainless Steel	DN 50-25 ISO-KF	40				PF 140 253-X
	Stainless Steel	DN 50-40 ISO-KF	40				PF 140 254-X

Screw-in flange

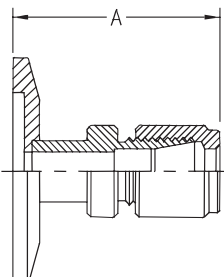
Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel, Viton®	DN 10 ISO-KF-G 3/8"	35	15	G 3/8"	10	PF 141 214-T
	Stainless Steel, Viton®	DN 16 ISO-KF-G 1/2"	35	16	G 1/2"	15	PF 141 225-T
	Stainless Steel, Viton®	DN 25 ISO-KF-G 1"	45	24	G 1"	24	PF 141 237-T
	Stainless Steel, Viton®	DN 40 ISO-KF-G 1 1/2"	50	28	G 1 1/2"	40	PF 141 248-T

Adaptor piece ISO-KF / VCR®, male

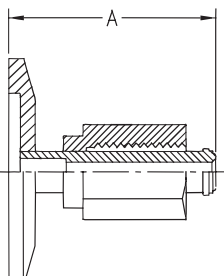
Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 16 ISO-KF / VCR 1/4"	36				PF 141 422-X
	Stainless Steel	DN 25 ISO-KF / VCR 1/2"	41				PF 141 433-X
	Stainless Steel	DN 40 ISO-KF / VCR 3/4"	54				PF 141 444-X

ISO-KF small flange components

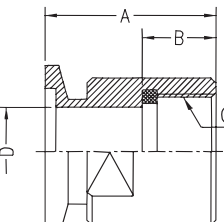
Adaptor piece ISO-KF / Swagelok®

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 16 ISO-KF / 6 mm	37				PF 141 522-X
	Stainless Steel	DN 25 ISO-KF / 10 mm	45				PF 141 534-X
	Stainless Steel	DN 40 ISO-KF / 16 mm	53				PF 141 546-X

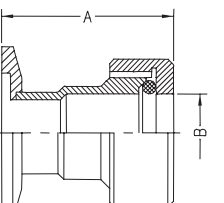
Adaptor piece ISO-KF / VCR®, female

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 16 ISO-KF / VCR 1/4"	36				PF 142 422-X
	Stainless Steel	DN 25 ISO-KF / VCR 1/2"	41				PF 142 433-X
	Stainless Steel	DN 40 ISO-KF / VCR 3/4"	54				PF 142 444-X

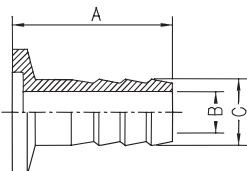
Screw on flange

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel, Viton®	DN 10 ISO-KF-G 3/8"	35	15.5	G 3/8"	10	PF 142 214-T
	Stainless Steel, Viton®	DN 16 ISO-KF-G 1/2"	35	16	G 1/2"	15	PF 142 225-T
	Stainless Steel, Viton®	DN 25 ISO-KF-G 1"	45	22	G 1"	24	PF 142 237-T
	Stainless Steel, Viton®	DN 40 ISO-KF-G 1 1/2"	50	26	G 1 1/2"	40	PF 142 248-T

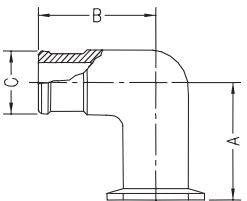
Compression fit tubing adaptor

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel, Viton®	DN 10 ISO-KF-10	50	10			PF 143 210-T
	Stainless Steel, Viton®	DN 40 ISO-KF-20	64	20			PF 143 244-T
	Stainless Steel, Viton®	DN 40 ISO-KF-26	71	26			PF 143 246-T

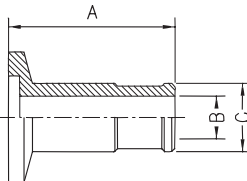
Hose nipple

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Aluminium	DN 16 ISO-KF-12	40	8	12		PF 144 021
	Aluminium	DN 25 ISO-KF-12	40	8	12		PF 144 031
	Aluminium	DN 40 ISO-KF-12	40	8	12		PF 144 041

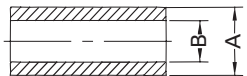
90° elbow S, for PVC hose and sleeve

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Aluminium	DN 16 ISO-KF-20	40	50	20		PF 145 024
	Aluminium	DN 25 ISO-KF-28	50	60	27		PF 145 037
	Aluminium	DN 40 ISO-KF-45	65	65	43		PF 145 049

Hose nipple for PVC hose and sleeve

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Aluminium	DN 10 ISO-KF-14	40	9	14		PF 146 012
	Aluminium	DN 16 ISO-KF-20	40	15	20		PF 146 024
	Aluminium	DN 25 ISO-KF-20	40	16	20		PF 146 034
	Aluminium	DN 25 ISO-KF-28	40	22	26		PF 146 037
	Aluminium	DN 40 ISO-KF-28	40	22	26		PF 146 047
	Aluminium	DN 40 ISO-KF-45	40	38	45		PF 146 049

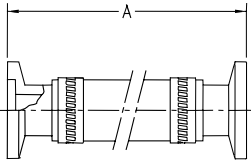
PVC hose with embedded polyester spiral

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	PVC, Polyester spiral	12	21	10			P 2358 262 SS
	PVC, Polyester spiral	14	19	13			P 2359 314 NV
	PVC, Polyester spiral	20	26	19			P 2359 455 NV
	PVC, Polyester spiral	28	34	25			P 2359 647 NV
	PVC, Steel spiral	45	60	45			P 2359 837 BR

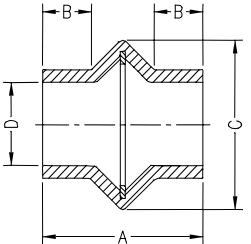
Components

ISO-KF small flange components

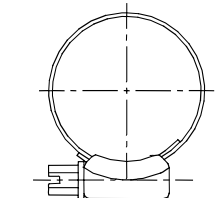
PVC hose complete with KF-Flanges

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	PVC / Aluminium	DN 16 ISO-KF	1000				PF 151 210-T
	PVC / Aluminium	DN 16 ISO-KF	500				PF 151 250-T
	PVC / Aluminium	DN 25 ISO-KF	1000				PF 151 310-T
	PVC / Aluminium	DN 25 ISO-KF	500				PF 151 350-T
	PVC / Aluminium	DN 40 ISO-KF	1000				PF 151 410-T
	PVC / Aluminium	DN 40 ISO-KF	500				PF 151 450-T

Sleeve, Neoprene

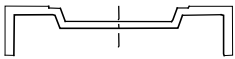
Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Neoprene	20	44	12	44	17	PF 147 004
	Neoprene	28	50	15	50	25	PF 147 007
	Neoprene	45	56	18	68	44	PF 147 009

Hose clip, zinc plated Steel

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Zinc plated Steel	20					P 4163 107 B
	Zinc plated Steel	28					P 4163 109 B
	Zinc plated Steel	45					P 4163 114 B

Miscellaneous

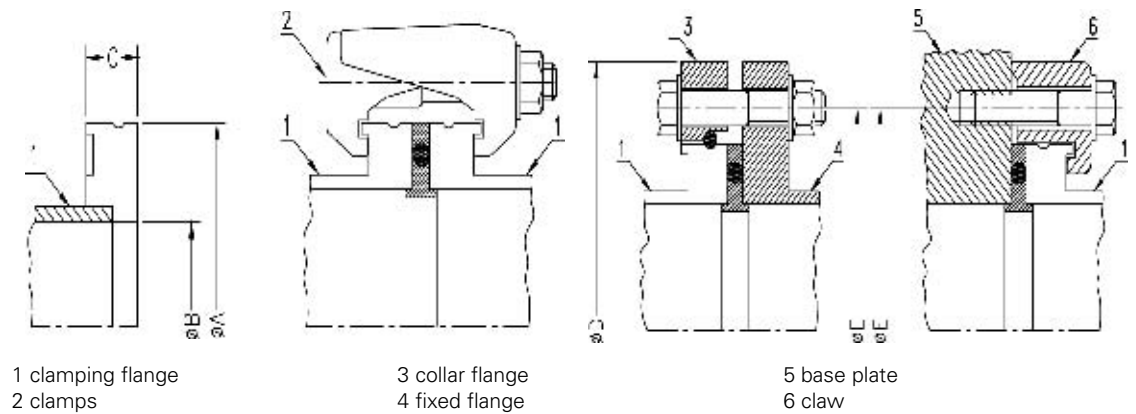
Protective cover, Plastic

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Plastic	DN 10 - 16 ISO-KF					PF 149 316
	Plastic	DN 20 - 25 ISO-KF					PF 149 325
	Plastic	DN 32 - 40 ISO-KF					PF 149 340
	Plastic	DN 50 ISO-KF					PF 149 350

ISO-K Clamping flange components



Clamping flange components comply with DIN 28404 or Pneurop 6606



Nominal diameter	A	B	C	Number clamps ²⁾	D	E	No. holes	Screws	E	Screws	No. claws
	95	70	12	4	130	110	4	M8 x 40	110	M8 x 35	4
	130	102	12	4	165	145	8	M8 x 40	145	M8 x 35	8
	180	153	12	4	225	200	8	M10 x 50	200	M10 x 35	8
	240	213	12	6	285	260	12	M10 x 50	260	M10 x 35	12
	290	261	12	6	335	310	12	M10 x 50	310	M10 x 35	12
DN 320	370	318	12	8	425	395	12	M12 x 60	395	M12 x 50	12
DN 400	450	400	12	8	510	480	16	M12 x 60	480	M12 x 50	16
DN 500 ¹⁾	550	501	12	12	610	580	16	M12 x 60	580	M12 x 50	16
DN 630 ¹⁾	690	651	12	12	750	720	20	M12 x 70	720	M12 x 55	20
DN 800		800	24	fixed flange	920	890	24	M12 x 70	890		
DN 1000		1000	24	fixed flange	1120	1090	32	M12 x 70	1090		

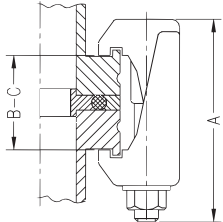
¹⁾ Without a groove for the retainer ring

²⁾ More clamps needed for turbopumps

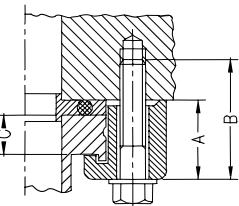
ISO-K Clamping flange components

Connecting elements

Claw clamp

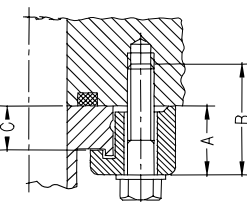
Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Steel, coated	DN 63 - 250 ISO	60	27	17		PF 300 110-T
	Steel, Zinc plated	DN 320 - 500 ISO	75	39	27.5		PF 300 101-T
	Steel, Zinc plated	DN 630 ISO	85	46	30		PF 300 102-T
	Stainless Steel	DN 63 - 250 ISO	60	27	17		PF 300 200-T

Claw grip for connection clamping flange/base plate

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Steel, Zinc plated	DN 63 - 100 ISO	22.5	35	10		PF 301 100-T
	Steel, Zinc plated	DN 160 - 250 ISO	23	35	10		PF 301 101-T
	Steel, Zinc plated	DN 320 - 500 ISO	36.5	50	15		PF 301 102-T
	Steel, Zinc plated	DN 630 ISO	41.5	55	20		PF 301 103-T

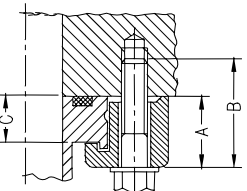
Not recommended for mounting on turbopumps

Claw grip for connection clamping flange/base plate with sealing groove

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Steel, Zinc plated	DN 63 - 100 ISO	18.6	30	10		PF 301 110-T
	Steel, Zinc plated	DN 160 - 250 ISO	19.1	35	10		PF 301 111-T
	Steel, Zinc plated	DN 320 - 500 ISO	30.9	45	15		PF 301 112-T
	Steel, Zinc plated	DN 630 ISO	36.5	50	20		PF 301 113-T

Not recommended for mounting on turbopumps

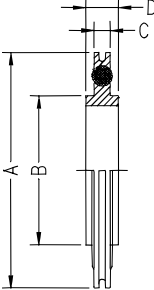
Claw grip for connection clamping flange Diff. pump/base plate with sealing groove

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Steel, Zinc plated	DN 63 - 100 ISO	20.6	30	12		PF 301 120-T
	Steel, Zinc plated	DN 160 - 250 ISO	21.1	35	12		PF 301 121-T
	Steel, Zinc plated	DN 320 - 500 ISO	33.9	45	18		PF 301 122-T
	Steel, Zinc plated	DN 630 ISO	36.5	50	20		PF 301 113-T

Not recommended for mounting on turbopumps

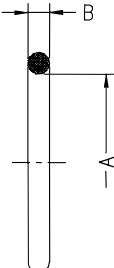
Seals

Centering ring¹⁾

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Neoprene, Aluminium	DN 63 ISO	95	70	3.9	8	PF 303 006-T
	Neoprene, Aluminium	DN 100 ISO	127	102	3.9	8	PF 303 010-T
	Neoprene, Aluminium	DN 160 ISO	178	153	3.9	8	PF 303 016-T
	Neoprene, Aluminium	DN 200 ISO	238	213	3.9	8	PF 303 020-T
	Neoprene, Aluminium	DN 250 ISO	286	261	3.9	8	PF 303 025-T
	Neoprene, Aluminium	DN 320 ISO	356	318	5.6	14	PF 303 032-T
	Neoprene, Aluminium	DN 400 ISO	438	400	5.6	14	PF 303 040-T
	Neoprene, Aluminium	DN 500 ISO	539	501	5.6	14	PF 303 050-T
	Neoprene, Aluminium	DN 630 ISO	689	651	5.6	14	PF 303 063-T
	Viton [®] , Aluminium	DN 63 ISO	95	70	3.9	8	PF 303 106-T
	Viton [®] , Aluminium	DN 100 ISO	127	102	3.9	8	PF 303 110-T
	Viton [®] , Aluminium	DN 160 ISO	178	153	3.9	8	PF 303 116-T
	Viton [®] , Aluminium	DN 200 ISO	238	213	3.9	8	PF 303 120-T
	Viton [®] , Aluminium	DN 250 ISO	286	261	3.9	8	PF 303 125-T
	Viton [®] , Aluminium	DN 320 ISO	356	318	5.6	14	PF 303 132-T
	Viton [®] , Aluminium	DN 400 ISO	438	400	5.6	14	PF 303 140-T
	Viton [®] , Aluminium	DN 500 ISO	539	501	5.6	14	PF 303 150-T
	Viton [®] , Aluminium	DN 630 ISO	689	651	5.6	14	PF 303 163-T
	Viton [®] , Aluminium	DN 800 ISO	840	800	5.6	14	PF 303 180-T
	Viton [®] , Aluminium	DN 1000 ISO	1040	1000	5.6	14	PF 303 199-T
	Viton [®] , Stainless Steel	DN 63 ISO	95	70	3.9	8	PF 303 206-T
	Viton [®] , Stainless Steel	DN 100 ISO	127	102	3.9	8	PF 303 210-T
	Viton [®] , Stainless Steel	DN 160 ISO	178	153	3.9	8	PF 303 216-T
	Viton [®] , Stainless Steel	DN 200 ISO	238	213	3.9	8	PF 303 220-T
	Viton [®] , Stainless Steel	DN 250 ISO	286	261	3.9	8	PF 303 225-T

¹⁾Centering ring for turbopump mounting see accessories for turbopumps

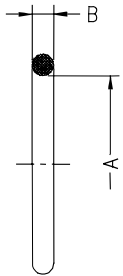
O-Ring

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Neoprene	DN 63 ISO	75.6	5.3			P 4071 054 PN
	Neoprene	DN 100 ISO	107.3	5.3			P 4071 274 PN
	Neoprene	DN 160 ISO	158.1	5.3			P 4071 524 PN
	Neoprene	DN 200 ISO	208.9	5.3			P 4071 659 PN
	Neoprene	DN 250 ISO	253.4	5.3			P 4071 774 PN
	Neoprene	DN 320 ISO	330	7			P 4071 886 PN
	Neoprene	DN 400 ISO	405	7			P 4074 005 PN
	Neoprene	DN 400 ISO	507	7			P 4074 106 PN
	Neoprene	DN 630 ISO	659	7			P 4074 245 PN

ISO-K Clamping flange components

Seals

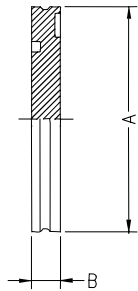
O-Ring



Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Viton®	DN 63 ISO	75.6	5.3			P 4071 054 PV
	Viton®	DN 63 ISO	107.3	5.3			P 4071 274 PV
	Viton®	DN 160 ISO	158.1	5.3			P 4071 524 PV
	Viton®	DN 200 ISO	208.9	5.3			P 4071 659 PV
	Viton®	DN 250 ISO	253.4	5.3			P 4071 774 PV
	Viton®	DN 320 ISO	330	7			P 4071 886 PV
	Viton®	DN 400 ISO	405	7			P 4074 005 PV
	Viton®	DN 500 ISO	507	7			P 4074 106 PV
	Viton®	DN 630 ISO	659	7			P 4074 245 PV
	Viton®	DN 800 ISO	808	7			P 4074 363 PV
	Viton®	DN 1000 ISO	1006	7			P 4074 523 PV

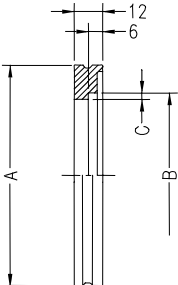
Flanges

Blanking flange

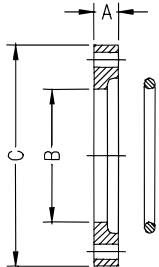


Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Steel, Nickel plated	DN 63 ISO-K	95	12			PF 305 106
	Steel, Nickel plated	DN 100 ISO-K	130	12			PF 305 110
	Steel, Nickel plated	DN 160 ISO-K	180	12			PF 305 116
	Stainless Steel	DN 63 ISO-K	95	12			PF 305 206
	Stainless Steel	DN 100 ISO-K	130	12			PF 305 210
	Stainless Steel	DN 160 ISO-K	180	12			PF 305 216
	Stainless Steel	DN 200 ISO-K	240	12			PF 305 220
	Stainless Steel	DN 250 ISO-K	290	12			PF 305 225
	Stainless Steel	DN 320 ISO-K	370	17			PF 305 232
	Stainless Steel	DN 400 ISO-K	450	17			PF 305 240
	Stainless Steel	DN 500 ISO-K	550	17			PF 305 250
	Stainless Steel	DN 630 ISO-K	690	22			PF 305 263

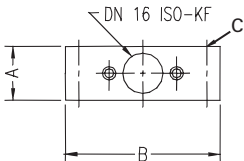
Welding flange

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Steel	DN 63 ISO-K	95	76.5	3		PF 306 106
	Steel	DN 100 ISO-K	130	108.5	4		PF 306 110
	Steel	DN 160 ISO-K	180	159.5	4.5		PF 306 116
	Steel	DN 250 ISO-K	290	267.5	3		PF 306 125
	Stainless Steel 316 L	DN 63 ISO-K	95	76.5	2.9		PF 306 206
	Stainless Steel 316 L	DN 100 ISO-K	130	108.5	2.9		PF 306 210
	Stainless Steel 316 L	DN 160 ISO-K	180	159.5	3		PF 306 216
	Stainless Steel 316 L	DN 200 ISO-K	240	219.5	3		PF 306 220
	Stainless Steel 316 L	DN 250 ISO-K	290	267.5	3		PF 306 225

Collar flange with retaining ring

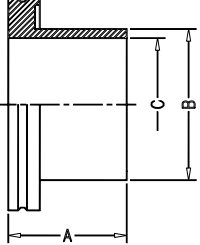
Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Steel, Nickel plated	DN 63 ISO-F	12	95.5	130		PF 307 106-T
	Steel, Nickel plated	DN 100 ISO-F	12	130.5	165		PF 307 110-T
	Steel, Nickel plated	DN 160 ISO-F	16	180.7	225		PF 307 116-T
	Steel, Nickel plated	DN 200 ISO-F	16	240.7	285		PF 307 120-T
	Steel, Nickel plated	DN 250 ISO-F	16	290.7	335		PF 307 125-T
	Steel, Nickel plated	DN 320 ISO-F	20	370.8	425		PF 307 132-T
	Steel, Nickel plated	DN 400 ISO-F	20	451	510		PF 307 140-T

Measurement flange

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Aluminium	DN 63 ISO-F	35	130	4xM8		PF 308 006-T
	Aluminium	DN 100 ISO-F	35	165	8xM8		PF 308 010-T
	Aluminium	DN 160 ISO-F	35	225	8xM10		PF 308 016-T

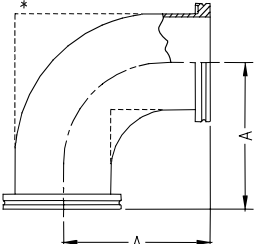
ISO-K Clamping flange components

Flange with pipe socket

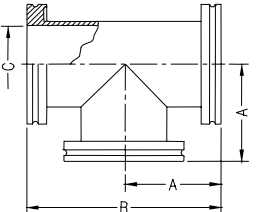
Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Steel	DN 63 ISO-K	100	76	70		PF 310 106-X
	Steel	DN 100 ISO-K	100	108	100		PF 310 110-X
	Steel	DN 160 ISO-K	100	159	150		PF 310 116-X
	Steel	DN 250 ISO-K	100	267	261		PF 310 125-X
	Stainless Steel 316 L	DN 63 ISO-K	100	76.1	70.3		PF 310 206-X
	Stainless Steel 316 L	DN 100 ISO-K	100	108	102.2		PF 310 210-X
	Stainless Steel 316 L	DN 160 ISO-K	100	159	153		PF 310 216-X
	Stainless Steel 316 L	DN 200 ISO-K	100	219	213		PF 310 220-X
	Stainless Steel 316 L	DN 250 ISO-K	100	267	261		PF 310 225-X
	Stainless Steel 316 L	DN 320 ISO-K	100	324	318		PF 310 232-X
	Stainless Steel 316 L	DN 400 ISO-K	100	406	400		PF 310 240-X
	Stainless Steel 316 L	DN 500 ISO-K	100	508	500		PF 310 250-X
	Stainless Steel 316 L	DN 630 ISO-K	100	660	650		PF 310 263-X

Pipe components

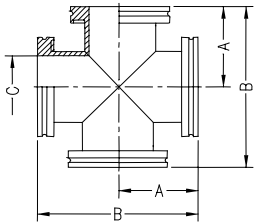
90° elbow

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 63 ISO-K	88				PF 311 206-X
	Stainless Steel	DN 100 ISO-K	108				PF 311 210-X
	Stainless Steel	DN 160 ISO-K	138				PF 311 216-X
	Stainless Steel	DN 200 ISO-K	178				PF 311 220-X
	Stainless Steel	DN 250 ISO-K	208				PF 311 225-X
	*DN 160-250 ISO-K						

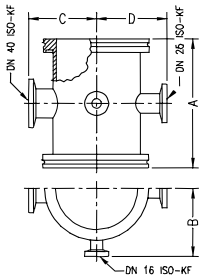
T-piece

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 63 ISO-K	88	176	70		PF 312 206-X
	Stainless Steel	DN 100 ISO-K	108	216	102		PF 312 210-X
	Stainless Steel	DN 160 ISO-K	138	276	153		PF 312 216-X
	Stainless Steel	DN 200 ISO-K	178	356	213		PF 312 220-X
	Stainless Steel	DN 250 ISO-K	208	416	261		PF 312 225-X

Cross-piece

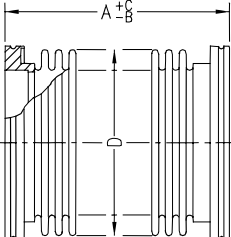
Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 63 ISO-K	88	176	70		PF 314 206-X
	Stainless Steel	DN 100 ISO-K	108	216	102		PF 314 210-X
	Stainless Steel	DN 160 ISO-K	138	276	153		PF 314 216-X
	Stainless Steel	DN 200 ISO-K	178	356	213		PF 314 220-X
	Stainless Steel	DN 250 ISO-K	208	416	261		PF 314 225-X

Measurement cross-piece

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 63 ISO-K	88	66	59	64	PF 317 206-X
	Stainless Steel	DN 100 ISO-K	100	82	77	80	PF 317 210-X
	Stainless Steel	DN 160 ISO-K	100	107	105	107	PF 317 216-X

Bellows

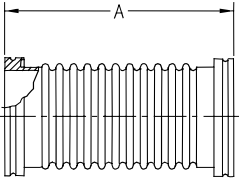
Bellows

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 63 ISO-K	127	25	5	90	PF 318 206-X
	Stainless Steel	DN 100 ISO-K	127	20	5	127	PF 318 210-X
	Stainless Steel	DN 160 ISO-K	220	28	1	190	PF 318 216-X
	Stainless Steel	DN 200 ISO-K	220	29	0	228	PF 318 220-X
	Stainless Steel	DN 250 ISO-K	220	25	25	285	PF 318 225-X

A = Unstressed length

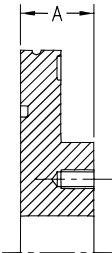
ISO-K Clamping flange components

Flexible metal hose

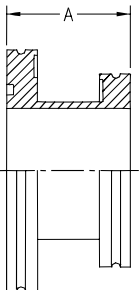
Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 63 ISO-K	250				PF 319 025-X
	Stainless Steel	DN 63 ISO-K	500				PF 319 050-X
	Stainless Steel	DN 63 ISO-K	750				PF 319 075-X
	Stainless Steel	DN 63 ISO-K	1000				PF 319 010-X
	Stainless Steel	DN 100 ISO-K	250				PF 319 125-X
	Stainless Steel	DN 100 ISO-K	500				PF 319 150-X
	Stainless Steel	DN 100 ISO-K	750				PF 319 175-X
	Stainless Steel	DN 100 ISO-K	1000				PF 319 110-X
DN 160 ISO-K on request							

Adaptors

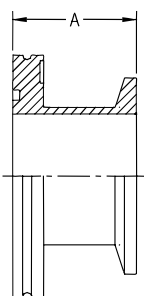
Reducing flange ISO-K/ISO-KF

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 160/63 ISO-K/F	22				PF 320 220
	Stainless Steel	DN 160/100 ISO-K/F	20				PF 320 221
	Stainless Steel	DN 200/100 ISO-K/F	20				PF 320 231
	Stainless Steel	DN 200/160 ISO-K/F	25				PF 320 232
	Stainless Steel	DN 250/160 ISO-K/F	30				PF 320 242

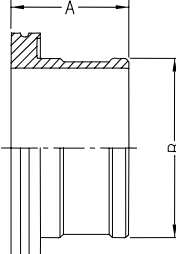
Reducing piece ISO-K/ISO-K

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 100/63 ISO-K	50				PF 321 210-X
	Stainless Steel	DN 160/100 ISO-K	50				PF 321 221-X
	Stainless Steel	DN 200/160 ISO-K	50				PF 321 232-X
	Stainless Steel	DN 250/200 ISO-K	50				PF 321 243-X

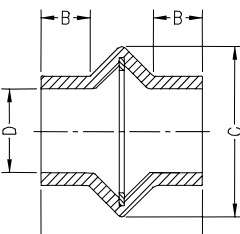
Adaptor piece ISO-K/ISO-KF

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Aluminium	DN 63 ISO-K/40 KF	40				PF 322 004
	Aluminium	DN 63 ISO-K/50 KF	45				PF 322 005
	Stainless Steel	DN 63 ISO-K/40 KF	40				PF 322 204-X
	Stainless Steel	DN 63 ISO-K/50 KF	40				PF 322 205-X
	Stainless Steel	DN 100 ISO-K/40 KF	38.5				PF 322 214-X

Sleeve connection

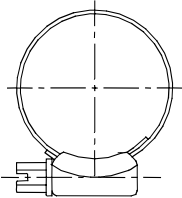
Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Aluminium	DN 63 ISO-K	51	76			PF 323 006
	Aluminium	DN 100 ISO-K	56	108			PF 323 010
	Aluminium	DN 160 ISO-K	56	159			PF 323 016

Sleeve

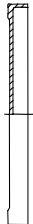
Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Neoprene	76	65	20	115	75	PF 324 006
	Neoprene	108	75	16	160	105	PF 324 010
	Neoprene	159	75	16	218	156	PF 324 016

ISO-K Clamping flange components

Hose clip

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Zinc plated Steel	76					P 4163 117 B
	Zinc plated Steel	108					P 4163 121 B
	Zinc plated Steel	159					P 4163 125 B

Protective cover

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Plastic	DN 63 ISO-K					PF 325 306
	Plastic	DN 100 ISO-K					PF 325 310
	Plastic	DN 160 ISO-K					PF 325 316
	Plastic	DN 200 ISO-K					PF 325 320
	Plastic	DN 250 ISO-K					PF 325 325

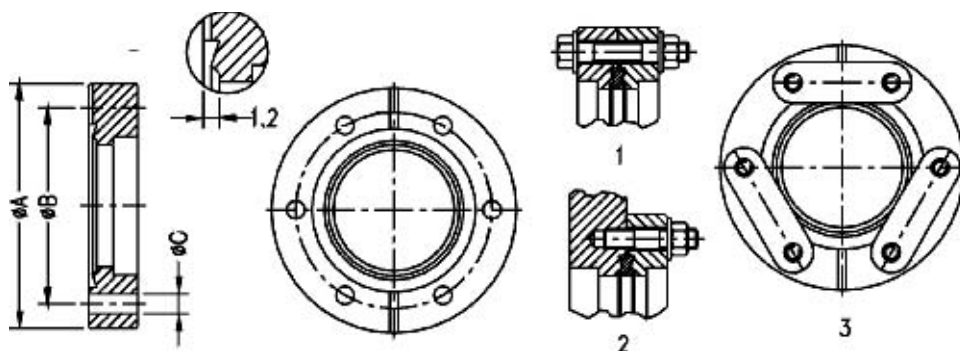


CF UHV Components



CF flange components for UHV applications comply with the standard ISO 3669 (Pneurop 6606).

Standard stainless steel components are made of steel 1.4306 (304L).



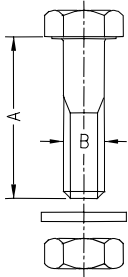
- 1 Connection with screws
- 2 Connection with stud screws
- 3 Connection with Duo nuts

Nominal diameter	A	O.D. B	C		Number bore holes	Number screws	Number stud screws	Number Duo nuts
DN 16 CF	35.	1 1/3"	27	4.3	6	6 x M4	6 x M4	3 x M4
DN 40 CF	69.5	2 3/4"	58.7	6.6	6	6 x M6	6 x M6	3 x M6
DN 63 CF	113.5	4 1/2"	92.2	8.4	8	8 x M8	8 x M8	
DN 100 CF	152	6"	130.3	8.4	16	16 x M8	16 x M8	
DN 160 CF	202.5	8"	181	8.4	20	20 x M8	20 x M8	
DN 200 CF	253	10"	231.8	8.4	24	24 x M8	24 x M8	
DN 250 CF	306	12"	284	8.4	32	32 x M8	32 x M8	

CF UHV Components

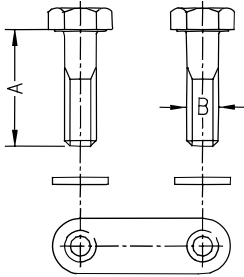
Connecting elements

Set of hexagonal bolts, set of 25 each, bolts, washers, & nuts. B = required number per flange

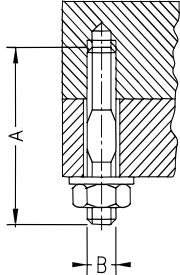
Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 16 CF	20	M4	25		PF 505 000-T
	Stainless Steel	DN 40 CF	35	M6	25		PF 505 001-T
	Stainless Steel	DN 63 CF	50	M8	25		PF 505 002-T
	Stainless Steel	DN 100 - 160 CF	55	M8	25		PF 505 003-T
	Stainless Steel	DN 200 CF	60	M8	25		PF 505 004-T
	Stainless Steel	DN 250 CF	60	M8	35		PF 505 005-T

C = quantity delivered

Set of hexagonal bolts, set of 6 bolts with 3 DUO nuts

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 16 CF	20	M4			PF 506 000-T
	Stainless Steel	DN 40 CF	35	M6			PF 506 001-T

Set of stud screws

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 16 CF	25	M4	8		PF 507 000-T
	Stainless Steel	DN 40 CF	35	M6	8		PF 507 001-T
	Stainless Steel	DN 63 - 100 CF, 47 mm	47	M8	18		PF 507 002-T
	Stainless Steel	DN 63 - 160 CF, 52 mm	52	M8	20		PF 507 003-T
	Stainless Steel	DN 200 - 250 CF	52	M8	34		PF 507 004-T

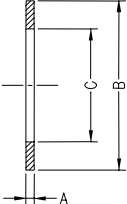
C = quantity delivered

Thread lubricant, C 100, 28 g, for use at high temperature

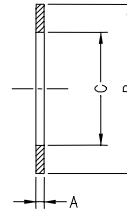
Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	C 100, 28 g						B 2751 050 CA

Seals

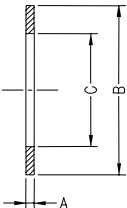
Copper seal, 10 Pieces (DN 250, 5 Pieces)

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	OFHC Copper	DN 16 CF	2	21.3	16		PF 501 401-T
	OFHC Copper	DN 40 CF	2	48.2	37		PF 501 404-T
	OFHC Copper	DN 63 CF	2	82.4	63.4		PF 501 406-T
	OFHC Copper	DN 100 CF	2	120.5	101.5		PF 501 410-T
	OFHC Copper	DN 160 CF	2	171.2	152.6		PF 501 416-T
	OFHC Copper	DN 200 CF	2	222.1	203		PF 501 420-T
	OFHC Copper	DN 250 CF	2	272.8	254		PF 501 425-T

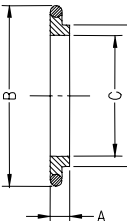
Copper seal silver plated, 10 Pieces (DN 250, 5 Pieces)

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	OFHC Copper, Silver plated	DN 16 CF	2	21.3	16		PF 501 501-T
	OFHC Copper, Silver plated	DN 40 CF	2	48.2	37		PF 501 504-T
	OFHC Copper, Silver plated	DN 63 CF	2	82.4	63.4		PF 501 506-T
	OFHC Copper, Silver plated	DN 100 CF	2	120.5	101.5		PF 501 510-T
	OFHC Copper, Silver plated	DN 160 CF	2	171.2	152.6		PF 501 516-T
	OFHC Copper, Silver plated	DN 200 CF	2	222.1	203		PF 501 520-T
	OFHC Copper, Silver plated	DN 250 CF	2	272.8	254		PF 501 525-T

Viton® seal, 5 Pieces

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Viton®	DN 16 CF	2	21.3	16.1		PF 501 301-T
	Viton®	DN 40 CF	3.2	48.1	41.6		PF 501 304-T

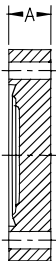
Viton® seal with centering ring, 1 Piece

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Viton®, Aluminium	DN 63 CF	5	74	58	63.3	PF 501 306-T
	Viton®, Aluminium	DN 100 CF	5	113	95	100.3	PF 501 310-T
	Viton®, Aluminium	DN 160 CF	5	163	145	150.5	PF 501 316-T
	Viton®, Aluminium	DN 200 CF	5	213	195	200.3	PF 501 320-T
	Viton®, Aluminium	DN 250 CF	5	266	248.3	256.2	PF 501 325-T

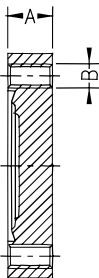
CF UHV Components

Flanges

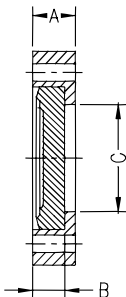
Blanking flange

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 16 CF-F	7.8				PF 510 201
	Stainless Steel	DN 40 CF-F	13				PF 510 204
	Stainless Steel	DN 63 CF-F	17.5				PF 510 206
	Stainless Steel	DN 100 CF-F	20				PF 510 210
	Stainless Steel	DN 160 CF-F	22				PF 510 216
	Stainless Steel	DN 200 CF-F	24.5				PF 510 220
	Stainless Steel	DN 250 CF-F	26				PF 510 225

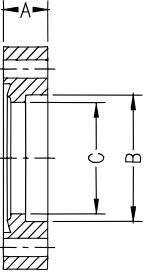
Blanking flange with tapped holes

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 40 CF-F	13	6 x M6			PF 511 204
	Stainless Steel	DN 63 CF-F	17.5	8 x M8			PF 511 206

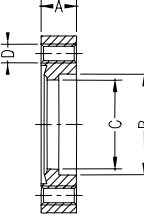
Blanking flange rotatable

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 16 CF-R	7.8	5.8	18.6		PF 512 201-U
	Stainless Steel	DN 40 CF-R	13	7.6	39		PF 512 204-U
	Stainless Steel	DN 63 CF-R	19	12.6	71		PF 512 206-U
	Stainless Steel	DN 100 CF-R	21.5	14.3	109		PF 512 210-U
	Stainless Steel	DN 160 CF-R	22	15.8	160		PF 512 216-U
	Stainless Steel	DN 200 CF-R	24.5	17.1	206.5		PF 512 220-U
	Stainless Steel	DN 250 CF-R	26	18	257		PF 512 225-U

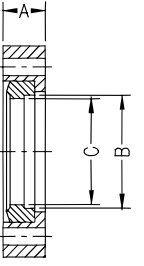
Welding flange

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel 304 L	DN 16 CF-F	7.8	18.2	17		PF 513 201
	Stainless Steel 304 L	DN 40 CF-F	13	38.2	35		PF 513 203
	Stainless Steel 304 L	DN 40 CF-F	13	40.2	37		PF 513 204
	Stainless Steel 304 L	DN 63 CF-F	17.5	70.3	66		PF 513 206
	Stainless Steel 304 L	DN 100 CF-F	20	108.4	104		PF 513 210
	Stainless Steel 304 L	DN 160 CF-F	22	159.3	155		PF 513 216
	Stainless Steel 304 L	DN 200 CF-F	24.5	205.3	201		PF 513 220
	Stainless Steel 304 L	DN 250 CF-F	26	256.3	250		PF 513 225

Welding flange with tapped holes

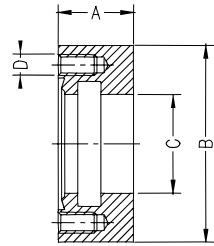
Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel 304 L	DN 16 CF-F	7.8	18.2	17	6 x M4	PF 514 201
	Stainless Steel 304 L	DN 40 CF-F	13	38.2	35	6 x M6	PF 514 203
	Stainless Steel 304 L	DN 40 CF-F	13	40.2	37	6 x M6	PF 514 204
	Stainless Steel 304 L	DN 63 CF-F	17.5	70.3	66	8 x M8	PF 514 206
	Stainless Steel 304 L	DN 100 CF-F	20	108.4	104	16 x M8	PF 514 210
	Stainless Steel 304 L	DN 160 CF-F	22	159.3	155	20 x M8	PF 514 216
	Stainless Steel 304 L	DN 200 CF-F	24.5	205.3	201	24 x M8	PF 514 220
	Stainless Steel 304 L	DN 250 CF-F	26	256.3	250	32 x M8	PF 514 225

Welding flange rotatable

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel 304 L	DN 16 CF-R	7.8	18.2	17		PF 515 201-U
	Stainless Steel 304 L	DN 40 CF-R	13	38.2	35		PF 515 203-U
	Stainless Steel 304 L	DN 40 CF-R	13	40.2	37		PF 515 204-U
	Stainless Steel 304 L	DN 63 CF-R	17.5	70.3	66		PF 515 206-U
	Stainless Steel 304 L	DN 100 CF-R	20	108.4	104		PF 515 210-U
	Stainless Steel 304 L	DN 160 CF-R	22	159.3	155		PF 515 216-U
	Stainless Steel 304 L	DN 200 CF-R	24.5	205.3	201		PF 515 220-U
	Stainless Steel 304 L	DN 250 CF-R	26	256.3	250		PF 515 225-U

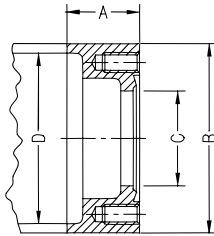
CF UHV Components

Welding flange outside



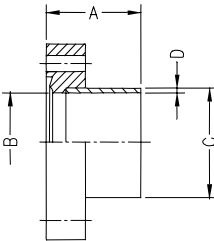
Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel 304 L	DN 16 CF-F	16	34	16	6 x M4	PF 516 201
	Stainless Steel 304 L	DN 40 CF-F	24	69.5	37	6 x M6	PF 516 204
	Stainless Steel 304 L	DN 63 CF-F	24	113.5	63	8 x M8	PF 516 206
	Stainless Steel 304 L	DN 100 CF-F	24	152	100	16 x M8	PF 516 210

Welding flange for gauge



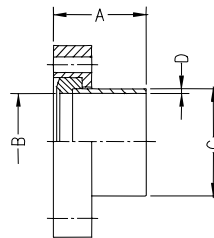
Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel 304 L	DN 40 CF-F	24	69.5	38	66	PF 516 203

Flange with pipe socket



Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel 304 L	DN 16 CF-F	12	16	18.2	1.1	PF 517 201-X
	Stainless Steel 304 L	DN 16 CF-F	38	16	18	1	PF 517 202-X
	Stainless Steel 304 L	DN 40 CF-F	38	37	40	1.5	PF 517 211-X
	Stainless Steel 304 L	DN 40 CF-F	63	37	40	1.5	PF 517 212-X
	Stainless Steel 304 L	DN 63 CF-F	105	63	70	2	PF 517 221-X
	Stainless Steel 304 L	DN 100 CF-F	135	100	108	2	PF 517 231-X
	Stainless Steel 304 L	DN 160 CF-F	167	150	159	2	PF 517 241-X

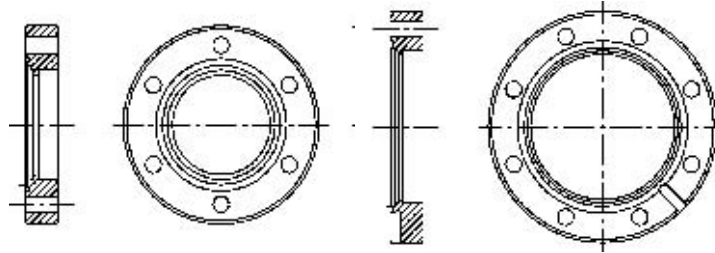
Flange with pipe socket rotatable



Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel 304 L	DN 16 CF-R	12	16	18.2	1.1	PF 518 201-U
	Stainless Steel 304 L	DN 16 CF-R	38	16	18	1	PF 518 202-U
	Stainless Steel 304 L	DN 40 CF-R	38	37	40	1.5	PF 518 211-U
	Stainless Steel 304 L	DN 63 CF-R	105	63	70	2	PF 518 221-U

Pipe components

Hole spacing related to component axis



DN 16 CF and DN 40 CF

From DN 63 CF

Intermediate piece

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 16 CF	76	16			PF 520 201-X
	Stainless Steel	DN 40 CF	126	37			PF 520 204-X
	Stainless Steel	DN 63 CF-F	210	66			PF 520 206-X
	Stainless Steel	DN 100 CF-F	270	102			PF 520 210-X
	Stainless Steel	DN 160 CF-F	334	148.5			PF 520 216-X
	DN 16 CF and DN 40 CF = one flange rotatable DN 63 CF, DN 100 CF and DN 160 CF = fixed flanges						

90° elbow

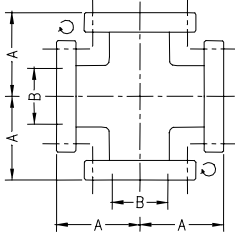
Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 16 CF-R	38	16.6			PF 521 201-X
	Stainless Steel	DN 40 CF-R	63	35			PF 521 204-X
	Stainless Steel	DN 63 CF-F	105	63			PF 521 206-X
	Stainless Steel	DN 100 CF-F	135	100			PF 521 210-X
	Stainless Steel	DN 160 CF-F	167	148.5			PF 521 216-X
	DN 16 CF and DN 40 CF = two flanges rotatable DN 63 CF, DN 100 CF and DN 160 CF = fixed flanges						

T-piece

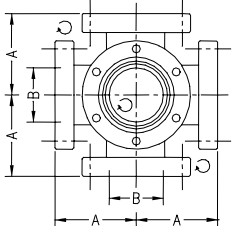
Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 16 CF	38	16.6			PF 522 201-X
	Stainless Steel	DN 40 CF	63	38			PF 522 204-X
	Stainless Steel	DN 63 CF-F	105	66			PF 522 206-X
	Stainless Steel	DN 100 CF-F	135	102			PF 522 210-X
	Stainless Steel	DN 160 CF-F	167	148.5			PF 522 216-X
	DN 16 CF and DN 40 CF = two flanges rotatable DN 63 CF, DN 100 CF and DN 160 CF = fixed flanges						

CF UHV Components

Cross piece

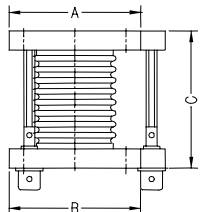
Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 16 CF	38	16.6			PF 524 201-X
	Stainless Steel	DN 40 CF	63	38			PF 524 204-X
	Stainless Steel	DN 63 CF-F	105	66			PF 524 206-X
	Stainless Steel	DN 100 CF-F	135	102			PF 524 210-X
	Stainless Steel	DN 160 CF-F	167	148.5			PF 524 216-X
	DN 16 CF and DN 40 CF = two flanges rotatable DN 63 CF, DN 100 CF and DN 160 CF = fixed flanges						

Double cross-piece

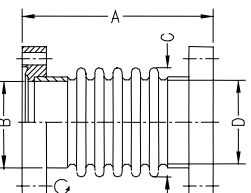
Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 16 CF	38	16.6			PF 526 201-X
	Stainless Steel	DN 40 CF	63	38			PF 526 204-X
	Stainless Steel	DN 63 CF-F	105	66			PF 526 206-X
	Stainless Steel	DN 100 CF-F	135	102			PF 526 210-X
	Stainless Steel	DN 160 CF-F	167	148.5			PF 526 216-X
	DN 16 CF and DN 40 CF = three flanges rotatable DN 63 CF, DN 100 CF and DN 160 CF = fixed flanges						

Bellows and adjusting pieces

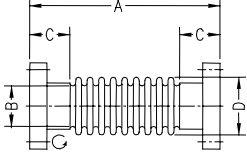
Adjusting piece

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 40 CF-F	70	70	80		PF 528 204-X
	Stainless Steel	DN 63 CF-F	114	114	80		PF 528 206-X

Bellows with flange

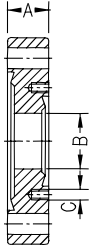
Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 16 CF-R	110	15	24	16	PF 541 200-X
	Stainless Steel	DN 40 CF-R	160	41	58	39	PF 541 210-X
	Stainless Steel	DN 63 CF-R	250	70	90	70	PF 541 220-X
	Stainless Steel	DN 100 CF-R	250	102	127	102	PF 541 230-X
	Stainless Steel	DN 160 CF-R	270	153	190	158	PF 541 240-X

Flexible metal hose

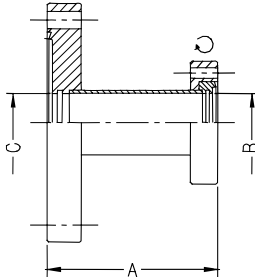
Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 16 CF-R	250	12	20	19.5	PF 530 025-X
	Stainless Steel	DN 16 CF-R	500	12	20	19.5	PF 530 050-X
	Stainless Steel	DN 16 CF-R	750	12	20	19.5	PF 530 075-X
	Stainless Steel	DN 16 CF-R	1000	12	20	19.5	PF 530 010-X
	Stainless Steel	DN 40 CF-R	250	37	50	52.5	PF 530 125-X
	Stainless Steel	DN 40 CF-R	500	37	50	52.5	PF 530 150-X
	Stainless Steel	DN 40 CF-R	750	37	50	52.5	PF 530 175-X
	Stainless Steel	DN 40 CF-R	1000	37	50	52.5	PF 530 110-X

Adaptors

Reducing flange CF-F/CF-F

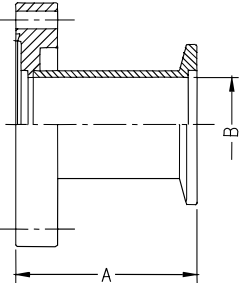
Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 40 CF-F/DN 16 CF-F	13	16	6 x M4		PF 543 210
	Stainless Steel	DN 63 CF-F/DN 40 CF-F	24	37	6 x M6		PF 543 221
	Stainless Steel	DN 100 CF-F/DN 40 CF-F	24	37	6 x M6		PF 543 231
	Stainless Steel	DN 100 CF-F/DN 63 CF-F	24	63	8 x M8		PF 543 232
	Stainless Steel	DN 160 CF-F/DN 40 CF-F	24	37	6 x M6		PF 543 241
	Stainless Steel	DN 160 CF-F/DN 40 CF-F	24	63	8 x M8		PF 543 242
	Stainless Steel	DN 160 CF-F/DN 100 CF-F	24	100	16 x M8		PF 543 243
	Stainless Steel	DN 200 CF-F/DN 40 CF-F	24	37	6 x M6		PF 543 251
	Stainless Steel	DN 200 CF-F/DN 63 CF-F	24	63	8 x M8		PF 543 252
	Stainless Steel	DN 200 CF-F/DN 100 CF-F	24	100	16 x M8		PF 543 253
	Stainless Steel	DN 200 CF-F/DN 160 CF-F	24	150	20 x M8		PF 543 254

Reducing piece CF-F/CF-R

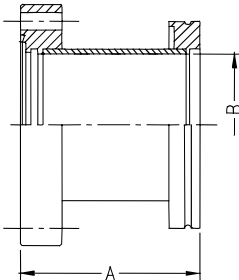
Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 40 CF-F/DN 16 CF-R	45	16	16		PF 544 210-X
	Stainless Steel	DN 63 CF-F/DN 40 CF-R	75	37	37		PF 544 221-X
	Stainless Steel	DN 100 CF-F/DN 63 CF-R	95	63	66		PF 544 232-X
	Stainless Steel	DN 160 CF-F/DN 100 CF-R	105	100	104		PF 544 243-X

CF UHV Components

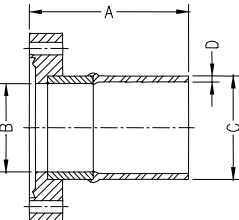
Adaptor piece CF-F/ISO-KF

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 16 CF-F/DN 16 ISO-KF	36	16			PF 545 202-X
	Stainless Steel	DN 16 CF-F/DN 25 ISO-KF	36	16			PF 545 203-X
	Stainless Steel	DN 40 CF-F/DN 16 ISO-KF	36	16			PF 545 212-X
	Stainless Steel	DN 40 CF-F/DN 25 ISO-KF	36	24			PF 545 213-X
	Stainless Steel	DN 40 CF-F/DN 40 ISO-KF	50	37			PF 545 214-X
	Stainless Steel	DN 63 CF-F/DN 40 ISO-KF	50	41			PF 545 224-X
	Stainless Steel	DN 100 CF-F/DN 40 ISO-KF	50	41			PF 545 234-X

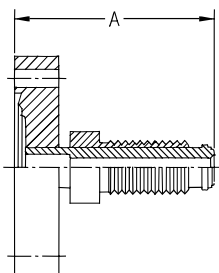
Adaptor piece CF-F/ISO-K

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 63 CF-F/DN 63 ISO-K	90	63			PF 546 220-X
	Stainless Steel	DN 100 CF-F/DN 100 ISO-K	90	100			PF 546 231-X
	Stainless Steel	DN 160 CF-F/DN 160 ISO-K	90	150			PF 546 242-X

Glass/metal connection with flange

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Flange: Stainless Steel Glas tube: Pyrex	DN 16 CF-F	91	8	12	1.75	PF 547 201-X
	Flange: Stainless Steel Glas tube: Pyrex	DN 16 CF-F	94	16	20	2	PF 547 202-X

Adaptor piece CF / VCR®, male


Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 16 CF/VCR 1/4"	36				PF 548 402-X
	Stainless Steel	DN 40 CF/VCR 3/4"	53				PF 548 414-X

Adaptor piece CF / VCR[®], female

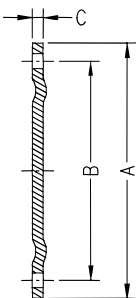
Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Stainless Steel	DN 16 CF/VCR 1/4"	36				PF 550 402-X
	Stainless Steel	DN 40 CF / VCR 3/4"	53				PF 550 414-X

Miscellaneous

Protective cover

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Plastic	DN 16 CF					PF 549 301
	Plastic	DN 40 CF					PF 549 304
	Plastic	DN 63 CF					PF 549 306
	Plastic	DN 100 CF					PF 549 310
	Plastic	DN 160 CF					PF 549 316
	Plastic	DN 200 CF					PF 549 320

Protective cover

Dimensions	Material	Nominal diameter	A	B	C	D	Order. No.
	Metal	DN 250 CF	306	284	4		PF 549 325

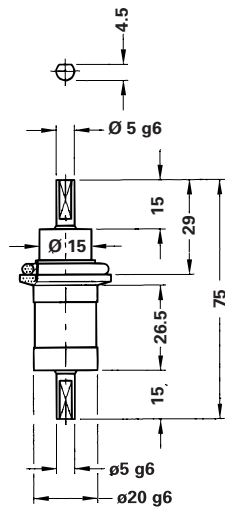
Rotary feedthroughs ISO-KF, ISO-K

DD 016 A, DD 025 A, DD 040 A, DD 063 A

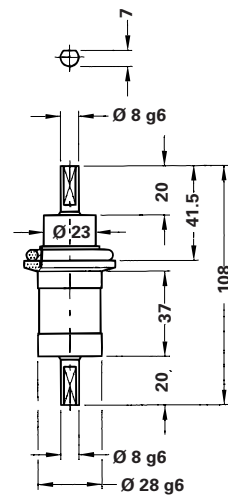
- For transmitting high torque
- With Viton® shaft seal and ball bearing



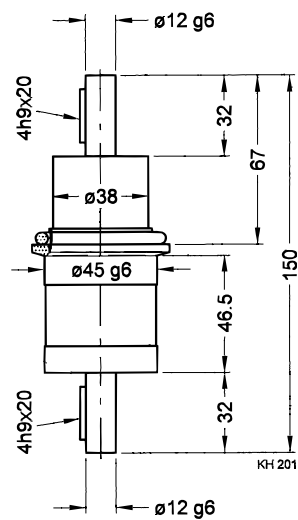
Dimensions (in mm)



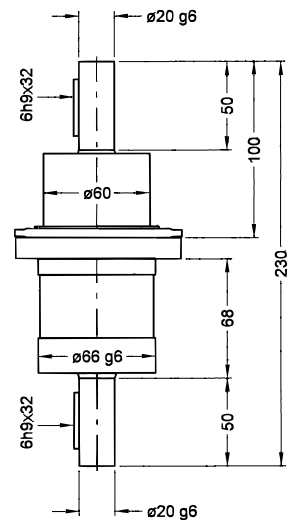
DD 016 A



DD 025 A



DD 040 A



DD 063 A

Technical data

	DD 016 A	DD 025 A	DD 040 A	DD 063 A
Connector	DN 16 ISO-KF	DN 25 ISO-KF	DN 40 ISO-KF	DN 63 ISO-K
Shaft connection	ø 5 x 14 mm	ø 8 x 20 mm	ø 12 x 30 mm	ø 20 x 50 mm
Shaft load, radial	60 N	150 N	250 N	500 N
Shaft load, axial	30 N	50 N	60 N	100 N
Transferable torque	1.5 Nm	6 Nm	25 Nm	100 Nm
Rotational speed	1500 rpm	1000 rpm	750 rpm	500 rpm
Service life (revolutions)	20 000 000	20 000 000	20 000 000	10 000 000
Tightness (static)	1·10 ⁻⁹ mbar l/s	1·10 ⁻⁹ mbar l/s	1·10 ⁻⁹ mbar l/s	1·10 ⁻⁹ mbar l/s
Feedthrough	Viton®	Viton®	Viton®	Viton®
Pressure min.	1·10 ⁻⁸ mbar	1·10 ⁻⁸ mbar	1·10 ⁻⁸ mbar	1·10 ⁻⁸ mbar
Pressure max.	1 bar	1 bar	1 bar	1 bar
Operating temperature	50 °C	50 °C	50 °C	50 °C
Bakeout temperature	110 °C	110 °C	110 °C	110 °C
Material	Stainless Steel , Aluminium, Viton®	Stainless Steel , Aluminium, Viton®	Stainless Steel , Aluminium, Viton®	Stainless Steel , Aluminium, Viton®
Weight	0.1 kg	0.2 kg	0.6 kg	2 kg

When a reduced service life is acceptable, the rotational speed can be increased by up to a factor of two.

Ordering Number

Feedthrough	PF 222 010-T	PF 223 010-T	PF 224 010-T	PF 420 010-T
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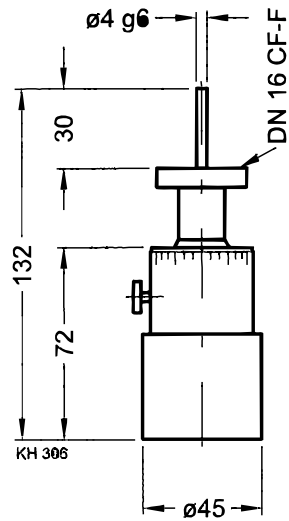
Rotary feedthroughs CF

UD 016, UD 140, UDD 235

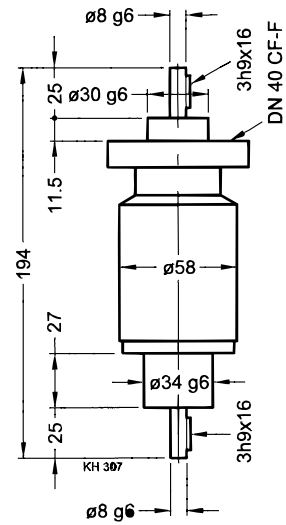
- ▶ Bellows sealed
- ▶ All-metal version
- ▶ For the toughest vacuum requirements



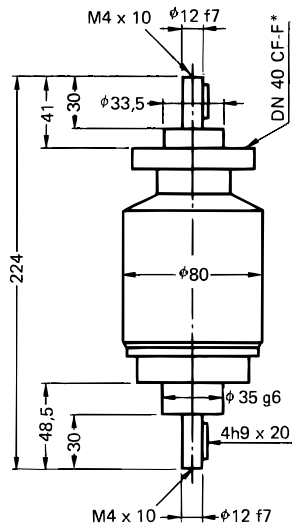
Dimensions (in mm)



UD 016



UD 140



UDD 235

Technical data

	UD 016	UD 140	UDD 235
Connector	DN 16 CF-F	DN 40 CF-F	DN 40 CF-F
Shaft connection	ø 4 mm	ø 8 mm	ø 12 mm
Shaft load, radial	10 N	60 N	100 N
Shaft load, axial	5 N	20 N	30 N
Transferable torque dynamic	0.4 Nm	4 Nm	10 Nm
Transferable torque static	0.2 Nm	3 Nm	5 Nm
Rotational speed	200 rpm	1000 rpm	500 rpm
Service life (revolutions)	1 000 000	2 000 000	1 000 000
Scale division: rotary knob	10 °	-	-
Tightness	1·10 ⁻¹⁰ mbar l/s	1·10 ⁻¹⁰ mbar l/s	1·10 ⁻¹⁰ mbar l/s
Feedthrough	Bellows	Bellows	Bellows
Pressure min.	1·10 ⁻⁹ mbar	1·10 ⁻⁹ mbar	1·10 ⁻⁹ mbar
Pressure max.	2 bar	2 bar	2 bar
Operating temperature	300 °C	300 °C	300 °C
Bakeout temperature	300 °C	300 °C	300 °C
Materials in contact with media	Stainless Steel	Stainless Steel	Stainless Steel
Weight	0.3 kg	1.5 kg	3 kg

Dynamic torque in operation at 300 °C only up to 0.2 Nm.

Ordering Number

Feedthrough	PF 620 010-T	PF 621 010-T	PF 621 012-T
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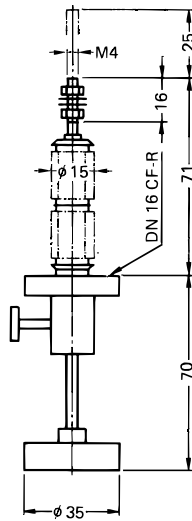
Linear motion feedthroughs CF

ULD 016 S, ULD 135 S, ULD 016 DP, ULD 135 DP

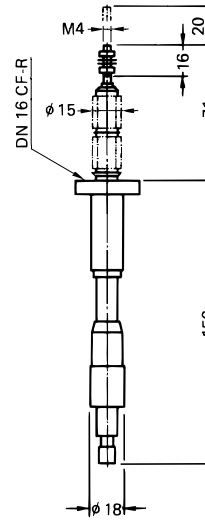


- With bellows for demanding vacuum requirements
- S: direct push and pull actuation
- DP: high setting accuracy with micrometer screw

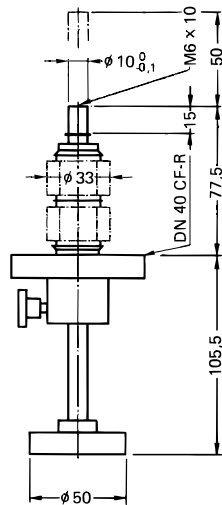
Dimensions (in mm)



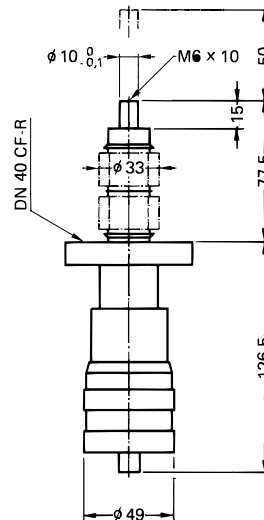
ULD 016 S



ULD 016 DP



ULD 135 S



ULD 135 DP

Technical data

	ULD 016 S	ULD 135 S	ULD 016 DP	ULD 135 DP
Connector	DN 16 CF-R	DN 40 CF-R	DN 16 CF-R	DN 40 CF-R
Actuator	Manually	Manually	Micrometer	Micrometer
Stroke	25 mm	50 mm	20 mm	50 mm
Stroke per revolution	-	-	0.5 mm	1 mm
Scale division	5 mm	10 mm	0.01 mm	0.005 mm
Shaft connection	M4 x 16 mm	M6 x 10 mm / ø 10 x 15 mm	M4 x 16mm	M6 x 10 mm / ø 10 x 15 mm
Load capacity radial: at max. displacement	20 N	100 N	20 N	100 N
Shaft load, axial: to vacuum	85 N	140 N	185 N	440 N
Shaft load, axial: to atmosphere	100 N	200 N	200 N	500 N
Load capacity: torsion	0.2 Nm	0.5 Nm	0.2 Nm	0.5 Nm
Tightness	1·10 ⁻¹⁰ mbar l/s	1·10 ⁻¹⁰ mbar l/s	1·10 ⁻¹⁰ mbar l/s	1·10 ⁻¹⁰ mbar l/s
Feedthrough	Bellows	Bellows	Bellows	Bellows
Pressure min.	1·10 ⁻⁹ mbar	1·10 ⁻⁹ mbar	1·10 ⁻⁹ mbar	1·10 ⁻⁹ mbar
Pressure max.	2 bar	2 bar	2 bar	2 bar
Operating temperature	300 °C	300 °C	-	-
Bakeout temperature: feedthrough	300 °C	300 °C	300 °C	300 °C
Bakeout temperature: micrometer screw/piston	-	-	100 °C	100 °C
Material	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
Weight	0.2 kg	0.8 kg	0.25 kg	1 kg

Ordering Number

Feedthrough	PF 630 010-T	PF 631 010-T	PF 630 012-T	PF 631 012-T
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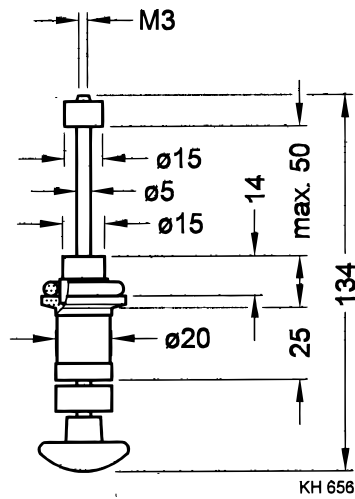
Rotary/linear feedthroughs ISO-KF

DS 016 A, DS 025 A, DS 040 A

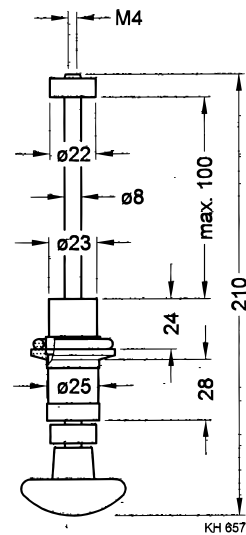


- ▶ Two Viton® shaft seals
- ▶ Direct push/pull and rotary actuation
- ▶ With locking ring and optimal locking piston

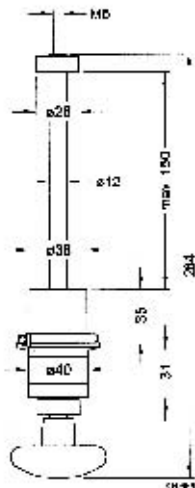
Dimensions (in mm)



DS 016 A



DS 025 A



DS 040 A

Technical data

	DS 016 A	DS 025 A	DS 040 A
Connector	DN 16 ISO-KF	DN 25 ISO-KF	DN 40 ISO-KF
Actuator	Rotary knob	Rotary knob	Rotary knob
Stroke	50 mm	100 mm	150 mm
Shaft connection	M3 x 6 / ø 5 mm	M4 x 8 / ø 8 mm	M6 x 10 / ø 12 mm
Load capacity radial: at max. displacement	10 N	15 N	30 N
Load capacity: torsion	2 Nm	8 Nm	20 Nm
Tightness (static)	1·10 ⁻⁹ mbar l/s	1·10 ⁻⁹ mbar l/s	1·10 ⁻⁹ mbar l/s
Feedthrough	Viton® shaft seals	Viton® shaft seals	Viton® shaft seals
Pressure min.	1·10 ⁻⁸ mbar	1·10 ⁻⁸ mbar	1·10 ⁻⁸ mbar
Pressure max.	1 bar	1 bar	1 bar
Operating temperature	50 °C	50 °C	50 °C
Bakeout temperature	110 °C	110 °C	110 °C
Material	Stainless Steel, Aluminium, Viton®	Stainless Steel, Aluminium, Viton®	Stainless Steel, Aluminium, Viton®
Weight	0.1 kg	0.2 kg	0.3 kg

Ordering Number

Feedthrough	PF 242 010-T	PF 243 010-T	PF 244 011-T
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Accessories

Locking piston	PT 226 978-T	PT 226 979-T	PT 226 980-T
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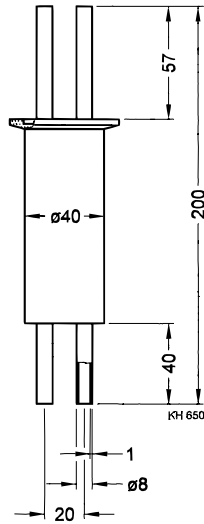
Liquid feedthroughs ISO-KF/CF

FD 040, FD 040 U

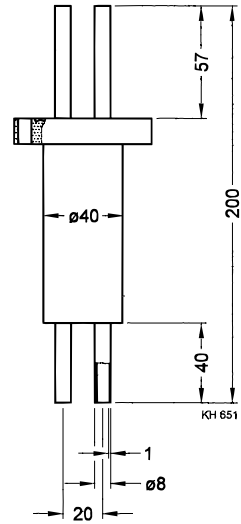


- For H₂O and LN₂
- Thermally insulated
- Especially suited for very hot and very cold media

Dimensions (in mm)



FD 040



FD 040 U

Technical data

	FD 040	FD 040 U
Connector	DN 40 ISO-KF	DN 40 CF-F
Number of pipes	2 pieces	2 pieces
Connection	ø 8 x 1 mm	ø 8 x 1 mm
Tightness	1·10 ⁻⁹ mbar l/s	1·10 ⁻¹⁰ mbar l/s
Feedthrough	welded	welded
Pressure min.	1·10 ⁻⁸ mbar	1·10 ⁻⁹ mbar
Pressure max.	2.5 bar	10 bar
Temperature range	-200 - +150 °C	-200 - +400 °C
Material	Stainless Steel	Stainless Steel
Weight	0.3 kg	0.4 kg

Ordering Number

Feedthrough	PF 284 011-X	PF 681 011-X
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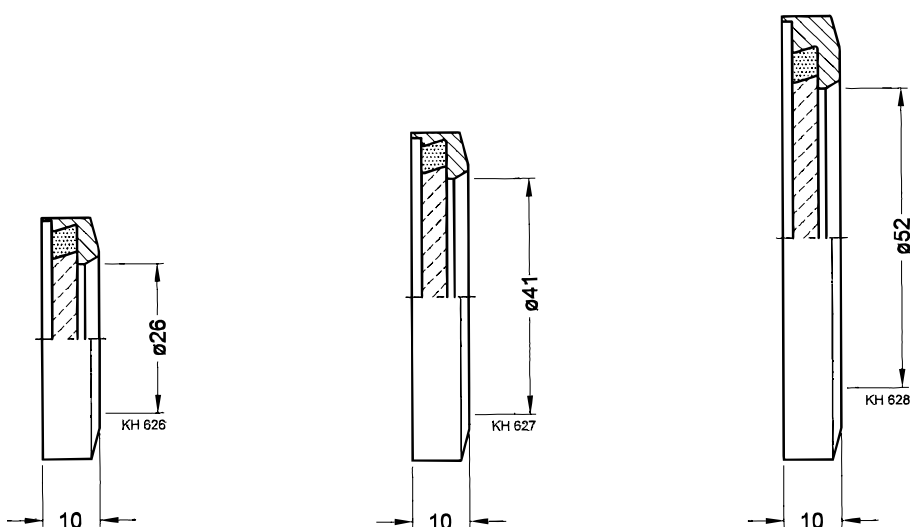


Inspection glass ISO-KF

- For visual process monitoring in a vacuum chamber
- Wide viewing angle



Dimensions (in mm)



DN 25 ISO-KF

DN 40 ISO-KF

DN 50 ISO-KF

Technical data

	DN 25 ISO-KF	DN 40 ISO-KF	DN 50 ISO-KF
Sight glass	Borosilicate	Borosilicate	Borosilicate
Glass thickness	3.8 mm	3.8 mm	3.8 mm
Tightness	$1 \cdot 10^{-9}$ mbar l/s	$1 \cdot 10^{-9}$ mbar l/s	$1 \cdot 10^{-9}$ mbar l/s
Seal	Viton®	Viton®	Viton®
Pressure min.	$1 \cdot 10^{-8}$ mbar	$1 \cdot 10^{-8}$ mbar	$1 \cdot 10^{-8}$ mbar
Pressure max.	4 bar	4 bar	4 bar
Bakeout temperature	150 °C	150 °C	150 °C
Flange	Aluminium	Aluminium	Aluminium
Weight	20 g	30 g	40 g

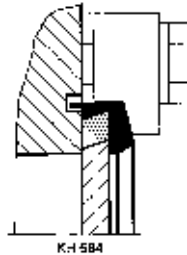
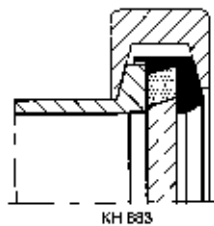
Pressure max.: at 150 °C only 3 bar.

Transmission curve see page 281.

Ordering Number

Inspection glass	PF 213 011-T	PF 214 011-T	PF 215 011-T
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Mounting



Mounting onto a plane requires a groove:

Width 2.5 mm; depth 2.5 mm

ID at DN 25 ISO-KF = 40 mm

ID at DN 40 ISO-KF = 55 mm

ID at DN 50 ISO-KF = 75 mm

Claws and clamping ring not included.

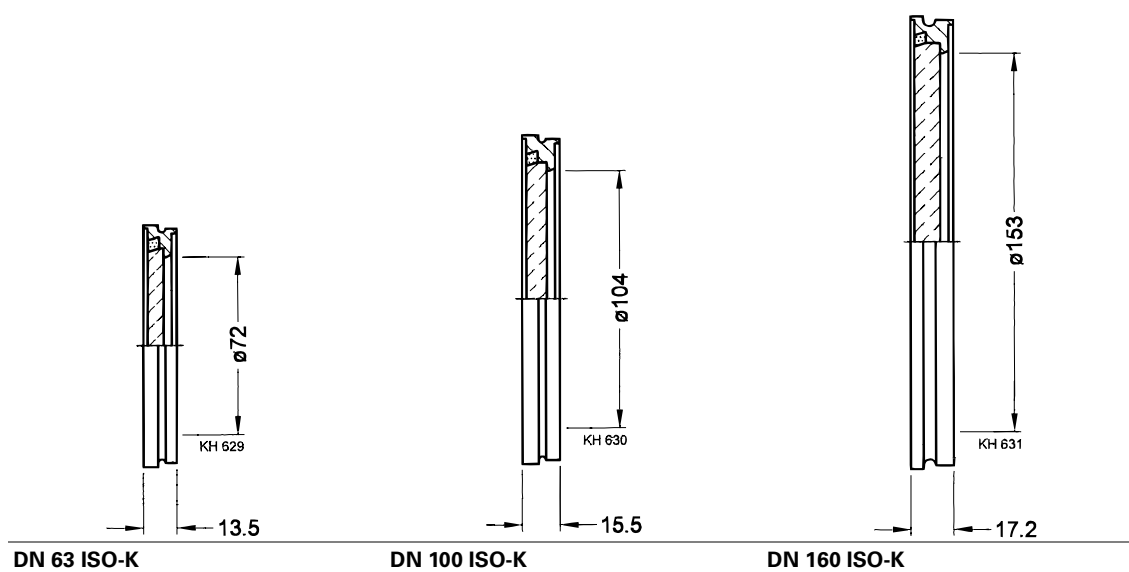


Inspection glass ISO-K

- For visual process monitoring in a vacuum chamber
- Wide viewing angle



Dimensions (in mm)



Technical data

	DN 63 ISO-K	DN 100 ISO-K	DN 160 ISO-K
Sight glass	Borosilicate	Borosilicate	Borosilicate
Glass thickness	6 mm	8 mm	10 mm
Tightness	$1 \cdot 10^{-9}$ mbar l/s	$1 \cdot 10^{-9}$ mbar l/s	$1 \cdot 10^{-9}$ mbar l/s
Seal	Viton®	Viton®	Viton®
Pressure min.	$1 \cdot 10^{-8}$ mbar	$1 \cdot 10^{-8}$ mbar	$1 \cdot 10^{-8}$ mbar
Pressure max.	2 bar	2 bar	2 bar
Bakeout temperature	150 °C	150 °C	150 °C
Flange	Aluminium	Aluminium	Aluminium
Weight	0.2 kg	0.3 kg	0.4 kg

Pressure max.: at 150 °C only 1 bar.

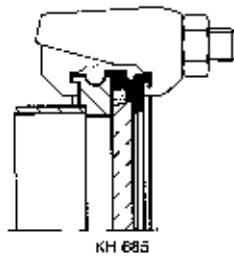
Transmission curve see page 281.

Ordering Number

Inspection glass	PF 410 011-T	PF 411 011-T	PF 412 011-T
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Mounting

Clamps not included.

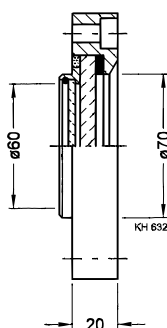


Inspection glass ISO-F with safety glass

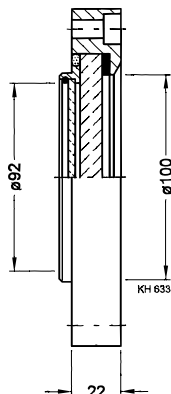


- For visual process monitoring in a vacuum chamber
- Wide viewing angle
- Replaceable safety glass

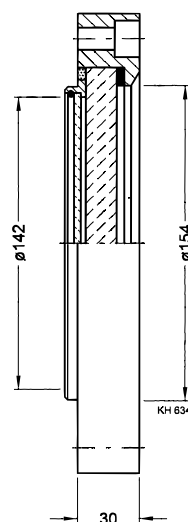
Dimensions (in mm)



DN 63 ISO-F



DN 100 ISO-F



DN 160 ISO-F

Technical data

	DN 63 ISO-F	DN 100 ISO-F	DN 160 ISO-F
Sight glass	Borosilicate	Borosilicate	Borosilicate
Window thickness	7.5 mm	11 mm	15 mm
Safety glass: thickness	2.5 mm	2.5 mm	2.5 mm
Tightness	$1 \cdot 10^{-9}$ mbar l/s	$1 \cdot 10^{-9}$ mbar l/s	$1 \cdot 10^{-9}$ mbar l/s
Seal	Viton®	Viton®	Viton®
Pressure min.	$1 \cdot 10^{-8}$ mbar	$1 \cdot 10^{-8}$ mbar	$1 \cdot 10^{-8}$ mbar
Pressure max.	2 bar	2 bar	2 bar
Bakeout temperature	150 °C	150 °C	150 °C
Flange	Anodized Aluminium, black	Anodized Aluminium, black	Anodized Aluminium, black
Weight	0.8 kg	1.4 kg	3 kg

Pressure max.: at 150 °C only 1 bar.

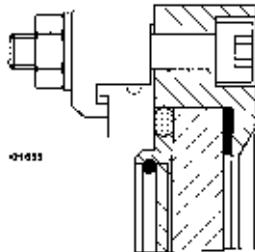
Transmission curve see page 281.

Ordering Number

Inspection glass	PF 410 013-T	PF 411 013-T	PF 412 013-T
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Mounting

Claws, screws, washers and nuts included.

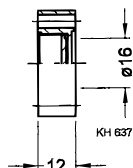


Inspection glass CF

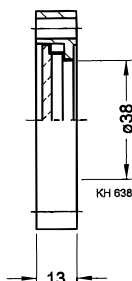
- For visual process monitoring in a vacuum chamber
- Wide viewing angle



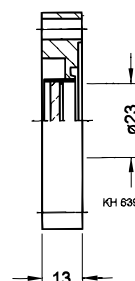
Dimensions (in mm)



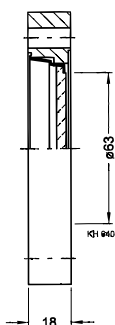
DN 16 CF-F Kodial



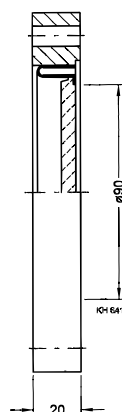
DN 40 CF-F Kodial



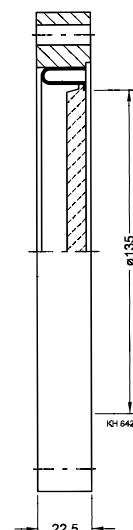
DN 40 CF-F Sapphire



DN 63 CF-F Kodial



DN 100 CF-F Kodial



DN 160 CF-F Kodial

Technical data

	DN 16 CF-F	DN 40 CF-F	DN 40 CF-F
Sight glass	Kodial	Kodial	Sapphire
Window thickness	1.5 mm	3 mm	3 mm
Tightness	$1 \cdot 10^{-10}$ mbar l/s	$1 \cdot 10^{-10}$ mbar l/s	$1 \cdot 10^{-10}$ mbar l/s
Seal	Metal	Metal	Metal
Pressure min.	$1 \cdot 10^{-10}$ mbar	$1 \cdot 10^{-10}$ mbar	$1 \cdot 10^{-10}$ mbar
Pressure max.	2 bar	2 bar	2 bar
Bakeout temperature	400 °C	400 °C	400 °C
Flange	Stainless Steel	Stainless Steel	Stainless Steel
Weight	40 g	0.24 kg	0.35 kg

Pressure max.: at 400 °C only 1 bar.

Transmission curve see page 281.

Ordering Number

Inspection glass	PF 610 010-X	PF 611 010-X	PF 611 012-X
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Technical data

	DN 63 CF-F	DN 100 CF-F	DN 160 CF-F
Sight glass	Kodial	Kodial	Kodial
Window thickness	4 mm	6 mm	8 mm
Tightness	$1 \cdot 10^{-10}$ mbar l/s	$1 \cdot 10^{-10}$ mbar l/s	$1 \cdot 10^{-10}$ mbar l/s
Seal	Metal	Metal	Metal
Pressure min.	$1 \cdot 10^{-10}$ mbar	$1 \cdot 10^{-10}$ mbar	$1 \cdot 10^{-10}$ mbar
Pressure max.	2 bar	2 bar	2 bar
Bakeout temperature	400 °C	400 °C	400 °C
Flange	Stainless Steel	Stainless Steel	Stainless Steel
Weight	0.85 kg	1.4 kg	2.8 kg

Pressure max.: at 400 °C only 1 bar.

Transmission curve see page 281.

Ordering Number

Inspection glass	PF 612 010-X	PF 613 010-X	PF 614 010-X
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Electric feedthroughs ISO-KF

DN 16 ISO-KF

► Measuring current feedthrough



Technical data

	DN 16 ISO-KF	DN 16 ISO-KF	DN 16 ISO-KF
Number of feedthroughs	4	9	9
Connection: Atmospheric side	Connector	Connector	Connector
Connection: Vacuum side	Solder connection	Solder connection	Connector
Voltage, per pole	50 V	50 V	50 V
Current, per pole	1 A	2 A	2 A
Test voltage	500 V / 50 Hz	500 V / 50 Hz	500 V / 50 Hz
Insulator	PTFE/Araldit	PTFE/Araldit	PTFE/Araldit
Contact	Gold-plated bronze	Gold-plated bronze	Gold-plated bronze
Connection wire diameter	0.6 mm	1.2 mm	1.2 mm
Cable diameter for plug connectors	4.7 mm	8.7 mm	8.7 mm
Tightness	1·10 ⁻⁹ mbar l/s	1·10 ⁻⁹ mbar l/s	1·10 ⁻⁹ mbar l/s
Seal	Viton®	Viton®	Viton®
Pressure min.	1·10 ⁻⁸ mbar	1·10 ⁻⁸ mbar	1·10 ⁻⁸ mbar
Pressure max.	2.5 bar	2.5 bar	2.5 bar
Bakeout temperature	130 °C	130 °C	130 °C
Housing	Nickel-plated steel	Nickel-plated steel	Nickel-plated Steel

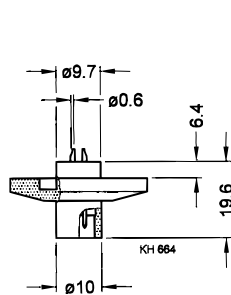
Ordering Number

Feedthrough	PF 272 011-X	PF 272 013-X	PF 272 015-X
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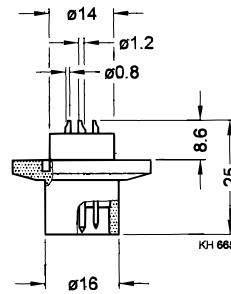
Accessories

Outer connector	PF 297 010	PF 297 013-T	PF 297 013-T
Inner connector	-	-	PF 297 015-T

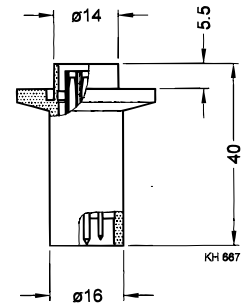
Feedthrough (in mm)



PF 272 011-X

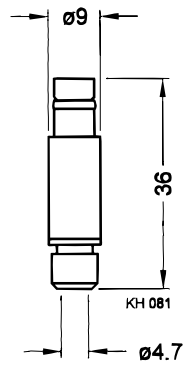


PF 272 013-X

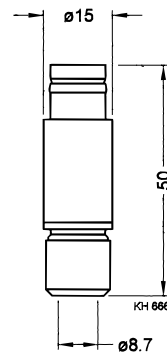


PF 272 015-X

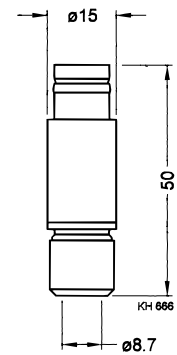
Outer connector (in mm)



PF 297 010

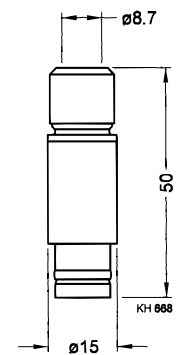


PF 297 013-T



PF 297 013-T

Inner connector (in mm)



PF 297 015-T

Electric feedthroughs ISO-KF

DN 40 ISO-KF

► Feedthrough for high voltages and currents



Technical data

	DN 40 ISO-KF	DN 40 ISO-KF	DN 40 ISO-KF	DN 40 ISO-KF
Number of feedthroughs	1	4	7	7
Connection: Atmospheric side	Connector	Connector	Connector	Connector
Connection: Vacuum side	Screw connection	Connector	Solder connection	Connector
Voltage, per pole	6000 V	800 V	380 V	380 V
Current, per pole	25 A	16 A	16 A	16 A
Test voltage	15 kV / 50 Hz	-	-	-
Insulator	PTFE/Araldit	PTFE/Araldit	PTFE/Araldit	PTFE/Araldit
Contact	Nickel-plated brass	Gold-plated bronze	Gold-plated bronze	Gold-plated bronze
Connection wire diameter	5 mm	2.5 mm	1.8 mm	1.8 mm
Cable diameter for plug connectors	22.7 mm	16.2 mm	16.2 mm	16.2 mm
Tightness	1·10 ⁻⁹ mbar l/s	1·10 ⁻⁹ mbar l/s	1·10 ⁻⁹ mbar l/s	1·10 ⁻⁹ mbar l/s
Seal	Viton®	Viton®	Viton®	Viton®
Pressure min.	1·10 ⁻⁸ mbar	1·10 ⁻⁸ mbar	1·10 ⁻⁸ mbar	1·10 ⁻⁸ mbar
Pressure max.	2.5 bar	2.5 bar	2.5 bar	2.5 bar
Bakeout temperature	130 °C	130 °C	130 °C	130 °C
Housing	Chrome-plated steel	Chrome-plated steel	Chrome-plated steel	Chrome-plated steel

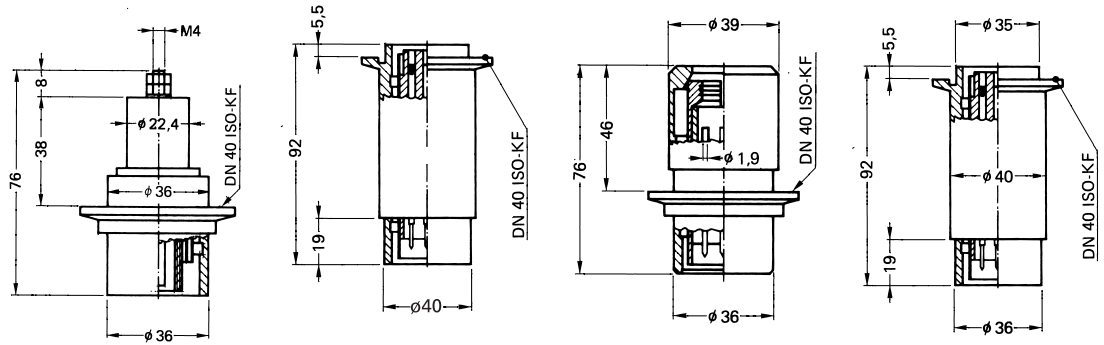
Ordering Number

Feedthrough	PF 254 010	PF 264 016-X	PF 264 010	PF 264 012
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Accessories

Outer connector	PF 295 010	PF 296 022-T	PF 296 010	PF 296 010
Inner connector	-	PF 296 024-T	-	PF 296 012

Feedthrough (in mm)



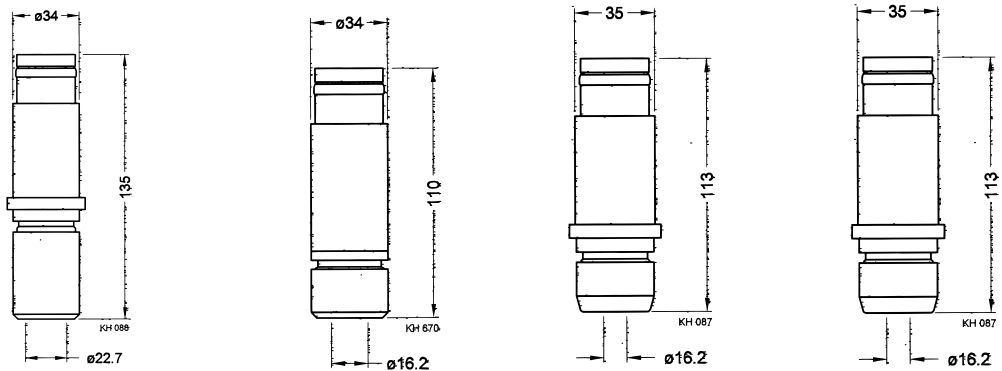
PF 254 010

PF 264 016-X

PF 264 010

PF 264 012

Outer connector (in mm)



PF 295 010

PF 296 022-T

PF 296 010

PF 296 010

Inner connector (in mm)



PF 296 024-T

PF 296 012

Electric feedthroughs ISO-KF

High-current feedthroughs DN 40 ISO-KF



- ▶ Selection of electrodes
- ▶ Insert into assembled feedthrough
- ▶ Current/water connection

Technical data

DN 40 ISO-KF

Number of feedthroughs	1
Voltage, per pole	50 V
Current, per pole	5000 A
Insulator	Duroplast
Tightness	$1 \cdot 10^{-9}$ mbar l/s
Seal	Viton®
Pressure min.	$1 \cdot 10^{-8}$ mbar
Pressure max.	2.5 bar
Bakeout temperature	110 °C
Housing	Aluminium

Pressure max. 10 bar with external centering ring, Current of 5000 A only with water cooling.

Ordering Number

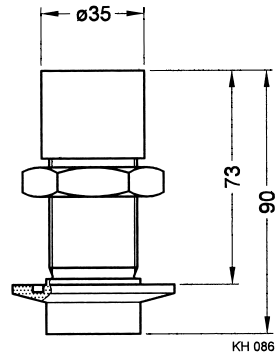
Feedthrough	PF 264 018-T
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Accessories

Current connection with water cooling	PF 296 026-T
Straight electrode	PF 296 014-X
Angle electrode	PF 296 016-X
T electrode	PF 296 018-X

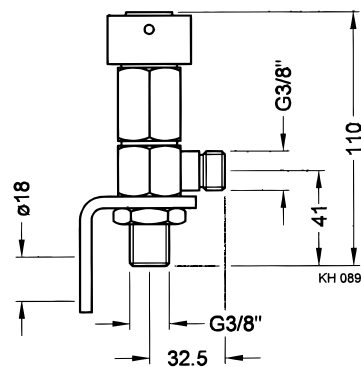


Feedthrough (in mm)



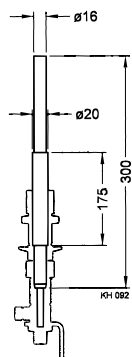
PF 264 018-T

Current connection with water cooling (in mm)



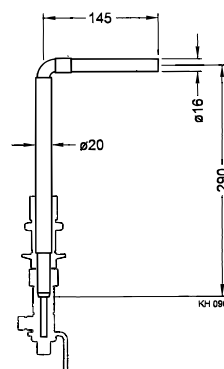
PF 296 026-T

Straight electrode



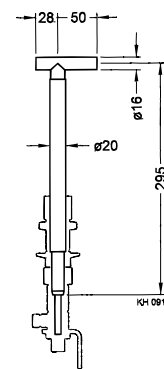
PF 296 014-X

Angle electrode



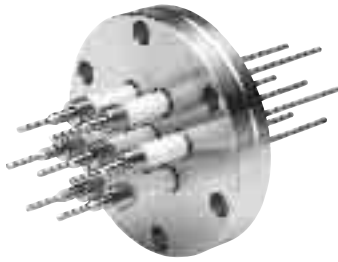
PF 296 016-X

T electrode



PF 296 018-X

Electric feedthrough CF



► Measuring current feedthrough
DN 40 CFF for ultra-high vacuum
applications

Technical data

	UMD 440	UMD 940
Connector	DN 40 CFF	DN 40 CF-F
Number of feedthroughs	4	9
Voltage, per pole	1 kV	1 kV
Current, per pole	8 A	8 A
Insulator	UMK 002, Ceramic	UMK 002, Ceramic
Conductor	Stainless Steel	Stainless Steel
Tightness	$1 \cdot 10^{-10}$ mbar l/s	$1 \cdot 10^{-10}$ mbar l/s
Pressure min.	$1 \cdot 10^{-10}$ mbar	$1 \cdot 10^{-10}$ mbar
Pressure max.	2 bar	2 bar
Bakeout temperature	400 °C	400 °C
Temperature rise at max. current	40 °C	40 °C
Flange	Stainless Steel	Stainless Steel
Weight	0.3 kg	0.4 kg

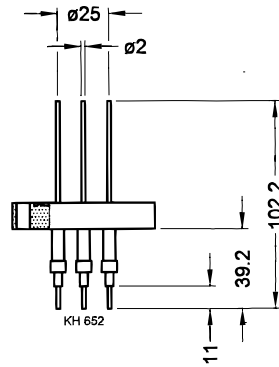
Ordering Number

Feedthrough	PF 671 011-X	PF 671 013-X
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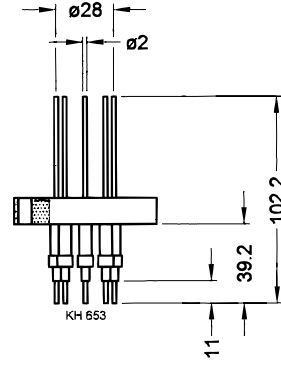
Accessories

	Package 5 pieces	Package 10 pieces
Outer connector	PF 697 016-T	PF 697 018-T
Inner connection piece	PF 697 017-T	PF 697 019-T

Feedthrough (in mm)

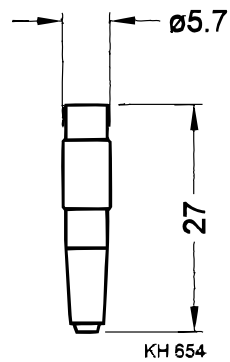


PF 671 011-X

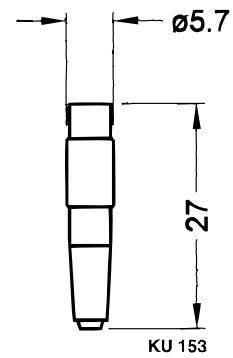


PF 671 013-X

Outer connector (in mm)

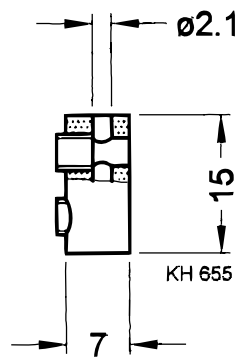


PF 697 016-T

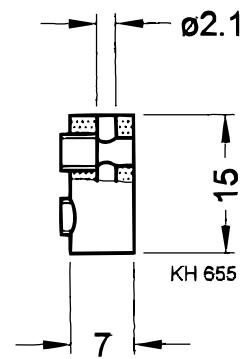


PF 697 018-T

Inner connection piece (in mm)



PF 697 017-T



PF 697 019-T

Electric feedthrough CF

Current and voltage feedthroughs

► For high voltages and currents



Technical data

	UKD 016	UKD 035	UKD 136	UKD 236
Connector	DN 16 CF-F	DN 40 CF-F	DN 40 CF-F	DN 40 CF-F
Number of feedthroughs	1	1	1	2
Voltage, per pole	4 kV	1 kV	12 kV	4 kV
Current, per pole	150 A	1000 A , max. current with water cooling	25 A	150 A
Insulator	UMK 006, Ceramic	UMK 012, Ceramic	UMK 106, Ceramic	UMK 006, Ceramic
Conductor	Copper	Copper	Stainless Steel	Copper
Tightness	$1 \cdot 10^{-10}$ mbar l/s	$1 \cdot 10^{-10}$ mbar l/s	$1 \cdot 10^{-10}$ mbar l/s	$1 \cdot 10^{-10}$ mbar l/s
Pressure min.	$1 \cdot 10^{-10}$ mbar	$1 \cdot 10^{-10}$ mbar	$1 \cdot 10^{-10}$ mbar	$1 \cdot 10^{-10}$ mbar
Pressure max.	2 bar	2 bar	2 bar	2 bar
Bakeout temperature	400 °C	400 °C	400 °C	400 °C
Temperature rise at max. current	50 °C	40 °C	30 °C	50 °C
Flange	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
Weight	0.15 kg	0.5 kg	0.45 kg	0.45 kg

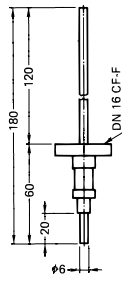
Ordering Number

Feedthrough	PF 660 010-X	PF 651 012-X	PF 651 010-X	PF 661 010-X
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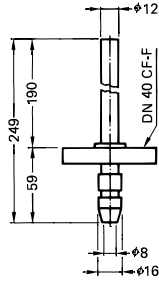
Accessories

	Package 2 pieces	Package 1 piece	Package 2 pieces	Package 1 piece
Outer connector	PF 696 011-T	PF 696 014-T	PF 696 011-T	PF 696 011-T
Inner connection piece	PF 696 013-T	PF 696 018-T	PF 696 013-T	PF 696 013-T
Outer connector water cooled	-	PF 696 016-T	-	-

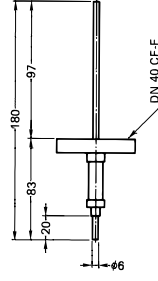
Feedthrough (in mm)



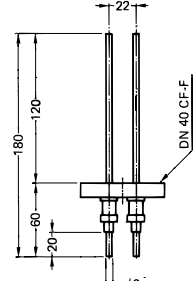
PF 660 010-X



PF 651 012-X

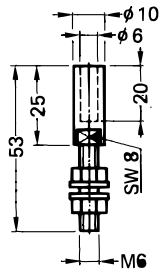


PF 651 010-X

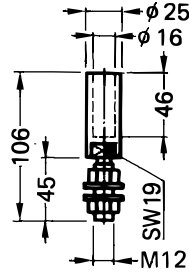


PF 661 010-X

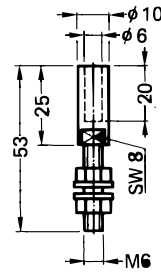
Outer connector (in mm)



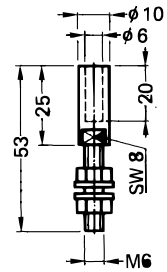
PF 696 011-T



PF 696 014-T

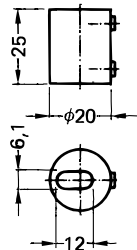


PF 696 011-T

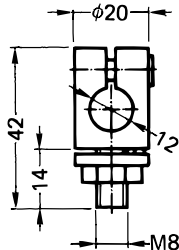


PF 696 011-T

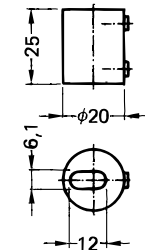
Inner connection piece (in mm)



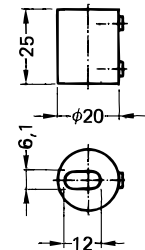
PF 696 013-T



PF 696 018-T

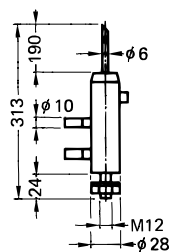


PF 696 013-T



PF 696 013-T

Outer connector, water cooled (in mm)



PF 696 016-T

Coaxial feedthroughs DN 16 ISO-KF

► With BNC and MHV plug connection



Technical data

	BNC	MHV
Connector	DN 16 ISO-KF	DN 16 ISO-KF
Number of feedthroughs	1	1
Voltage AC/50Hz	0.35 kV	3.5 kV
Voltage DC	0.5 kV	5 kV
Current	3 A	3 A
Frequency	150 MHz	-
Impedance	50-60 Ohm	-
Insulation resistance at 20°C	$1 \cdot 10^{10}$ Ohm	$1 \cdot 10^{10}$ Ohm
Tightness	$1 \cdot 10^{-9}$ mbar l/s	$1 \cdot 10^{-9}$ mbar l/s
Feedthrough	Al ₂ O ₃	Al ₂ O ₃
Pressure min.	$1 \cdot 10^{-8}$ mbar	$1 \cdot 10^{-8}$ mbar
Pressure max.	2.5 bar	2.5 bar
Bakeout temperature: with connector	50 °C	50 °C
Bakeout temperature (with metal seal): without connector	200 °C	200 °C
Standard connection: Outside connector	UG 88/U	UG 932/U
Standard connection: Cable	RG 58/U	RG 59/U
Housing, flange, conductors	Stainless Steel	Stainless Steel
Weight	0.1 kg	0.1 kg

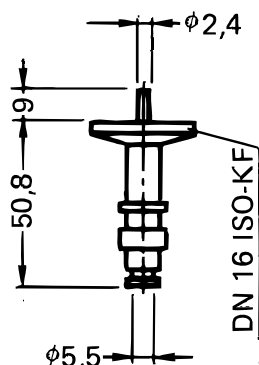
Pressure max. 10 bar with external centering ring and connector.

Bakeout temperature (without outside connector) 200 °C with aluminum seal, 150 °C with FPM seal.

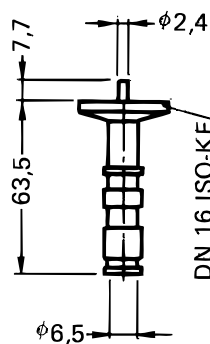
Ordering Number

Feedthrough	PF 272 016-X	PF 272 018-X
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Dimensions (in mm)



PF 272 016-X



PF 272 018-X

Coaxial feedthroughs DN 16 CF-F

- With BNC and MHV plug connection

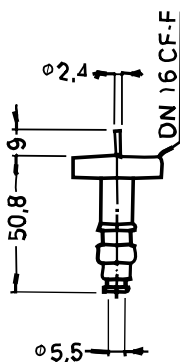
Technical data

	BNC	MHV
Connector	DN 16 CF-F	DN 16 CF-F
Number of feedthroughs	1	1
Voltage AC/50Hz	0.35 kV	3.5 kV
Voltage DC	0.5 kV	5 kV
Current	3 A	3 A
Frequency	150 MHz	-
Impedance	50-60 Ohm	-
Insulation resistance at 20°C	$1 \cdot 10^{10}$ Ohm	$1 \cdot 10^{10}$ Ohm
Tightness	$1 \cdot 10^{-10}$ mbar l/s	$1 \cdot 10^{-10}$ mbar l/s
Feedthrough	Al ₂ O ₃	Al ₂ O ₃
Pressure min.	$1 \cdot 10^{-10}$ mbar	$1 \cdot 10^{-10}$ mbar
Pressure max.	2.5 bar	2.5 bar
Bakeout temperature: with connector	50 °C	50 °C
Bakeout temperature (with metal seal): without connector	400 °C	-
Standard connection: Outside connector	UG 88/U	UG 932/U
Standard connection: Cable	RG 58/U	RG 59/U
Housing, flange, conductors	Stainless Steel	Stainless Steel
Weight	0.14 kg	0.14 kg
Pressure max.: 2 bar during bakeout		

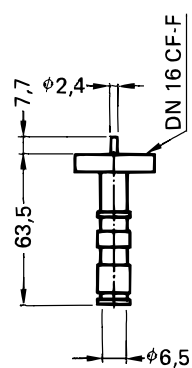
Ordering Number

Feedthrough	PF 670 012-X	PF 670 014-X
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Dimensions (in mm)



PF 670 012-X



PF 670 014-X

Thread lubricant C 100

- Prevents seizing of Stainless Steel screw connections at atmosphere even at high temperatures.
- Remains fully effective for at least 10 bakeout cycles.

Technical data

C 100

In packages of	28 g
Temperature stability	1000 °C

Ordering Number

Thread lubricant	B 2751 050 CA
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Sealing materials

- For sealing small leaks

Technical data

Rhodorsil 340

Sprayseal

Version	Paste	Spray
In packages of	100 g	170 g
Solvent	Axarel 6100/9100	Axarel 6100/9100
Temperature stability	-40 - 200 °C	350 °C

Ordering Number

Sealing materials	B 2753 420-K	B 2751 049-E
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Vacuum grease/oil

- For valve elastomer seals
- Low vapor pressure
- Good adhesive properties

Technical data

	Apiezon "M"	DC	OL 090
Vapor pressure at 100 °C	-	5·10 ⁻⁶ mbar	1·10 ⁻⁶ mbar
Vapor pressure at 20 °C	1·10 ⁻⁸ mbar	1·10 ⁻⁷ mbar	1·10 ⁻¹² mbar
Temperature stability	10 - 30 °C	-40 - 200 °C	-60 - 300 °C
Material	Mineral grease	Silicone grease	Fluorinated Fomblin oil
Resistance to chemicals	-	good	very good
Resistance to oxidation	-	very good	very good
Resistance to thermal decomposition	-	very good	good
Lubricity	good	good	good
In packages of	25 g	50 g	10 ml

Ordering Number

Vacuum gease/oil	B 8010 070 28	B 2751 020 DK	B N845 804-T
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Technical data

	FU 90	FM 090
Vapor pressure at 100 °C	1·10 ⁻⁶ mbar	1·10 ⁻⁷ mbar
Vapor pressure at 20 °C	1·10 ⁻¹² mbar	1·10 ⁻¹² mbar
Temperature stability	-20 - 200 °C	-60 - 300 °C
Material	Fluorinated Fomblin grease	Fluorinated Fomblin grease
Resistance to chemicals	very good	very good
Resistance to oxidation	very good	very good
Resistance to thermal decomposition	good	good
Lubricity	good	good/very good
In packages of	10 g	30 g

Ordering Number

Vacuum gease/oil	B 2751 055 UB	B N845 805-T
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**Valves for shutting off, venting
and dosing**

Contents

		Page
Selection aid		352
Special Icons in the Dimensions		353
Angle valves		
Manually operated	EVB...SA/SX	354
Electropneumatic	EVB...PA/PX	358
Electromagnetic	EVB...MA/MX	366
Electromagnetic, without vacuum feedthrough	EVC 110 M	368
Inline valves		
Manually operated	DVB...SX	370
Electropneumatic	DVB...PX	372
Gate Valves		
Manually operated	SVV...HA	374
Electropneumatic	SVV...PA	378
Bellows-sealed gate valves		
Manually operated	SVV...HM/HF	382
Electropneumatic	SVV...PM/PF	384
Mini angle valves		
Manually operated	EVI 005 S	386
Electropneumatic	EVI 005/105 P	388
Electromagnetic	EVI 005 M	390
Mini inline valves		
Electromagnetic	DVI 005/205 M	392
Special Valves		
All-metal angle valves, manually operated	UVH 016 – UVH 063 VI/CU	394
Venting valve, manually operated	FVB 010 HA/HX	396
Pressure relief valve	AVA 016 X	397
Rough gas dosing valve	EVD 010 H	398
Gas dosing/shut-off valve	EVN 116	399
All-metal regulating valve	UDV 040/046/146	400
Control unit for all-metal gas dosing valve		402
Overview gas dosing systems		403
Control valves for gas dosing systems	EVR, RME	404
Control unit gas dosing system	RVC 300	406
Interface for control valve	EVR 116	408













Selection aid

Type of actuation, Type	Designation	Nominal diameter																Page	
		ISO-KF					ISO-K					CF							
		DN 5 - Mini	DN 10	DN 16	DN 25	DN 40	DN 63	DN 100	DN 160	DN 200	DN 250	DN 16	DN 40	DN 63	DN 100	DN 160	DN 200	DN 250	
Manual																			
Angle, with bellows feedthrough	EVI 005 S	●																	386
	EVB...SA/SX			●	●	●													354
	EVB...SA/SX						●	●											356
Angle, all metal	UVH 016 - UVH 063 VI/CU											●	●	●					394
Inline, with bellows feedthrough	DVB...SX			●	●	●													370
Gate valve	SVV...HA			●	●	●													374
	SVV...HA						●	●	●										376
Bellows-sealed gate valve	SVV...HM/HF												●	●	●	●	●		382
Electropneumatic																			
Angle, with bellows feedthrough	EVI 005/105 P	●																	388
	EVB...PA			●	●	●													358
	EVB...PX			●	●	●													360
	EVB...PA						●	●	●										362
	EVB...PX						●	●											364
Inline, with bellows feedthrough	DVB...PX			●	●	●													372
Gate valve	SVV...PA			●	●	●													378
	SVV...PA						●	●	●	●	●								380
Bellows-sealed gate valve	SVV...PM/PF												●	●	●	●	●	●	384
Electromagnetic																			
Angle, without vacuum feedthrough	EVI 005 M	●																	390
	EVC 110 M		●																368
Angle, with bellows feedthrough	EVB...MA/MX			●	●	●													366
Inline, without vacuum feedthrough	DVI 005/205 M		●																392
Special valves																			
Venting valve, manually operated	FVB 010 HA/HX		●																396
Pressure relief valve	AVA 016 X			●															397
Rough gas and dosing valve	EVD 010 H		●																398
Gas dosing/shut-off valve	EVN 116			●															399
All metal regulating valve	UDV 040/046/146												●						400
Gas dosing system regulating valve	EVR 116 + RME 005	●																	404



Gas dosing valves	Type	Gas flow at an inlet pressure of 1 bar (mbar l/s)														Page
		10^{-10}	10^{-9}	10^{-8}	10^{-7}	10^{-6}	10^{-5}	10^{-4}	10^{-3}	10^{-2}	10^{-1}	10^0	10^1	10^2	10^3	
Manually	EVD 010 H														40 - 1700	398
	EVN 116														$5 \cdot 10^{-6}$ - 1000	399
	UDV 040/046														10^{-10} - 600	400
Automatic	EVR 116 + RVC 300														$5 \cdot 10^{-6}$ - 1250	404
	RME 005 + RVC 300														10^{-5} - 100	406
	UDV 146 + RVG 050 C														10^{-10} - 600	402

Special Icons in the Dimensions

	Position sensor connection		Leak detection bore
	Electrical connection		Rotatable
	Compressed air connection		Valve seat side
	Required height		Direction of flow
	Position indicator		For mounting



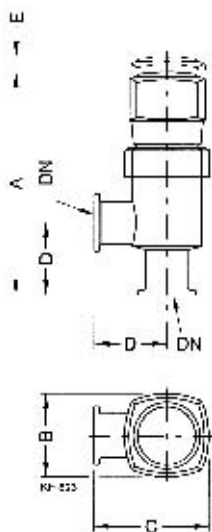
Angle valves, manually actuated

ISO-KF, rotary knob



- ▶ Six-stage rotary knob
- ▶ Quick open with 130 ° rotation
- ▶ Service life of 10 million cycles
- ▶ For general vacuum applications
- ▶ With condutions values from 10, 20, 30, 50 and 100 %

Dimensions



DN 16 ISO-KF, DN 25 ISO-KF, DN 40 ISO-KF

General technical data

Tightness	$1 \cdot 10^{-9}$ mbar l/s
Seal	Viton®
Pressure min.	$1 \cdot 10^{-8}$ mbar
Feedthrough	Bellows, Stainless Steel
Service life	10000000 cycles
Differential pressure in closing direction	2 bar

Technical data

Flange (in)	DN 16 ISO-KF	DN 25 ISO-KF	DN 40 ISO-KF
Dimensions:			
A:	118.3 mm	154.5 mm	173.8 mm
B:	44 mm	58 mm	82 mm
C:	62 mm	79 mm	106 mm
D:	40 mm	50 mm	65 mm
E:	5 mm	10 mm	12 mm
Pressure max.	6 bar	6 bar	6 bar
Conductance for molecular flow	4.5 l/s	16 l/s	40 l/s
Can be opened to a pressure difference of	2 bar	3 bar	4 bar
Differential pressure in opening direction	2 bar	2 bar	1.5 bar

Aluminium housing

	EVB 016 SA	EVB 025 SA	EVB 040 SA
Bakeout temperature: housing	80 °C	80 °C	80 °C
Bakeout temperature: actuator	50 °C	50 °C	50 °C
Weight	0.3 kg	0.4 kg	0.55 kg
Ordering number	PF A31 002	PF A41 002	PF A51 002

Stainless Steel housing

	EVB 016 SX	EVB 025 SX	EVB 040 SX
Bakeout temperature: housing	150 °C	150 °C	150 °C
Bakeout temperature: actuator	50 °C	50 °C	50 °C
Weight	0.43 kg	0.68 kg	1.35 kg
Ordering number	PF A31 032	PF A41 032	PF A51 032



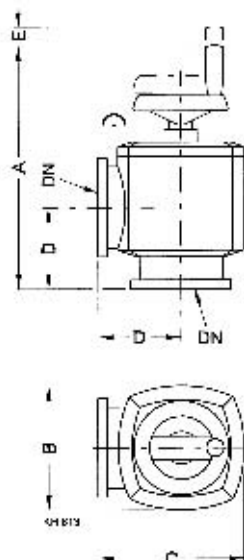
Angle valves, manually actuated

ISO-K, hand wheel



- ▶ Spindle drive with hand wheel, optimal indication of open and closed positions
- ▶ Continuous opening
- ▶ Service life of 1.5 million cycles
- ▶ For general vacuum applications

Dimensions



DN 63 ISO-K, DN 100 ISO-K

General technical data

Tightness	$1 \cdot 10^{-9}$ mbar l/s
Seal	Viton®
Pressure min.	$1 \cdot 10^{-8}$ mbar
Feedthrough	Bellows, Stainless Steel
Service life	1500000 cycles
Differential pressure in closing direction	1.5 bar

Technical data

Flange (in)	DN 63 ISO-K	DN 100 ISO-K
Dimensions:		
A:	266 mm	320 mm
B:	124 mm	164 mm
C:	150 mm	190 mm
D:	88 mm	108 mm
E:	20 mm	25 mm
Pressure max.	1.5 bar	1.5 bar
Conductance for molecular flow	140 l/s	330 l/s
Can be opened to a pressure difference of	1.5 bar	1.5 bar
Differential pressure in opening direction	1.5 bar	1.5 bar
Differential pressure in closing direction	1.5 bar	1.5 bar

Aluminium housing

	EVB 063 SA	EVB 100 SA
Bakeout temperature: housing	150 °C	150 °C
Bakeout temperature: actuator	60 °C	60 °C
Weight	3.6 kg	6.1 kg
Ordering number	PF B12 001	PF B22 001

Stainless Steel housing

	EVB 063 SX	EVB 100 SX
Bakeout temperature: housing	150 °C	150 °C
Bakeout temperature: actuator	60 °C	60 °C
Weight	6.5 kg	11.1 kg
Ordering number	PF B12 031	PF B22 031



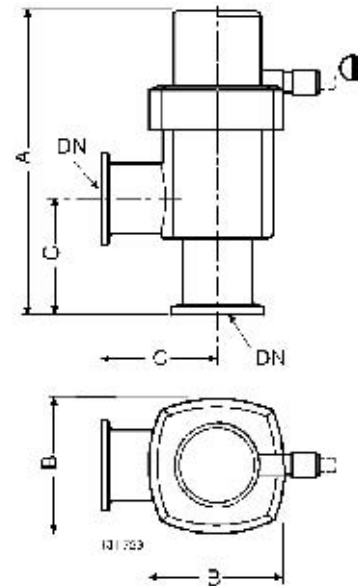
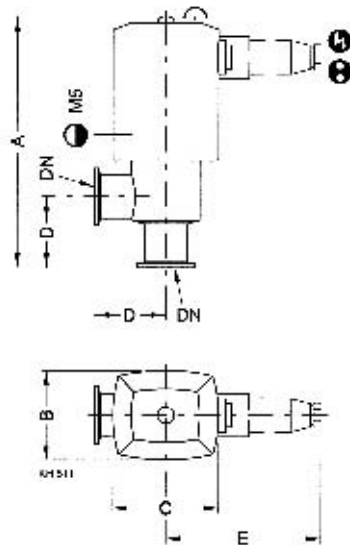
Angle valve, pneumatically activated

ISO-KF, aluminium housing



- ▶ Visual indication of open and closed positions
- ▶ Electrical position indicator for open and closed positions
- ▶ Service life of 10 million cycles
- ▶ For general vacuum applications

Dimensions



With and without pilot valve

Without pilot valve and position indicator

General technical data

Bakeout temperature: actuator, pilot valve	50 °C
Bakeout temperature: housing	80 °C
Tightness	1·10 ⁻⁹ mbar l/s
Seal	Viton®
Pressure min.	1·10 ⁻⁸ mbar
Compressed air (overpressure) max.	7 bar
Compressed air (overpressure) min.	3 bar
Feedthrough	Bellows, Stainless Steel
Position feedback: Load capacity	250 V AC / 0.1 A; 50 V DC / 0.25 A
Service life	10000000 cycles
Power pilot valve	1 W

Technical data

	EVB 016 PA	EVB 025 PA	EVB 040 PA
Flange (in)	DN 16 ISO-KF	DN 25 ISO-KF	DN 40 ISO-KF
Dimensions with and without pilot valve:			
A:	154 mm	176 mm	196.5 mm
B:	51 mm	63 mm	83 mm
C:	60 mm	74 mm	98 mm
D:	40 mm	50 mm	65 mm
E:	100 mm	108 mm	120 mm
Dimensions without pilot valve and position indicator:			
A:	109 mm	132 mm	161.8 mm
B:	44 mm	58 mm	82 mm
C:	40 mm	50 mm	65 mm
Differential pressure in opening direction	2 bar	2 bar	1.5 bar
Differential pressure in closing direction	4 bar	4 bar	2 bar
Compressed air volume	5.5 cm ³	12.1 cm ³	26.2 cm ³
Pressure max.	4 bar	4 bar	2.5 bar
Conductance for molecular flow	4.5 l/s	16 l/s	40 l/s
Can be opened to a pressure difference of	4 bar	4 bar	2 bar
Opening time	100 ms	110 ms	150 ms

with pilot valve

Supply	24 V AC	24 V AC	24 V AC
Closing time	200 ms	290 ms	250 ms
Weight	0.4 kg	0.5 kg	0.7 kg
Ordering number	PF A38 102	PF A48 102	PF A58 102
Supply	24 V DC	24 V DC	24 V DC
Closing time	200 ms	290 ms	250 ms
Weight	0.4 kg	0.5 kg	0.7 kg
Ordering number	PF A38 202	PF A48 202	PF A58 202
Supply	100-115 V AC	100-115 V AC	100-115 V AC
Closing time	200 ms	290 ms	250 ms
Weight	0.4 kg	0.5 kg	0.7 kg
Ordering number	PF A38 402	PF A48 402	PF A58 402
Supply	200-240 V AC	200-240 V AC	200-240 V AC
Closing time	200 ms	290 ms	250 ms
Weight	0.4 kg	0.5 kg	0.7 kg
Ordering number	PF A38 502	PF A48 502	PF A58 502
Supply	24 V DC, normally open	24 V DC, normally open	24 V DC, normally open
Closing time	200 ms	290 ms	250 ms
Weight	0.4 kg	0.5 kg	0.7 kg
Ordering number	PF A38 203	PF A48 203	PF A58 203

without pilot valve

Weight	0.3 kg	0.4 kg	0.6 kg
Ordering number	PF A36 002	PF A46 002	PF A56 002

without pilot valve and position indicator

Weight	0.3 kg	0.4 kg	0.6 kg
Ordering number	PF A35 003	PF A45 003	PF A55 003

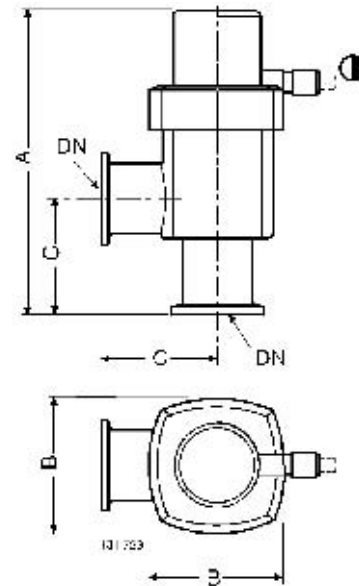
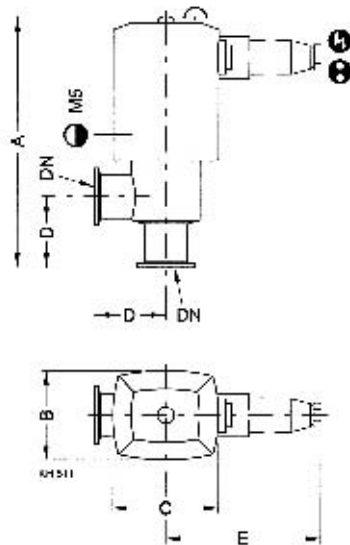
Angle valve, pneumatically activated

ISO-KF, Stainless Steel housing



- ▶ Visual indication of open and closed positions
- ▶ Electrical position indicator of open and closed positions
- ▶ Service life of 10 million cycles
- ▶ For general vacuum applications

Dimensions



With and without pilot valve

Without pilot valve and position indicator

General technical data

Bakeout temperature: actuator, pilot valve	50 °C
Bakeout temperature: housing	150 °C
Tightness	1·10 ⁻⁹ mbar l/s
Seal	Viton®
Pressure min.	1·10 ⁻⁸ mbar
Compressed air (overpressure) max.	7 bar
Compressed air (overpressure) min.	3 bar
Feedthrough	Bellows, Stainless Steel
Position feedback: Load capacity	250 V AC / 0.1 A; 50 V DC / 0.25 A
Service life	10000000 cycles
Power pilot valve	1 W

Technical data

	EVB 016 PX	EVB 025 PX	EVB 040 PX
Flange (in)	DN 16 ISO-KF	DN 25 ISO-KF	DN 40 ISO-KF
Dimensions with and without pilot valve:			
A:	154 mm	176 mm	196.5 mm
B:	51 mm	63 mm	83 mm
C:	60 mm	74 mm	98 mm
D:	40 mm	50 mm	65 mm
E:	100 mm	108 mm	120 mm
Dimensions without pilot valve and position indicator:			
A:	109 mm	132 mm	161.8 mm
B:	44 mm	58 mm	82 mm
C:	40 mm	50 mm	65 mm
Differential pressure in opening direction	2 bar	2 bar	1.5 bar
Differential pressure in closing direction	4 bar	4 bar	2 bar
Compressed air volume	5.5 cm ³	12.1 cm ³	26.2 cm ³
Pressure max.	4 bar	4 bar	2.5 bar
Conductance for molecular flow	4.5 l/s	16 l/s	40 l/s
Can be opened to a pressure difference of	4 bar	4 bar	2 bar
Opening time	100 ms	110 ms	150 ms

with pilot valve

Supply	24 V AC	24 V AC	24 V AC
Closing time	200 ms	290 ms	250 ms
Weight	0.5 kg	0.7 kg	1.5 kg
Ordering number	PF A38 132	PF A48 132	PF A58 132
Supply	24 V DC	24 V DC	24 V DC
Closing time	200 ms	290 ms	250 ms
Weight	0.5 kg	0.7 kg	1.5 kg
Ordering number	PF A38 232	PF A48 232	PF A58 232
Supply	100-115 V AC	100-115 V AC	100-115 V AC
Closing time	200 ms	290 ms	250 ms
Weight	0.5 kg	0.7 kg	1.5 kg
Ordering number	PF A38 432	PF A48 432	PF A58 432
Supply	200-240 V AC	200-240 V AC	200-240 V AC
Closing time	200 ms	290 ms	250 ms
Weight	0.5 kg	0.7 kg	1.5 kg
Ordering number	PF A38 532	PF A48 532	PF A58 532
Supply	24 V DC, normally open	24 V DC, normally open	24 V DC, normally open
Closing time	200 ms	290 ms	250 ms
Weight	0.5 kg	0.7 kg	1.5 kg
Ordering number	PF A38 233	PF A48 233	PF A58 233

without pilot valve

Weight	0.4 kg	0.6 kg	1.4 kg
Ordering number	PF A36 032	PF A46 032	PF A56 032

without pilot valve and position indicator

Weight	0.4 kg	0.6 kg	1.4 kg
Ordering number	PF A35 033	PF A45 033	PF A55 033

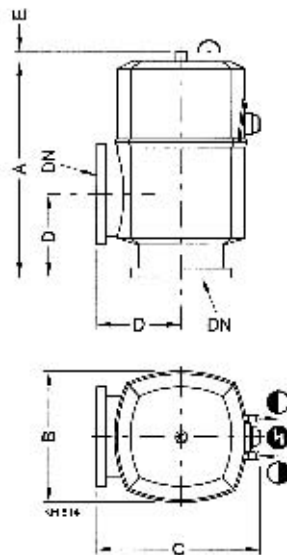
Angle valve, pneumatically activated

ISO-K, aluminium housing



- ▶ Visual indication of open and closed positions
- ▶ Electrical position indicator for open and closed positions
- ▶ Service life of 1.5 million cycles
- ▶ For general vacuum applications

Dimensions



With and without pilot valve

General technical data

Bakeout temperature: actuator, pilot valve	60 °C
Bakeout temperature: housing	80 °C
Tightness	$1 \cdot 10^{-9}$ mbar l/s
Seal	Viton®
Pressure min.	$1 \cdot 10^{-8}$ mbar
Power pilot valve	3, 1/2, 2 VA
Compressed air (overpressure) max.	8 bar
Compressed air (overpressure) min.	4 bar
Feedthrough	Bellows, Stainless Steel
Position feedback: Load capacity	250 V AC / 0.125 A; 50 V DC / 0.25 A
Service life	1500000 cycles

Technical data

	EVB 063 PA	EVB 100 PA	EVB 160 PA
Flange (in)	DN 63 ISO-K	DN 100 ISO-K	DN 160 ISO-K
Dimensions:			
A:	250 mm	282 mm	366 mm
B:	124 mm	164 mm	215 mm
C:	168 mm	208 mm	264 mm
D:	88 mm	108 mm	138 mm
E:	14 mm	14 mm	14 mm
Differential pressure in opening direction	1.5 bar	1.5 bar	1.5 bar
Differential pressure in closing direction	1.5 bar	1.5 bar	1.5 bar
Compressed air volume	75 cm ³	195 cm ³	570 cm ³
Pressure max.	4 bar	4 bar	4 bar
Conductance for molecular flow	140 l/s	330 l/s	800 l/s
Can be opened to a pressure difference of	1.5 bar	1.5 bar	1.5 bar
Opening time	300 ms	400 ms	600 ms
Closing time	300 ms	400 ms	650 ms

with pilot valve

Supply	24 V AC	24 V AC	24 V AC
Weight	4 kg	6.7 kg	11.4 kg
Ordering number	PF B18 101	PF B28 101	PF B38 101
Supply	24 V DC	24 V DC	24 V DC
Weight	4 kg	6.7 kg	11.4 kg
Ordering number	PF B18 201	PF B28 201	PF B38 201
Supply	100-115 V AC	100-115 V AC	100-115 V AC
Weight	4 kg	6.7 kg	11.4 kg
Ordering number	PF B18 401	PF B28 401	PF B38 401
Supply	200-240 V AC	200-240 V AC	200-240 V AC
Weight	4 kg	6.7 kg	11.4 kg
Ordering number	PF B18 501	PF B28 501	PF B38 501

without pilot valve

Weight	4 kg	6.7 kg	11.4 kg
Ordering number	PF B16 002	PF B26 002	PF B36 002



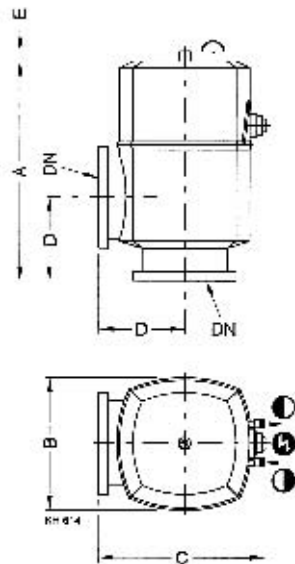
Angle valve, pneumatically activated

ISO-K, steel housing



- ▶ Visual indication of open and closed positions
- ▶ Electrical position indicator of open and closed positions
- ▶ Service life of 1.5 million cycles
- ▶ For general vacuum applications

Dimensions



With and without pilot valve

General technical data

Bakeout temperature: actuator, pilot valve	60 °C
Bakeout temperature: housing	150 °C
Tightness	$1 \cdot 10^{-9}$ mbar l/s
Seal	Viton®
Pressure min.	$1 \cdot 10^{-8}$ mbar
Power pilot valve	3.1/2.2 VA
Compressed air (overpressure) max.	8 bar
Compressed air (overpressure) min.	4 bar
Feedthrough	Bellows, Stainless Steel
Position feedback: Load capacity	250 V AC / 0.125 A; 50 V DC / 0.25 A
Service life	1500000 cycles

Technical data

	EVB 063 PX	EVB 100 PX
Flange (in)	DN 63 ISO-K	DN 100 ISO-K
Dimensions:		
A:	250 mm	282 mm
B:	124 mm	164 mm
C:	168 mm	208 mm
D:	88 mm	108 mm
E:	14 mm	14 mm
Differential pressure in opening direction	1.5 bar	1.5 bar
Differential pressure in closing direction	1.5 bar	1.5 bar
Compressed air volume	75 cm ³	195 cm ³
Pressure max.	4 bar	4 bar
Conductance for molecular flow	140 l/s	330 l/s
Can be opened to a pressure difference of	1.5 bar	1.5 bar
Opening time	300 ms	400 ms
Closing time	300 ms	400 ms

with pilot valve

Supply	24 V AC	24 V AC
Weight	6.8 kg	11.7 kg
Ordering number	PF B18 131	PF B28 131
Supply	24 V DC	24 V DC
Weight	6.8 kg	11.7 kg
Ordering number	PF B18 231	PF B28 231
Supply	100-115 V AC	100-115 V AC
Weight	6.8 kg	11.7 kg
Ordering number	PF B18 431	PF B28 431
Supply	200-240 V AC	200-240 V AC
Weight	6.8 kg	11.7 kg
Ordering number	PF B18 531	PF B28 531

without pilot valve

Weight	6.8 kg	11.7 kg
Ordering number	PF B16 032	PF B26 032



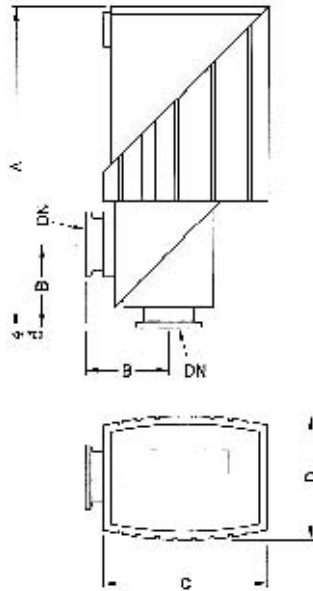
Angle valve, electromagnetically activated

ISO-KF



- ▶ Modulation via separate control voltage is possible
- ▶ Electrical position indicator of open and closed positions
- ▶ Service life of 2 million cycles
- ▶ For general vacuum applications

Dimensions



DN 16 ISO-KF, DN 25 ISO-KF, DN 40 ISO-KF

General technical data

Pickup/holding current	5.2 / 0.7 A
Pickup power	400 W
Bakeout temperature: actuator, powerless	50 °C
Bakeout temperature: housing	120 °C
Tightness	1·10 ⁻⁹ mbar l/s
Seal	Viton®
Pressure min.	1·10 ⁻⁸ mbar
Feedthrough	Bellows, Stainless steel
Position feedback: Load capacity	30 V DC / 0.1 A
Service life	2000000 cycles
Supply	85-248 V, 50/60 Hz

Technical data

	EVB 016 MA/MX	EVB 025 MA/MX	EVB 040 MA/MX
Flange (in)	DN 16 ISO-KF	DN 25 ISO-KF	DN 40 ISO-KF
Dimensions:			
A:	160 mm	194 mm	230 mm
B:	40 mm	50 mm	65 mm
C:	84.5 mm	96.5 mm	119.5 mm
D:	59 mm	75 mm	96 mm
Differential pressure in opening direction	1.3 bar	1.3 bar	1.3 bar
Differential pressure in closing direction	1.3 bar	1.3 bar	1.3 bar
Pressure max.	1.3 bar	1.3 bar	1.3 bar
Conductance for molecular flow	4 l/s	16 l/s	40 l/s
Can be opened to a pressure difference of	1.3 bar	1.3 bar	1.3 bar
Opening time	0.1 s	0.12 s	0.23 s
Switching frequency at 40°C	30 rpm	30 rpm	30 rpm
Switching frequency at 50°C	20 rpm	20 rpm	20 rpm
Closing time	240 ms	240 ms	700 ms
Control voltage	15 - 30 V DC	15 - 30 V DC	15 - 30 V DC
Control current	3 - 5 mA	3 - 5 mA	3 - 5 mA

Aluminium housing

	EVB 016 MA	EVB 025 MA	EVB 040 MA
Weight	1.3 kg	2.2 kg	4 kg
Ordering number	PF A34 505	PF A44 505	PF A54 505

Stainless Steel housing

	EVB 016 MX	EVB 025 MX	EVB 040 MX
Weight	1.45 kg	2.9 kg	5.4 kg
Ordering number	PF A34 535	PF A44 535	PF A54 535



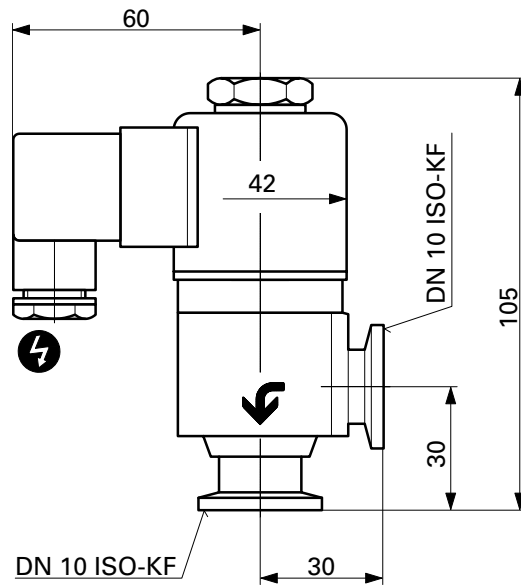
Angle valve, electromagnetically activated

DN 10 ISO-KF, without feedthrough



- ▶ Aluminium housing
- ▶ Service life of 1.5 million cycles
- ▶ For general vacuum applications
- ▶ No vacuum feedthrough

Dimensions (in mm)



EVC 110 M

General technical data

Bakeout temperature: actuator	80 °C
Bakeout temperature: housing	150 °C
Seal	Viton®
Pressure max.	10 bar
Pressure min.	1·10 ⁻⁸ mbar
Service life	1500000 cycles

Technical data

EVC 110 M

Flange (in)	DN 10 ISO-KF
Pickup/holding power	35/15 VA
Tightness	1·10 ⁻⁹ mbar l/s
Differential pressure in opening direction	1 bar
Differential pressure in closing direction	10 bar
Housing	Aluminium
Weight	0.46 kg
Conductance for molecular flow	1 l/s
Can be opened to a pressure difference of	2 bar
Opening time	45 ms
Switching frequency	50 rpm
Closing time	60 ms

Angle valve

Supply	230 V, 50/60 Hz
Ordering number	PF A23 501
Supply	115 V, 50/60 Hz
Ordering number	PF A23 401
Supply	24 V, 50/60 Hz
Ordering number	PF A23 101
Supply	24 V DC
Ordering number	PF A23 201

Accessories

Order.-No.

Centering ring, Viton®/Aluminium, DN 10 ISO-KF	PF 110 110-T
Filter: port, centering and clamping ring	PT 413 607-T



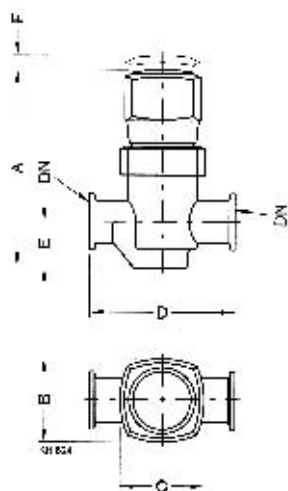
Inline-valves, manually activated

ISO-KF, rotary knob, Stainless Steel housing



- ▶ Six-stages rotary knob
- ▶ Quick open with 130 ° rotation
- ▶ Service life of 10 million cycles
- ▶ For general vacuum applications

Dimensions



DN 16 ISO-KF, DN 25 ISO-KF, DN 40 ISO-KF

General technical data

Bakeout temperature: actuator	50 °C
Bakeout temperature: housing	150 °C
Tightness	1·10 ⁻⁹ mbar l/s
Seal	Viton®
Pressure min.	1·10 ⁻⁸ mbar
Feedthrough	Bellows , Stainless Steel
Service life	10000000 cycles

Technical data

	DVB 016 SX	DVB 025 SX	DVB 040 SX
Flange (in)	DN 16 ISO-KF	DN 25 ISO-KF	DN 40 ISO-KF
Dimensions:			
A:	100.3 mm	136 mm	154.3 mm
B:	44 mm	58 mm	82 mm
C:	44 mm	58 mm	82 mm
D:	80 mm	100 mm	130 mm
E:	22 mm	31.5 mm	45.5 mm
F:	5 mm	10 mm	12 mm
Differential pressure in opening direction	2 bar	2 bar	1.5 bar
Differential pressure in closing direction	2 bar	2 bar	2 bar
Pressure max.	6 bar	6 bar	6 bar
Weight	0.48 kg	0.7 kg	1.4 kg
Conductance for molecular flow	2.5 l/s	8 l/s	20 l/s
Can be opened to a pressure difference of	2 bar	3 bar	4 bar

Stainless Steel housing

Ordering number	PF D31 032	PF D41 032	PF D51 032
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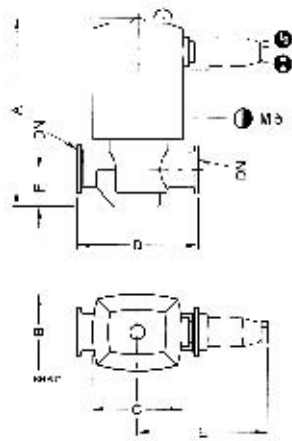
Inline-valve, pneumatically activated, with position indicator

ISO-KF, Stainless Steel housing



- ▶ Visual indication of open and closed positions
- ▶ Electrical position indicator of open and closed positions
- ▶ Service life of 10 million cycles
- ▶ For general vacuum applications

Dimensions



With and without pilot valve

General technical data

Bakeout temperature: actuator, pilot valve	50 °C
Bakeout temperature: housing	150 °C
Tightness	$1 \cdot 10^{-9}$ mbar l/s
Seal	Viton®
Power pilot valve	1 W
Compressed air (overpressure) max.	7 bar
Compressed air (overpressure) min.	3 bar
Pressure min.	$1 \cdot 10^{-8}$ mbar
Feedthrough	Bellows, Stainless Steel
Position feedback: Load capacity	250 V AC / 0.1 A; 50 V DC / 0.25 A
Service life	10000000 cycles

Technical data

	DVB 016 PX	DVB 025 PX	DVB 040 PX
Flange (in)	DN 16 ISO-KF	DN 25 ISO-KF	DN 40 ISO-KF
Dimensions:			
A:	135.9 mm	157.4 mm	177 mm
B:	51 mm	63 mm	83 mm
C:	60 mm	74 mm	98 mm
D:	80 mm	100 mm	130 mm
E:	100 mm	108 mm	120 mm
F:	22 mm	31.5 mm	45.5 mm
Differential pressure in opening direction	2 bar	2 bar	1.5 bar
Differential pressure in closing direction	4 bar	4 bar	2 bar
Pressure max.	4 bar	4 bar	2.5 bar
Compressed air volume	5.5 cm ³	12.1 cm ³	26.2 cm ³
Conductance for molecular flow	2.5 l/s	8 l/s	20 l/s
Can be opened to a pressure difference of	4 bar	4 bar	2 bar
Opening time	100 ms	110 ms	150 ms

with pilot valve

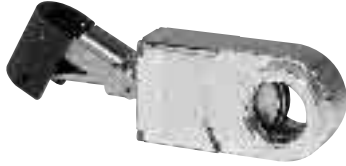
Supply	24 V AC	24 V AC	24 V AC
Closing time	200 ms	290 ms	250 ms
Weight	0.44 kg	0.9 kg	1.52 kg
Ordering number	PF D38 132	PF D48 132	PF D58 132
Supply	24 V DC	24 V DC	24 V DC
Closing time	200 ms	290 ms	250 ms
Weight	0.44 kg	0.9 kg	1.52 kg
Ordering number	PF D38 232	PF D48 232	PF D58 232
Supply	100 - 115 V AC	100 - 115 V AC	100 - 115 V AC
Closing time	200 ms	290 ms	250 ms
Weight	0.44 kg	0.9 kg	1.52 kg
Ordering number	PF D38 432	PF D48 432	PF D58 432
Supply	200 - 240 V AC	200 - 240 V AC	200 - 240 V AC
Closing time	200 ms	290 ms	250 ms
Weight	0.44 kg	0.9 kg	1.52 kg
Ordering number	PF D38 532	PF D48 532	PF D58 532
Supply	24 V DC, normally open	24 V DC, normally open	24 V DC, normally open
Closing time	200 ms	290 ms	250 ms
Weight	0.44 kg	0.9 kg	1.52 kg
Ordering number	PF D38 233	PF D48 233	PF D58 233

without pilot valve

Weight	0.42 kg	0.88 kg	1.5 kg
Ordering number	PF D36 032	PF D46 032	PF D56 032

Gate valve, manually activated

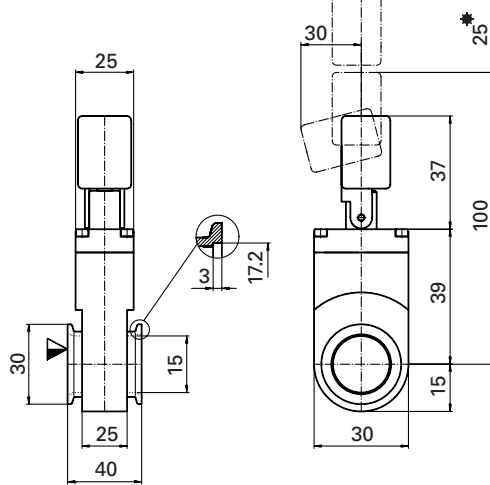
ISO-KF



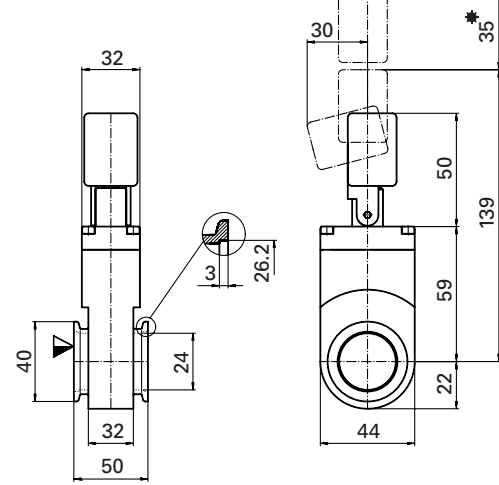
- ▶ Small footprint
- ▶ Low-cost valve for industrial applications
- ▶ Sealing: Linear feedthrough

Dimensions (in mm)

DN 16



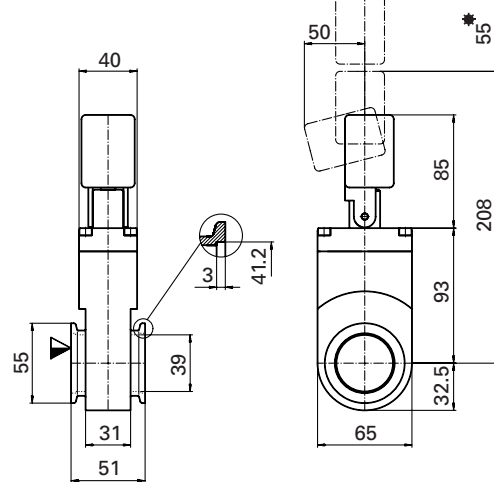
DN 25



SVV 016 HA

SVV 025 HA

DN 40



SVV 040 HA



General technical data

Actuator	Toggle lever
Tightness	$1 \cdot 10^{-9}$ mbar l/s
Seal	Viton®
Pressure min.	$1 \cdot 10^{-7}$ mbar
Feedthrough	Shaft feedthrough
Housing	Aluminium
Can be opened to a pressure difference of	$3 \cdot 10^1$ mbar
Valve plate	Stainless Steel

Technical data

	SVV 016 HA	SVV 025 HA	SVV 040 HA
Flange (in)	DN 16 ISO-KF	DN 25 ISO-KF	DN 40 ISO-KF
Bakeout temperature: actuator	80 °C	80 °C	80 °C
Bakeout temperature: housing	100 °C	100 °C	100 °C
Pressure max.	2 bar	2 bar	2 bar
Weight	0.4 kg	0.4 kg	0.7 kg
Conductance for molecular flow	10 l/s	34 l/s	140 l/s
Service life	50000 cycles	50000 cycles	50000 cycles

Gate valve

Ordering number	PF D31 000	PF D41 000	PF D51 000
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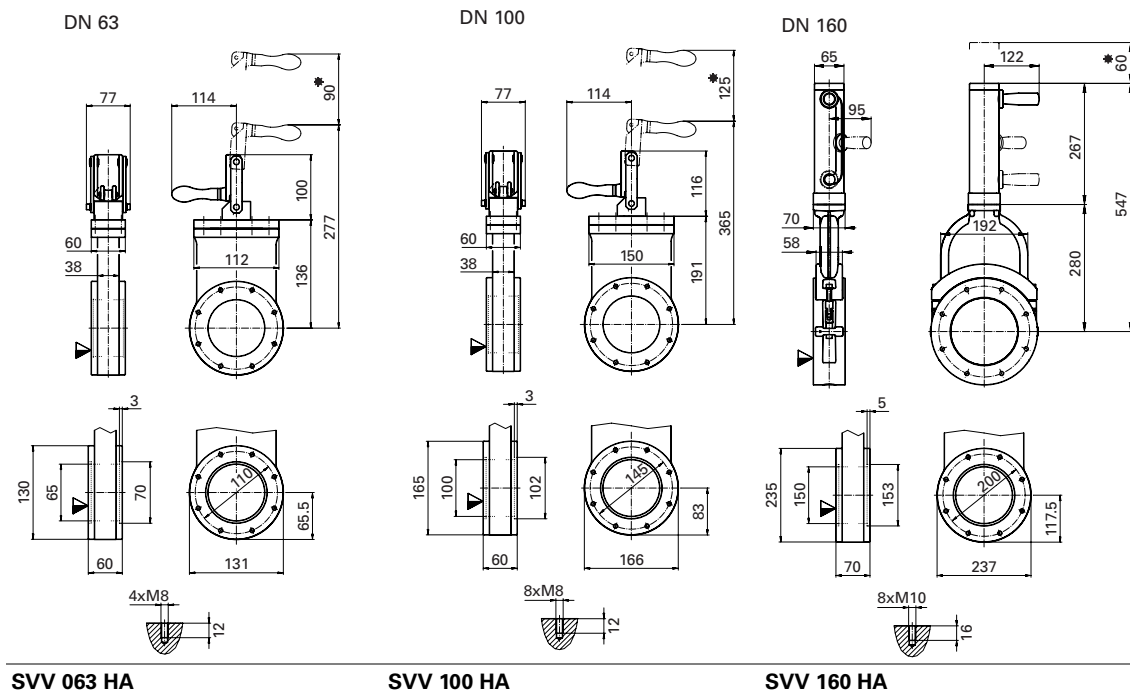
Gate valve, manually activated

ISO-F



- ▶ Small footprint
- ▶ Low-cost valve for industrial applications
- ▶ Sealing: Linear feedthrough

Dimensions (in mm)



General technical data

Tightness	1·10 ⁻⁹ mbar l/s
Seal	Viton®
Pressure min.	1·10 ⁻⁷ mbar
Feedthrough	Shaft feedthrough
Housing	Aluminium
Can be opened to a pressure difference of	3·10 ¹ mbar
Valve plate	Stainless Steel

Technical data

	SVV 063 HA	SVV 100 HA	SVV 160 HA
Flange (in)	DN 63 ISO-F	DN 100 ISO-F	DN 160 ISO-F
Actuator	Toggle lever	Toggle lever	Connecting rod
Bakeout temperature: actuator	80 °C	80 °C	80 °C
Bakeout temperature: housing	120 °C	120 °C	120 °C
Pressure max.	1.6 bar	1.6 bar	1.6 bar
Weight	3 kg	5 kg	9 kg
Conductance for molecular flow	550 l/s	2000 l/s	6000 l/s
Service life	50000 cycles	50000 cycles	100000 cycles

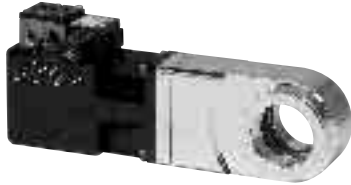
Gate valve

Ordering number	PF E11 000	PF E21 000	PF E31 001
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Gate valve, electropneumatically activated

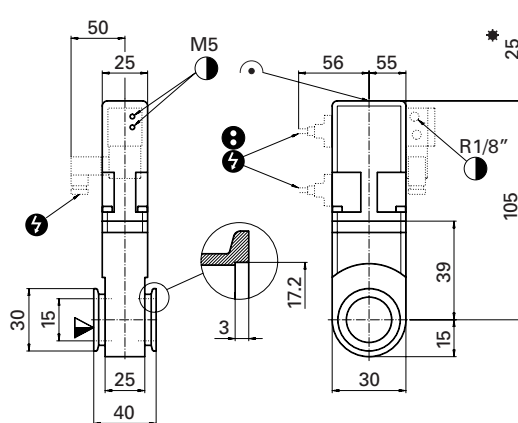
ISO-KF



- Small footprint
- Low-cost valve for industrial applications
- Sealing: Linear feedthrough

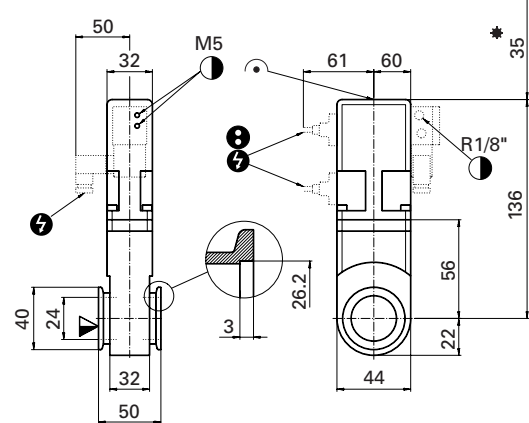
Dimensions (in mm)

DN 16



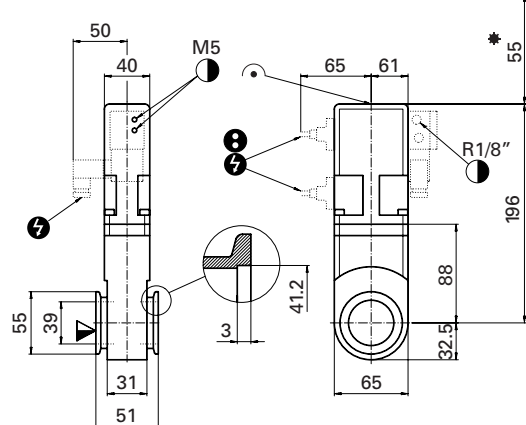
SVV 016 PA

DN 25



SVV 025 PA

DN 40



SVV 040 PA

General technical data

Bakeout temperature: actuator	50 °C
Bakeout temperature: housing	100 °C
Tightness	1·10 ⁻⁹ mbar l/s
Seal	Viton®
Pressure min.	1·10 ⁻⁷ mbar
Compressed air (overpressure) max.	7 bar
Compressed air (overpressure) min.	4.5 bar
Feedthrough	Shaft feedthrough
Housing	Aluminium
Position feedback: Load capacity	50 V/0,5 A
Can be opened to a pressure difference of	3·10 ¹ mbar
Valve plate	Stainless Steel

Technical data

	SVV 016 PA	SVV 025 PA	SVV 040 PA
Flange (in)	DN 16 ISO-KF	DN 25 ISO-KF	DN 40 ISO-KF
Pressure max.	2 bar	2 bar	2 bar
Compressed air volume	10 cm ³	30 cm ³	70 cm ³
Weight	0.8 kg	0.8 kg	1.2 kg
Conductance for molecular flow	10 l/s	34 l/s	140 l/s
Closing / opening time	0.5 s	0.8 s	1.1 s
Power consumption	6 VA	6 VA	6 VA
Service life	50000 cycles	50000 cycles	50000 cycles

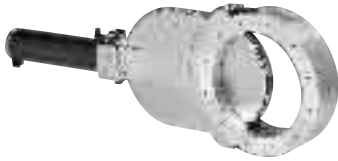
Gate valve

Supply	230 V, 50 Hz	230 V, 50 Hz	230 V, 50 Hz
Ordering number	PF D38 500	PF D48 500	PF D58 500
Supply	24 V, 50 Hz	24 V, 50 Hz	24 V, 50 Hz
Ordering number	PF D38 100	PF D48 100	PF D58 100
Supply	24 V DC	24 V DC	24 V DC
Ordering number	PF D38 200	PF D48 200	PF D58 200



Gate valve, electropneumatically activated

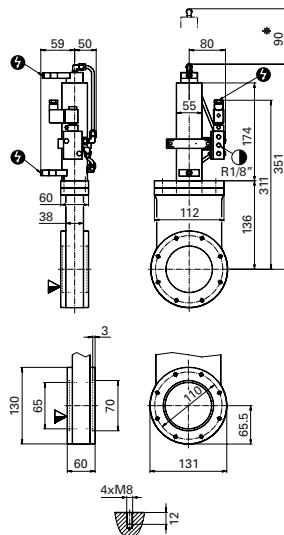
ISO-F



- ▶ Small footprint
- ▶ Low-cost valve for industrial applications
- ▶ Sealing: Linear feedthrough

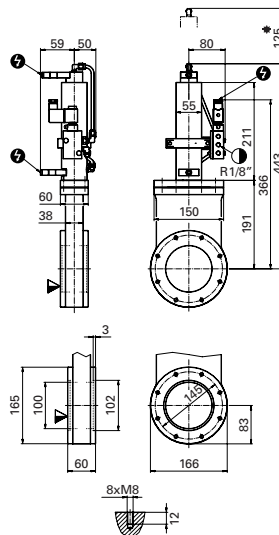
Dimensions (in mm)

DN 63



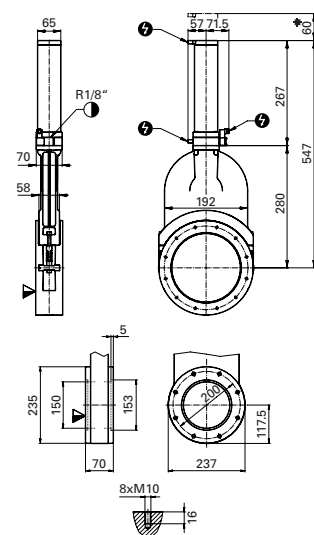
SVV 063 PA

DN 100



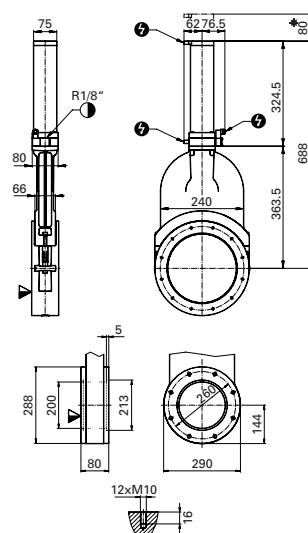
SVV 100 PA

DN 160



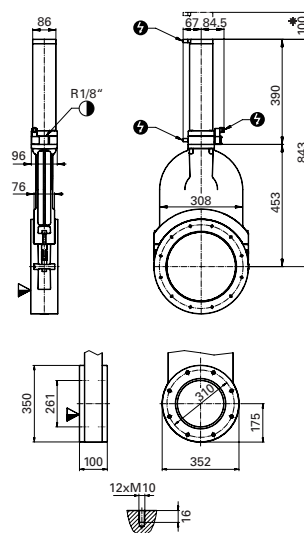
SVV 160 PA

DN 200



SVV 200 PA

DN 250



SVV 250 PA

General technical data

Bakeout temperature: actuator	50 °C
Bakeout temperature: housing	120 °C
Tightness	1·10 ⁻⁹ mbar l/s
Seal	Viton®
Pressure min.	1·10 ⁻⁷ mbar
Compressed air (overpressure) max.	7 bar
Compressed air (overpressure) min.	4 bar
Feedthrough	Shaft feedthrough
Housing	Aluminium
Position feedback: Load capacity	250 V/5 A
Can be opened to a pressure difference of	3·10 ¹ mbar
Valve plate	Stainless Steel

Technical data

	SVV 063 PA	SVV 100 PA	SVV 160 PA
Flange (in)	DN 63 ISO-F	DN 100 ISO-F	DN 160 ISO-F
Pressure max.	1.6 bar	1.6 bar	1.6 bar
Compressed air volume	160 cm ³	240 cm ³	500 cm ³
Weight	4 kg	6 kg	9 kg
Conductance for molecular flow	550 l/s	2000 l/s	6000 l/s
Closing / opening time	0,7 s	1 s	2 s
Power consumption	2.5 VA	2.5 VA	6 VA
Service life	50000 cycles	50000 cycles	100000 cycles

Gate valve

Supply	230 V, 50 Hz	230 V, 50 Hz	230 V, 50 Hz
Ordering number	PF E18 500	PF E28 500	PF E38 500
Supply	24 V, 50 Hz	24 V, 50 Hz	24 V, 50 Hz
Ordering number	PF E18 100	PF E28 100	PF E38 101
Supply	24 V DC	24 V DC	24 V DC
Ordering number	PF E18 200	PF E28 200	PF E38 201

Technical data

	SVV 200 PA	SVV 250 PA
Flange (in)	DN 200 ISO-F	DN 250 ISO-F
Pressure max.	1.6 bar	1.2 bar
Compressed air volume	900 cm ³	1500 cm ³
Weight	18 kg	25 kg
Conductance for molecular flow	12000 l/s	22000 l/s
Closing / opening time	3 s	5 s
Power consumption	6 VA	6 VA
Service life	100000 cycles	100000 cycles

Gate valve

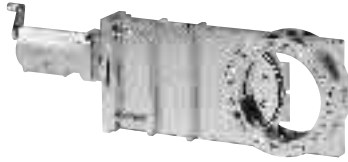
Supply	230 V, 50 Hz	230 V, 50 Hz
Ordering number	PF E48 501	PF E58 501
Supply	24 V, 50 Hz	24 V, 50 Hz
Ordering number	PF E48 101	PF E58 101
Supply	24 V DC	24 V DC
Ordering number	PF E48 201	PF E58 201



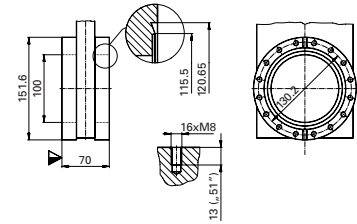
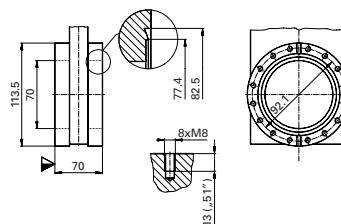
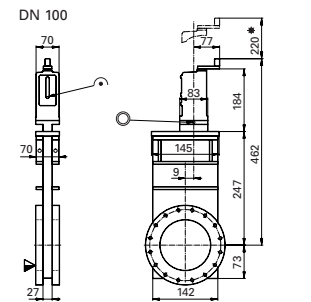
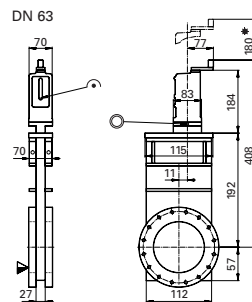
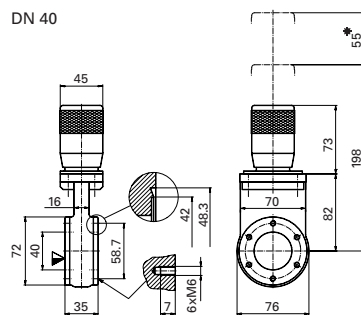
Bellows-sealed gate valve, manually activated

CF-F

- ▶ Gate and hand wheel bakeable up to 250 °C
- ▶ Sealing: Bellows
- ▶ For UHV applications



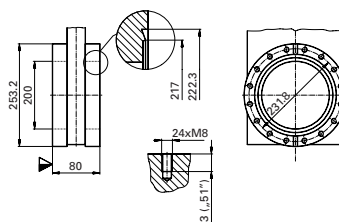
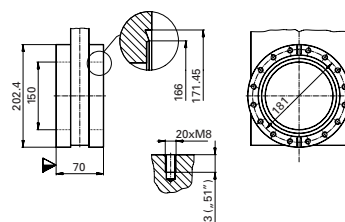
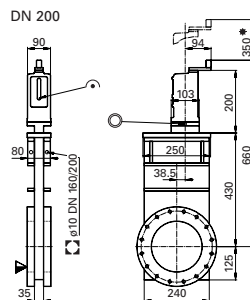
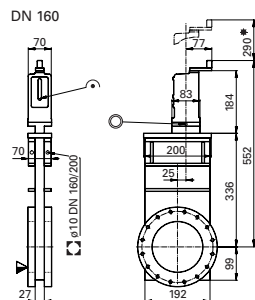
Dimensions (in mm)



SVV 040 HM

SVV 063 HF

SVV 100 HF



SVV 160 HF

SVV 200 HF

General technical data

Tightness: Housing	5·10 ⁻¹⁰ mbar l/s
Tightness: Valve seat	1·10 ⁻⁹ mbar l/s
Seal: Housing	Metal
Seal: Valve seat	Viton®
Pressure min.	1·10 ⁻¹⁰ mbar
Feedthrough	Bellows
Housing	Stainless Steel
Can be opened to a pressure difference of	3·10 ¹ mbar
Service life	50000 cycles
Valve plate	Stainless Steel

Technical data

	SVV 040 HM	SVV 063 HF	SVV 100 HF
Flange (in)	DN 40 CF-F	DN 63 CF-F	DN 100 CF-F
Bakeout temperature: Valve open, under Vacuum	250 °C	250 °C	250 °C
Bakeout temperature: Valve closed	200 °C	200 °C	200 °C
Pressure max.	2 bar	1.6 bar	1.6 bar
Weight	1.5 kg	9 kg	12 kg
Conductance for molecular flow	220 l/s	600 l/s	1700 l/s

Gate valve

Ordering number	PF F51 031	PF F61 031	PF F71 031
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Technical data

	SVV 160 HF	SVV 200 HF
Flange (in)	DN 160 CF-F	DN 200 CF-F
Bakeout temperature: Valve open, under Vacuum	250 °C	250 °C
Bakeout temperature: Valve closed	200 °C	200 °C
Pressure max.	1.6 bar	1.6 bar
Weight	18 kg	28 kg
Conductance for molecular flow	6000 l/s	12000 l/s



Gate valve

Ordering number	PF F81 031	PF F91 031	
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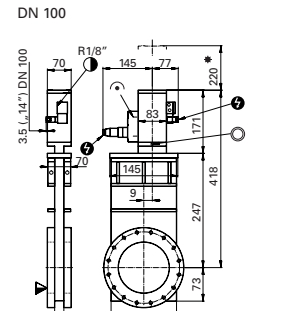
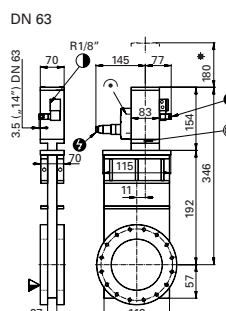
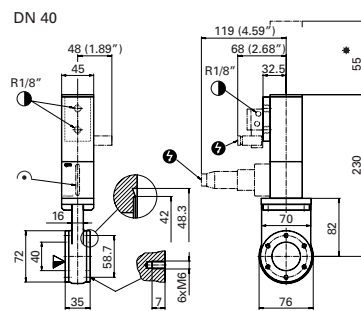
Bellows-sealed gate valve, electro-pneumatically activated

CF-F



- ▶ Valve bakeable up to 250 °C
- ▶ Pneumatic drive bakeable up to 200 °C
- ▶ Sealing: Bellows
- ▶ For UHV applications

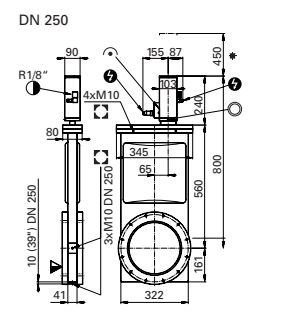
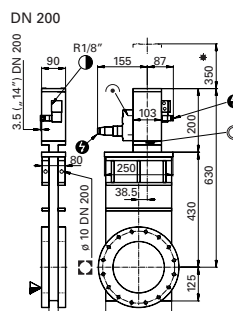
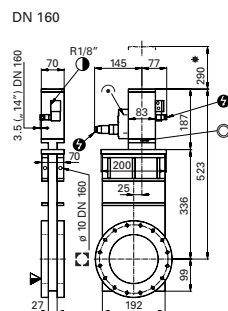
Dimensions (in mm)



SVV 040 PM

SVV 063 PF

SVV 100 PF



SVV 160 PF

SVV 200 PF

SVV 250 PF

General technical data

Tightness: Housing	5·10 ⁻¹⁰ mbar l/s
Tightness: Valve seat	1·10 ⁻⁹ mbar l/s
Seal: Housing	Metal
Seal: Valve seat	Viton®
Pressure min.	1·10 ⁻¹⁰ mbar
Compressed air (overpressure) max.	7 bar
Compressed air (overpressure) min.	5 bar
Feedthrough	Bellows
Housing	Stainless Steel
Position feedback: Load capacity	250 V/5 A
Power consumption	6 VA
Can be opened to a pressure difference of	3·10 ¹ mbar
Service life	50000 cycles
Valve plate	Stainless Steel

Technical data

	SVV 040 PM	SVV 063 PF	SVV 100 PF
Flange (in)	DN 40 CF-F	DN 63 CF-F	DN 100 CF-F
Bakeout temperature: actuator	200 °C	200 °C	200 °C
Bakeout temperature: Valve open, under Vacuum	250 °C	250 °C	250 °C
Bakeout temperature: Valve closed	200 °C	200 °C	200 °C
Pressure max.	2 bar	1.6 bar	1.6 bar
Compressed air volume	60 cm ³	80 cm ³	110 cm ³
Weight	1.8 kg	9 kg	12 kg
Conductance for molecular flow	220 l/s	600 l/s	1700 l/s
Closing / opening time	0.7 s	1 s	1,2 s

Gate valve

Supply	230 V, 50 Hz	230 V, 50 Hz	230 V, 50 Hz
Ordering number	PF F58 531	PF F68 531	PF F78 531
Supply	24 V, 50 Hz	24 V, 50 Hz	24 V, 50 Hz
Ordering number	PF F58 131	PF F68 131	PF F78 131
Supply	24 V DC	24 V DC	24 V DC
Ordering number	PF F58 231	PF F68 231	PF F78 231

Technical data

	SVV 160 PF	SVV 200 PF	SVV 250 PF
Flange (in)	DN 160 CF-F	DN 200 CF-F	DN 250 CF-F
Bakeout temperature: actuator	200 °C	200 °C	200 °C
Bakeout temperature: Valve open, under Vacuum	250 °C	250 °C	250 °C
Bakeout temperature: Valve closed	200 °C	200 °C	200 °C
Pressure max.	1.6 bar	1.6 bar	1.2 bar
Compressed air volume	140 cm ³	250 cm ³	350 cm ³
Weight	18 kg	28 kg	42 kg
Conductance for molecular flow	6000 l/s	12000 l/s	26000 l/s
Closing / opening time	1.5 s	2 s	4 s

Gate valve

Supply	230 V, 50 Hz	230 V, 50 Hz	230 V, 50 Hz
Ordering number	PF F88 531	PF F98 531	PF F98 541
Supply	24 V, 50 Hz	24 V, 50 Hz	24 V, 50 Hz
Ordering number	PF F88 131	PF F98 131	PF F98 141
Supply	24 V DC	24 V DC	24 V DC
Ordering number	PF F88 231	PF F98 231	PF F98 241

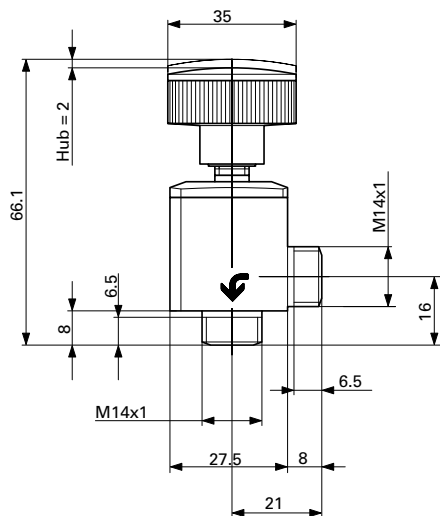
Mini angle valve, manually actuated

Complete valve



- For connections DN 10 ISO-KF, Tube AD 1/4"
- Sealing: Bellows
- For industrial applications

Dimensions (in mm)



EVI 005 S, Complete valve



Technical data

EVI 005 S

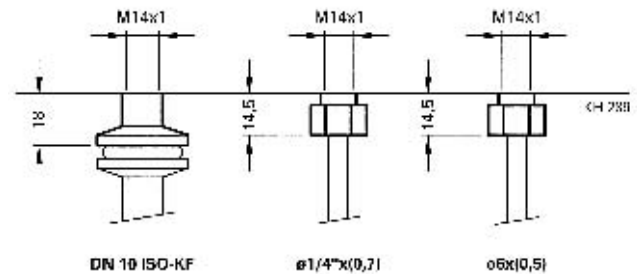
Bakeout temperature: actuator	70 °C
Bakeout temperature: housing	150 °C
Tightness	1·10 ⁻⁹ mbar l/s
Seal	Viton®
Differential pressure in opening direction	4 bar
Differential pressure in closing direction	4 bar
Pressure max.	5 bar
Pressure min.	1·10 ⁻⁸ mbar
Feedthrough	Bellows, Stainless Steel
Housing	Stainless Steel
Weight	150 g
Conductance for laminar flow	4 l/s
Conductance for molecular flow	0.4 l/s
Can be opened to a pressure difference of	4 bar
Service life	1500000 cycles
Ambient temperature	5 - 70 °C
Valve plate	Stainless Steel

Mini angle valve

Ordering number

PF H12 031

Dimensions accessories (in mm)



Accessories

Flange (in) (2 pieces required)	DN 10 ISO-KF	Rohr AD 1/4"	Rohr AD 6 mm
Ordering number	PT 420 912-T	PT 420 913-T	PT 420 914-T

Mini angle valves, electropneumatically actuated

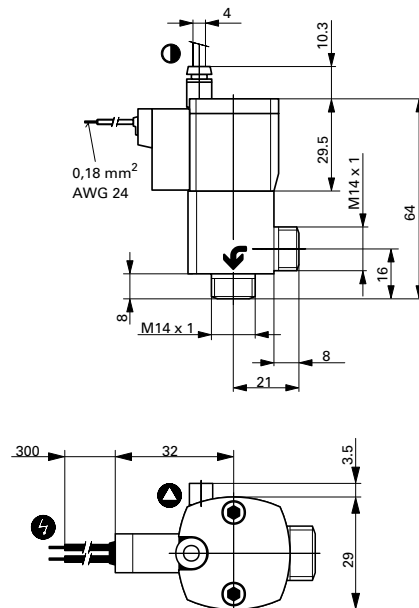
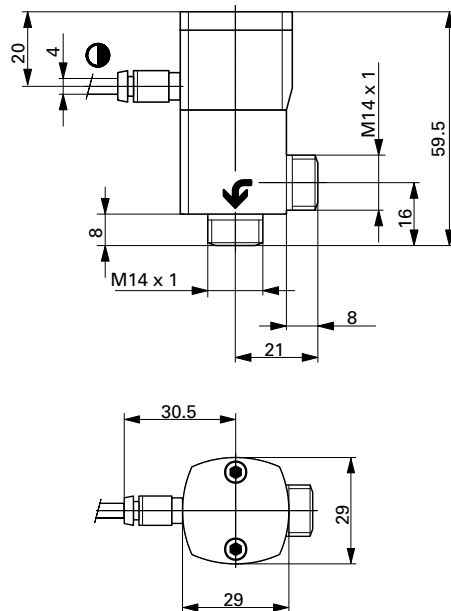
Complete valve



- ▶ Extremely high service life
> 5 Millionen cycles
- ▶ Short opening and closing times
- ▶ Small size
- ▶ For industrial applications



Dimensions (in mm)



EVI 005 P, Complete valve, without control valve

EVI 105 P, Complete valve, with control valve

General technical data

Bakeout temperature: actuator	80 °C
Bakeout temperature: housing	150 °C
Tightness	1·10 ⁻⁹ mbar l/s
Seal	Viton®
Differential pressure in opening direction	3 bar
Differential pressure in closing direction	3 bar
Pressure max.	4 bar
Pressure min.	1·10 ⁻⁸ mbar
Compressed air (overpressure) max.	8 bar
Compressed air (overpressure) min.	4 bar
Feedthrough	Bellows, Stainless Steel
Housing	Stainless Steel
Conductance for laminar flow	4 l/s
Conductance for molecular flow	0.4 l/s
Can be opened to a pressure difference of	3 bar
Switching frequency	150 rpm
Closing / opening time	35/35 ms
Protection acc. to DIN 40050	IP 65
Service life	5000000 cycles

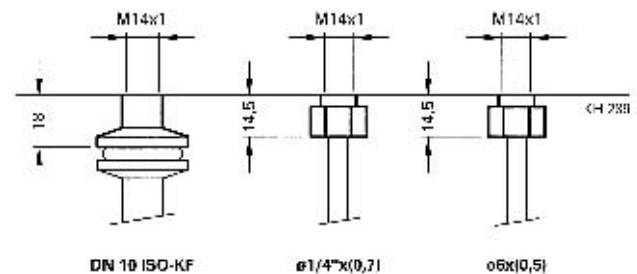
Technical data

	EVI 005 P	EVI 105 P
Weight	200 g	200 g
Electrical position indicator	without	without
Control valve	without	with
Ambient temperature	5 - 80 °C	5 - 40 °C
Supply	-	24 V DC
Supply: Power consumption max.	-	1 W

Mini angle valve

Ordering number	PF H15 031	PF H17 231
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Dimensions accessories (in mm)



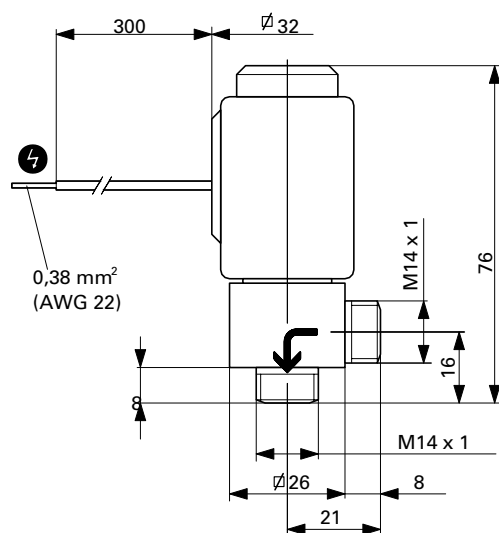
Accessories

Flange (in) (2 pieces required)	DN 10 ISO-KF	Rohr AD 1/4"	Rohr AD 6 mm
Ordering number	PT 420 912-T	PT 420 913-T	PT 420 914-T



- ▶ Complete valve for connections
DN 10 ISO-KF, Tube AD 1/4"
- ▶ Extremely high service life
> 2 Millionen cycles
- ▶ Short opening time
- ▶ Small size
- ▶ No vacuum feedthrough
- ▶ For industrial applications

Dimensions (in mm)



EVI 005 M, Complete valve

Technical data

EVI 005 M

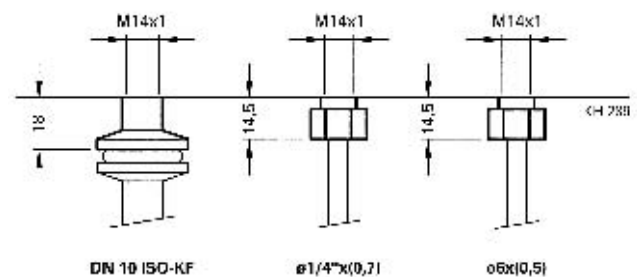
Actuator	Stainless Steel
Version	normally closed
Bakeout temperature: actuator	120 °C
Bakeout temperature: housing	150 °C
Tightness	1·10 ⁻⁹ mbar l/s
Seal	Viton®
Differential pressure in opening direction	1.5 bar
Differential pressure in closing direction	5 bar
Pressure max.	10 bar
Pressure min.	1·10 ⁻⁸ mbar
Housing	Stainless Steel
Weight	300 g
Conductance for laminar flow	3 l/s
Conductance for molecular flow	0.3 l/s
Can be opened to a pressure difference of	1 bar
Switching frequency	5 1/s
Closing / opening time	7/30 ms
Protection acc. to DIN 40050	IP 65
Service life	2000000 cycles
Ambient temperature	5 - 40 °C
Supply	24 V DC
Supply: Power consumption max.	10 W
Bakeout temperature 150 °C without coil, 120 °C with coil.	

Mini angle valve

Ordering number

PF H13 231

Dimensions accessories (in mm)



Accessories

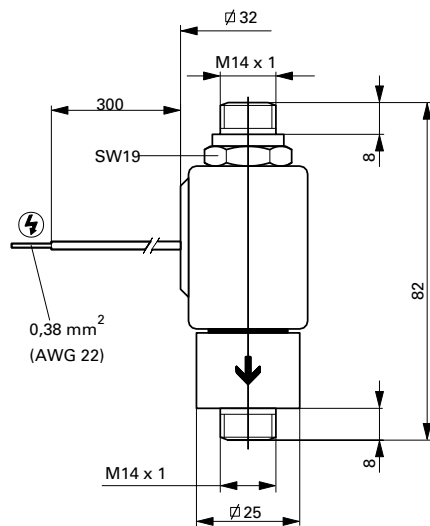
Flange (in) (2 pieces required)	DN 10 ISO-KF	Rohr AD 1/4"	Rohr AD 6 mm
Ordering number	PT 420 912-T	PT 420 913-T	PT 420 914-T

Mini inline valve, solenoid actuated



- ▶ Complete valve for connections
DN 10 ISO-KF, Tube AD 1/4",
Tube AD 6 mm
- ▶ Extremely high service life
> 2 Millionen cycles
- ▶ Extremely short closing
and opening times
- ▶ Small size
- ▶ No vacuum feedthrough
- ▶ For industrial applications

Dimensions (in mm)



DVI 005 M, DVI 205 M, Complete valve



General technical data

Actuator	Stainless Steel
Bakeout temperature: actuator	120 °C
Bakeout temperature: housing	150 °C
Tightness	1·10 ⁻⁹ mbar l/s
Seal	Viton®
Pressure max.	10 bar
Pressure min.	1·10 ⁻⁸ mbar
Housing	Stainless Steel
Weight	300 g
Conductance for laminar flow	2 l/s
Conductance for molecular flow	0.2 l/s
Switching frequency	5 1/s
Protection acc. to DIN 40050	IP 65
Service life	2000000 cycles
Ambient temperature	5 - 40 °C
Supply	24 V DC
Supply: Power consumption max.	10 W

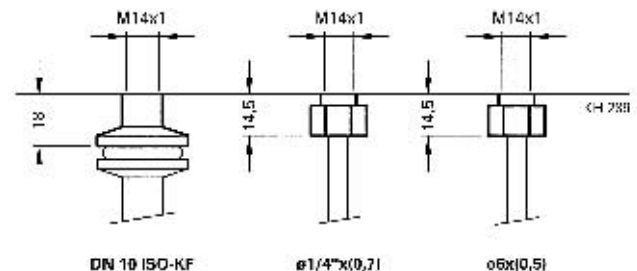
Technical data

	DVI 005 M	DVI 205 M
Version	normally closed	normally open
Differential pressure in opening direction	1.5 bar	2 bar
Differential pressure in closing direction	5 bar	4 bar
Can be opened to a pressure difference of	1 bar	4 bar
Closing / opening time	7/30 ms	30/10 ms
Bakeout temperature 150 °C without coil, 120 °C with coil.		

Mini inline valve

	DVI 005 M	DVI 205 M
Ordering number	PF H13 232	PF H13 233

Dimensions accessories (in mm)



Accessories

Flange (in) (2 pieces required)	DN 10 ISO-KF	Rohr AD 1/4"	Rohr AD 6 mm
Ordering number	PT 420 912-T	PT 420 913-T	PT 420 914-T

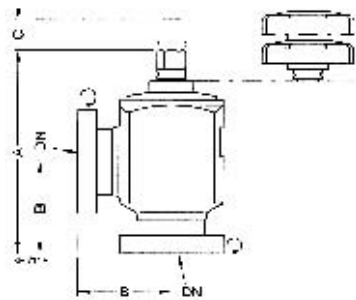
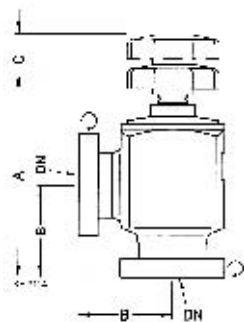
All-metal angle valve, manually actuated

CF-R



- ▶ Non-magnetic materials
- ▶ High bakeout temperature even when closed
- ▶ Easily exchangeable valve plate
- ▶ For HV and UHV applications

Dimensions



VI = for UHV and HV applications

CU = for UHV applications

General technical data

Bakeout temperature: with adjustment knob	80 °C
Pressure max.	4 bar
Feedthrough	Bellows, Stainless Steel
Housing	Stainless Steel

Technical data

	UVH 016 - VI	UVH 040 - VI	UVH 063 - VI
Flange (in)	DN 16 CF-R	DN 40 CF-R	DN 63 CF-R
Dimensions:			
A:	104.2 mm	150.9 mm	231.2 mm
B:	38 mm	63 mm	105 mm
C:	15 mm	27 mm	36 mm
Bakeout temperature: without adjustment knob	180 °C	180 °C	180 °C
Tightness	1·10 ⁻¹⁰ mbar l/s	1·10 ⁻¹⁰ mbar l/s	1·10 ⁻¹⁰ mbar l/s
Pressure min.	1·10 ⁻⁹ mbar	1·10 ⁻⁹ mbar	1·10 ⁻⁹ mbar
Weight	0.35 kg	1.8 kg	4.8 kg
Conductance for molecular flow	3 l/s	38 l/s	100 l/s
Service life	50000 cycles	50000 cycles	50000 cycles
Seal: Valve plate	Viton®	Viton®	Viton®

Special valve

Ordering number	PF C32 032	PF C52 032	PF C62 032
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Technical data

	UVH 016 - CU	UVH 040 - CU	UVH 063 - CU
Flange (in)	DN 16 CF-R	DN 40 CF-R	DN 63 CF-R
Dimensions:			
A:	88 mm	140 mm	210 mm
B:	38 mm	63 mm	105 mm
C:	15 mm	27 mm	36 mm
Bakeout temperature: without adjustment knob	350 °C	350 °C	350 °C
Tightness	1·10 ⁻¹² mbar l/s	1·10 ⁻¹² mbar l/s	1·10 ⁻¹² mbar l/s
Pressure min.	1·10 ⁻¹¹ mbar	1·10 ⁻¹¹ mbar	1·10 ⁻¹¹ mbar
Weight	0.4 kg	2 kg	5 kg
Conductance for molecular flow	3 l/s	38 l/s	100 l/s
Service life	1000 cycles	1000 cycles	1000 cycles
Seal plate	Copper	Copper	Copper

Special valve

Ordering number	PF K32 032	PF K52 032	PF K62 032
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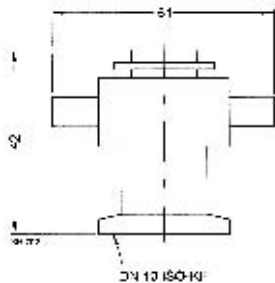
Venting valves, manually actuated

ISO-KF



- For manual venting of small vacuum chambers
- Easy open and close of valve due to unscrew resp. tighten of screw cap

Dimensions (in mm)



General technical data

Bakeout temperature	80 °C
Venting time for 50 l volume	14 s
Tightness	1·10 ⁻⁹ mbar l/s
Seal	Viton®
Pressure max.	1 bar
Pressure min.	1·10 ⁻⁸ mbar

Technical data

	FVB 010 HA	FVB 010 HX
Flange (in)	DN 10 ISO-KF	DN 10 ISO-KF
Housing	Aluminium	Stainless Steel
Weight	0.1 kg	0.15 kg
Screw cap	Brass	Brass
Valve plate	Aluminium	Stainless Steel

Special valve

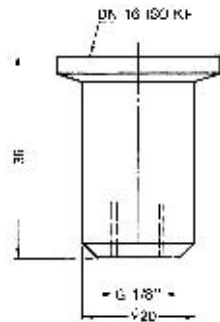
Ordering number	PF I22 003	PF I22 031
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Pressure relief valve

AVA 016 X

Safety valve

Dimensions (in mm)



Technical data

AVA 016 X

Flange (in)	DN 16 ISO-KF
Flange (out)	G 1/8"
Tightness	1·10 ⁻⁹ mbar l/s
Seal	Viton®
Flow rate max.	6 l/min
Material	Housing, Stainless Steel

Special valve

Ordering number	PF I30 031
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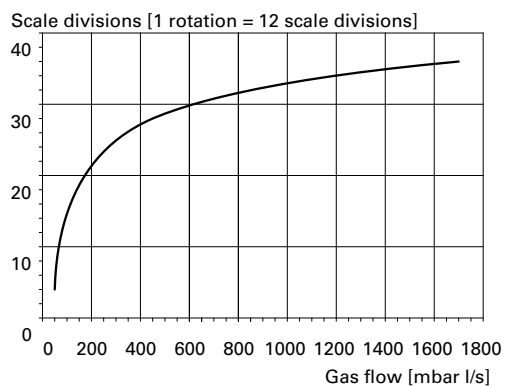
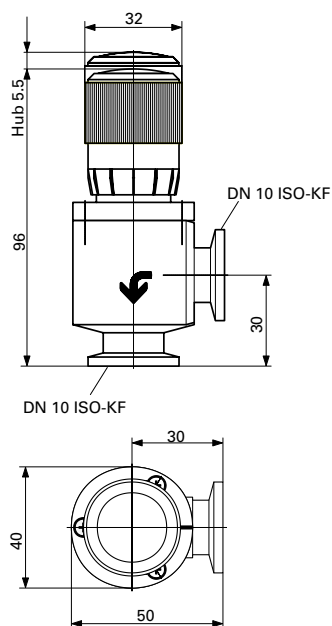


Gas dosing valve

EVD 010 H

- For admitting a reproducible flow of gases
- For slow manual venting

Dimensions (in mm)



Technical data

EVD 010 H

Flange (in)	DN 10 ISO-KF
Flange (out)	DN 10 ISO-KF
Tightness	$1 \cdot 10^{-8}$ mbar l/s
Seal	Viton®
Gas flow max. controllable	$1.7 \cdot 10^3$ mbar l/s
Gas flow min. controllable	40 mbar l/s
Housing	Aluminium
Weight	0.2 kg

Special valve

Ordering number

PF I22 001

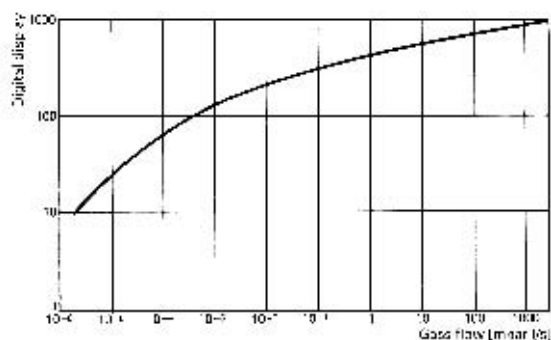
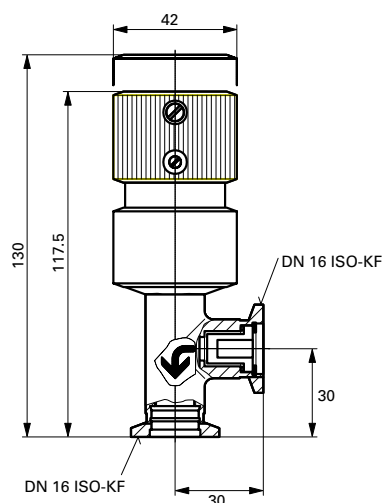
Gas dosing and shut-off valve

EVN 116 - Two in One



- ▶ Very wide control range
- ▶ Digital display
- ▶ Excellent reproducibility
- ▶ Extremely small dead volume
- ▶ Integrated shut-off valve
- ▶ Closing without change of flow setting

Dimensions (in mm)



Technical data

EVN 116

Flange (in)	DN 16 ISO-KF
Flange (out)	DN 16 ISO-KF
Tightness	$1 \cdot 10^{-9}$ mbar l/s
Seal	Viton®
Differential pressure	2.5 bar
Dosing sleeve	Fluorplastomer
Gas flow max. controllable	$1 \cdot 10^3$ mbar l/s
Gas flow min. controllable	$5 \cdot 10^{-6}$ mbar l/s
Housing/needle/filter	Stainless Steel
Weight	0.4 kg
Temperature: Operating	80 °C
Dead volume	0.032 cm ³

Special valve

Ordering number

PF I32 031

Accessories

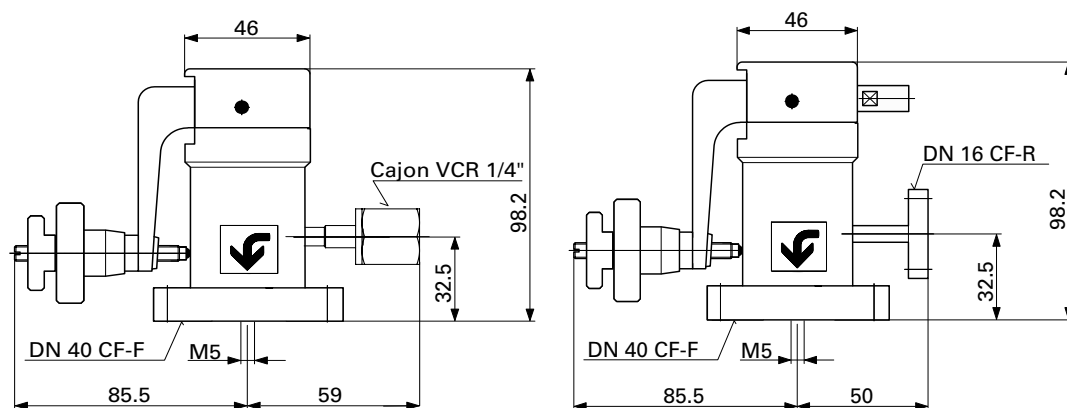
Filter vacuum side (EVN 116 = 590 mbar l/s)	PT 420 462-T
Filter vacuum side (EVN 116 / EVR 116 = 1250 mbar l/s)	PT 420 463-T

All-metal gas dosing valve



- ▶ Minimal dead volume
- ▶ Controlled routing of the gas flow using capillary
- ▶ Demixing-free gas inlet with throttle backing pump
- ▶ Operating temperature 200 °C
- ▶ For mass spectrometer applications

Dimensions (in mm)



UDV 040

UDV 046/146

General technical data

Tightness	$1 \cdot 10^{-11}$ mbar l/s
Pressure max.	30 bar
Pressure min.	$1 \cdot 10^{-11}$ mbar
Housing	Stainless Steel
Conductance for laminar flow	0.7 l/s
Temperature : Bakeout	450 °C
Temperature: Operating	200 °C
Valve seat	Copper
Valve plate	Sapphire



Technical data

	UDV 040	UDV 046	UDV 146
Flange (in)	VCR 1/4"	DN 16 CF-R	DN 16 CF-R
Flange (out)	DN 40 CF-F	DN 40 CF-F	DN 40 CF-F
Actuator	manual	manual	manual/thermo-mechanic
Gas flow max.	$6 \cdot 10^2$ mbar l/s	$6 \cdot 10^2$ mbar l/s	$6 \cdot 10^2$ mbar l/s
Flow rate min. for: air	$1 \cdot 10^{-9}$ mbar l/s	$1 \cdot 10^{-9}$ mbar l/s	$1 \cdot 10^{-9}$ mbar l/s
Flow rate min. for: pure gases	$1 \cdot 10^{-10}$ mbar l/s	$1 \cdot 10^{-10}$ mbar l/s	$1 \cdot 10^{-10}$ mbar l/s
Weight	1.4 kg	1.4 kg	1.4 kg

Special valve

Ordering number	PF I52 031	PF I52 035	PF I52 034
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Accessories

Capillary complete, vacuum side, length 1 m	PT 418 976-T
Capillary complete, inlet side, length 2 m	PT 420 537-T
Heater, 200 °C	PT 420 376-T
RVG 050 C, Control unit all-metal gas dosing system, 115/230 V	PF I00 795

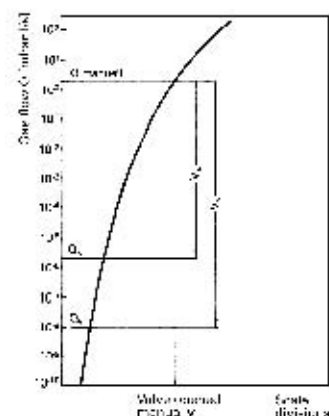
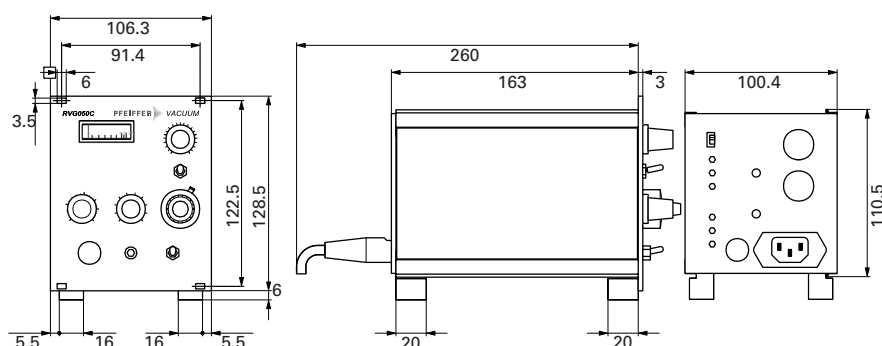


Control unit RVG 050 C for all-metal gas dosing valve UDV 146



For arranging a closed loop control system in connection with gas dosing valve UDV 146.

Dimensions (in mm)



Technical data

RVG 050 C

Output for valve heater: Voltage	20 V DC
Output for valve heater: Current	0.5 A
Weight	2.3 kg
Actual value input: Analog voltage	10 V DC
Actual value input: Impedance	100 kOhm
Power consumption	20 VA
Mains requirement: voltage (selectable)	115/230 V AC
Control range for 1 bar N ₂ , inlet side	1 · 10 ⁻⁹ - 100 mbar l/s
Control characteristic (proportional-integral)	PI
Set point input: External	10 V DC
Set point input: Impedance	100 kOhm
Set point input: Internal (scale division)	0 - 1000
Ambient temperature	5-50 °C
Time constant, adjustable	2 - 30 s

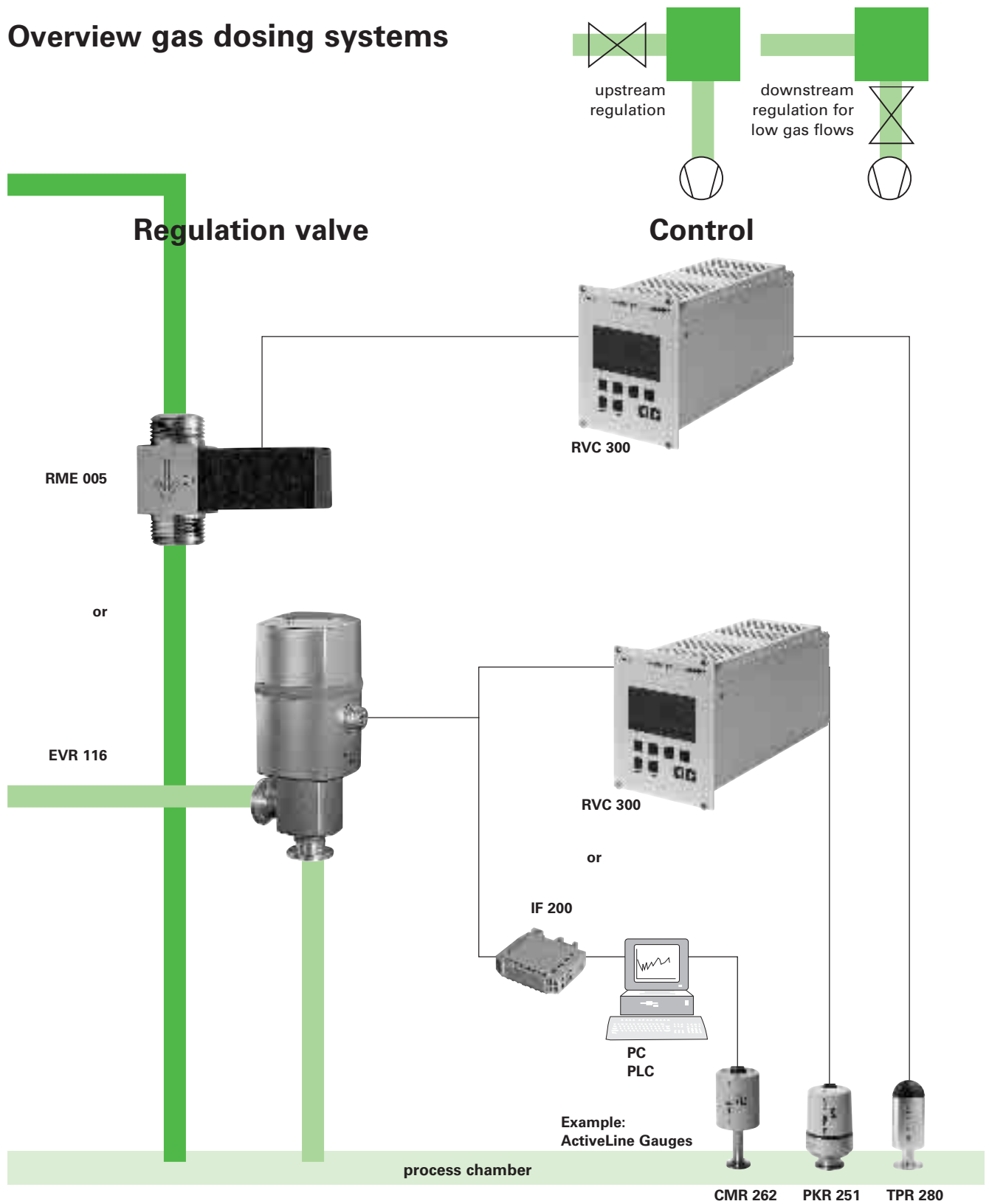
Special valve

Ordering number	PF I00 795
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Accessories

UDV 146, All-metal regulating valve, DN 16 CF-F	PF I52 034
RVG-UDV, Extension cable, 2 m, 200°C	PT 519 953-T
RVG-UDV, Connection cable, 3 m, 80°C	PT 519 178-T
RVG-UDV, Connection cable, 12 m, 80°C	PT 519 343-T

Overview gas dosing systems



Control valves for gas dosing systems

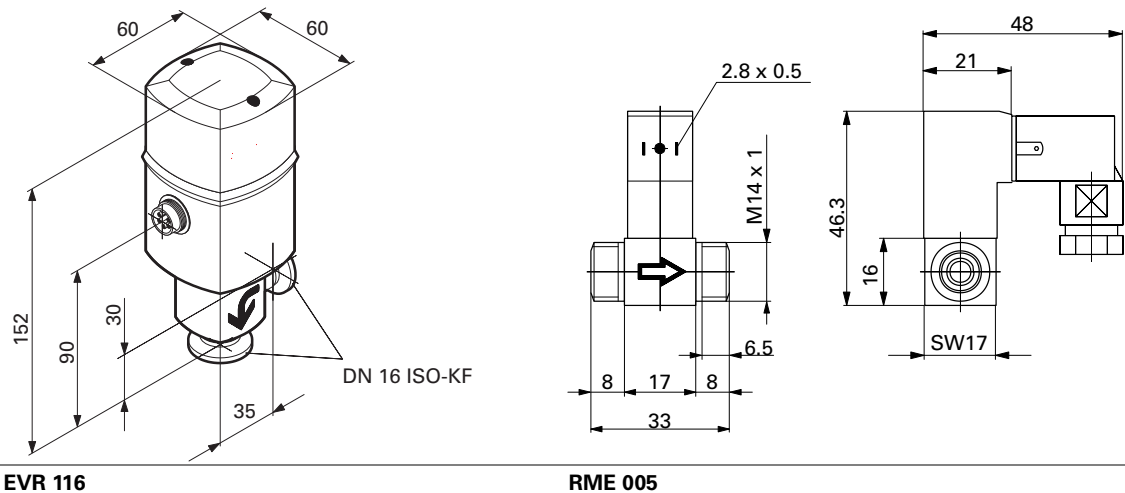
EVR 116, RME 005



- Very wide control range
- Large gas throughput
- Withstands corrosive gases - Stainless Steel/Viton®
- Valve closes automatically in the event of a power failure in combination with the RVC 300 controller



Dimensions (in mm)



Technical data

	EVR 116	RME 005
Flange (in)	DN 16 ISO-KF	DN 5 mm M14x1
Flange (out)	DN 16 ISO-KF	DN 5 mm M14x1
Control	RVC 300 or IF 200	RVC 300
Bakeout temperature: actuator	60 °C	60 °C
Bakeout temperature: housing	80 °C	80 °C
Tightness	1·10 ⁻⁹ mbar l/s	1·10 ⁻⁹ mbar l/s
Seal	Viton®	Viton®
Dosing sleeve	Fluorplastomer	-
Pressure max.	2.5 bar	2 bar
Pressure min.	1·10 ⁻⁸ mbar	1·10 ⁻⁸ mbar
Gas flow max. controllable	1.25·10 ³ mbar l/s	1·10 ² mbar l/s
Gas flow min. controllable	5·10 ⁻⁶ mbar l/s	1·10 ⁻⁵ mbar l/s
Housing/needle/filter	Stainless Steel	Stainless Steel
Weight	0.5 kg	80 g
Closing / opening time	< 3 / 4 s	150/100 ms
Ambient temperature	5 - 40 °C	5 - 50 °C
Supply: Voltage	24 V DC	0 - 24 V DC
Supply: Power consumption max.	12 VA	2 W
Control voltage	0 - 10 V DC	-

Control valves/dosing systems

Ordering number	PF I39 931	PF I39 932
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Accessories

Connection, DN 10 ISO-KF	-	PT 420 912-T
Connection, for tube OD 1/4"	-	PT 420 913-T
Connection, for tube OD 6 mm	-	PT 420 914-T
Filter vacuum side (EVN 116 / EVR 116 = 1250 mbar l/s)	PT 420 463-T	-
IF 200, Interface for gas dosing system	PF I00 091	-
RVC 300, Control unit gas dosing system	PF I00 792	PF I00 792
RVC-EVR, Connection cable, 3 m	PT 583 115-T	-
RVC-EVR, Connection cable, 5 m	PT 583 116-T	-
RVC-EVR, Connection cable, 10 m	PT 583 117-T	-
RVC-EVR, Connection cable, 15 m	PT 583 118-T	-
RVC-EVR, Connection cable, 20 m	PT 583 119-T	-
RVC 300 - RME 005, Connection cable, 3 m	-	PT 250 003-T
RVC 300 - RME 005, Connection cable, 5 m	-	PT 250 005-T
RVC 300 - RME 005, Connection cable, 10 m	-	PT 250 010-T
RVC 300 - RME 005, Connection cable, 15 m	-	PT 250 015-T
RVC 300 - RME 005, Connection cable, 20 m	-	PT 250 020-T
RVC 300 - RME 005, Connection cable, 25 m	-	PT 250 025-T



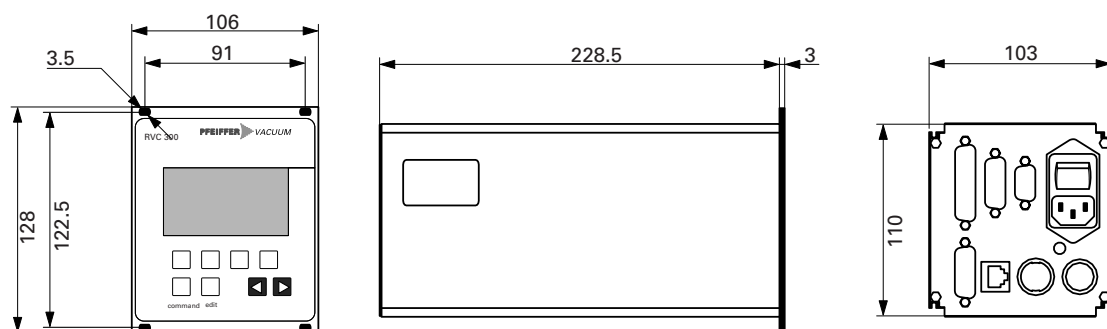
Control unit gas dosing system

RVC 300



- ▶ Easy operation
- ▶ Self-explanatory LCD display and function keys
- ▶ Analog/digital in/outputs and interfaces
- ▶ Adjustable PID control algorithm

Dimensions (in mm)



Technical data

RVC 300

Output: Analog	4 pieces: signal - pressure sensor / valve signal (0 - 10 V DC) / valve position EVR 116 / + 10 V DC reference voltage - 10 mA
Output: Digital	8 pieces: valve closed / valve open / valve in position / valve error / sensor error / operable / emission on / sensor - status on
Mode of operation	Local/Remote
Input: Analog	4 pieces: 0 - 10 V DC / set value pressure, set value flow (2 ot reserved)
Input: Digital	8 pieces: flow downsize / flow enlarge / valve external close / valve external open / flow mode / pressure mode / emission on / degas on
Weight	1.65 kg
Control range	APR 250: 1 - 1100 mbar APR 260: 1 - 1100 mbar CMR 261/271: 1 - 1100 mbar CMR 262/272: 10^{-1} - 110 mbar CMR 263/273: 10^{-2} - 11 mbar CMR 274: 10^{-3} - 1,1 mbar TPR 261: $5 \cdot 10^{-4}$ - 1000 mbar TPR 265: $5 \cdot 10^{-4}$ - 1000 mbar IKR 251: $2 \cdot 10^{-9}$ - 10^{-2} mbar IKR 261: $2 \cdot 10^{-9}$ - 10^{-2} mbar PKR 251-261: $5 \cdot 10^{-9}$ - 1000 mbar
Control speed	1 - 99 selectable level
Interface	RS-232-C, RS-485
Supply: Voltage	90 - 250 V AC
Supply: Power consumption max.	50 VA

Control unit gas dosing system

Ordering number

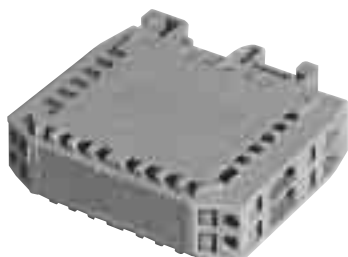
PF I00 792

Accessories

EVR 116, Control valve	PF I39 931
RME 005, Control valve	PF I39 932
RVC-EVR, Connection cable, 3 m	PT 583 115-T
RVC-EVR, Connection cable, 5 m	PT 583 116-T
RVC-EVR, Connection cable, 10 m	PT 583 117-T
RVC-EVR, Connection cable, 15 m	PT 583 118-T
RVC-EVR, Connection cable, 20 m	PT 583 119-T
RVC 300 - RME 005, Connection cable, 3 m	PT 250 003-T
RVC 300 - RME 005, Connection cable, 5 m	PT 250 005-T
RVC 300 - RME 005, Connection cable, 10 m	PT 250 010-T
RVC 300 - RME 005, Connection cable, 15 m	PT 250 015-T
RVC 300 - RME 005, Connection cable, 20 m	PT 250 020-T

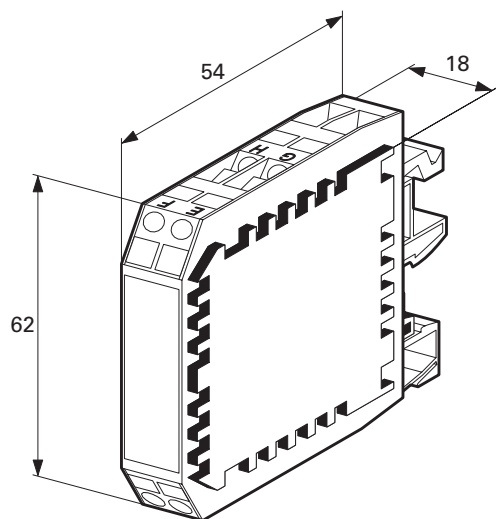
Interface for control valve EVR 116

IF 200



- Easy and cost effective integration into systems
- Pressure signal is conditioned by the system controller

Dimensions (in mm)



Technical data

IF 200

Connection	Terminals
Fixation	Mounting rail
Weight	40 g
Interface	RS-232-C
Supply	0.5 A
Supply: Voltage	24 V DC

Interface

Ordering number

PF I00 091





**Always the right pressure gauge
for your application**

Contents

	Page
Selection aid	412
Fundamentals of total pressure measurement	413
 DigiLine™	
Your advantages/Applications	419
The DigiLine™ concept	420
Total pressure transmitter	422
Display units and power supplies	430
Converters	434
Software DokuStar Plus	436
Accessories	436
 ActiveLine	
Your advantages/The ActiveLine concept	439
Compact Piezo Gauge	440
Compact Capacitance Diaphragm Gauge	444
Compact Pirani Gauge	450
Compact Pirani Capacitance Gauge	454
Compact Cold Cathode Gauge	456
Compact FullRange™ CC Gauge	460
Compact Process Ion Gauge	462
Compact FullRange™ BA Gauge	464
SingleGauge™/DualGauge™ controller unit	466
SingleGauge™ measuring systems	468
DualGauge™ measuring systems	470
MaxiGauge™ controller unit	472
Pirani measurement unit	474
Accessories	476
 ModulLine	
Your advantages/Applications/The ModulLine concept	478
Pirani gauges	480
Cold Cathode Gauges	484
TPG 300, basic unit	488
Interface and relay boards	490
Measurement boards	496
TPG 300, complete measuring units	498



Vacuum measurement and control units

Selection aid

Gauges	Measurement range			Application					
		max. (mbar)	min. (mbar)	Vacuum furnaces	Sputter- ring	Evapo- ration Chambers	Reactive Pro- cesses	Load- lock	Accele- rator
DigiLine™									
Digital Piezo Transmitter	CPT 100	2000	1	▲	▲	▲	▲	▲	
Digital Pirani Transmitter	PPT 100	1000	$1 \cdot 10^{-4}$	●	▲	●	▲	●	
Digital Piezo/Pirani Transmitter	RPT 100	1800	$1 \cdot 10^{-4}$	●	▲	●	▲	●	
Digital Pirani/Bayard-Alpert Transmitter	HPT 100	1000	$1 \cdot 10^{-9}$	▲	▲				
ActiveLine									
Compact Piezo Gauge	APR 250	1100	$1 \cdot 10^{-1}$	▲	▲	▲	▲	▲	
	APR 260	1100	$1 \cdot 10^{-1}$	▲	▲	▲	▲	▲	
	APR 262	2200	$2 \cdot 10^{-1}$	▲	▲	▲	▲	▲	
	APR 265	5500	0,5	▲	▲	▲	▲	▲	
	APR 266	11000	1	▲	▲	▲	▲	▲	
	APR 267	55000	5	▲	▲	▲	▲	▲	
Compact Capacitance Diaphragm Gauge	CMR 261	1100	$1 \cdot 10^{-1}$	▲	●	●	●		
Temperature compensated	CMR 262	110	$1 \cdot 10^{-2}$	▲	●	●	●		
	CMR 263	11	$1 \cdot 10^{-3}$	▲	●	●	●		
	CMR 264	1,1	$1 \cdot 10^{-4}$	▲	●	●	●		
Temperature regulated	CMR 271	1100	$1 \cdot 10^{-1}$	▲	●	●	●		
	CMR 272	110	$1 \cdot 10^{-2}$	▲	●	●	●		
	CMR 273	11	$1 \cdot 10^{-3}$	▲	●	●	●		
	CMR 274	1,1	$1 \cdot 10^{-4}$	▲	●	●	●		
	CMR 275	0,11	$1 \cdot 10^{-5}$	▲	●	●	●		
Compact Pirani Gauge	TPR 280	1000	$5 \cdot 10^{-4}$	●	▲	▲		▲	
	TPR 281	1000	$5 \cdot 10^{-4}$	●	▲	▲	▲	▲	
Compact Pirani Capacitance Gauge	PCR 260	1500	$5 \cdot 10^{-4}$	●	▲	▲		●	
Compact Cold Cathode Gauge	IKR 251	0,01	$2 \cdot 10^{-9}$	▲	▲	●	▲		
	IKR 261	0,01	$2 \cdot 10^{-9}$	▲	▲	●	▲		
	IKR 270	0,01	$5 \cdot 10^{-11}$	▲	▲	●	▲		
Compact FullRange™ Cold Cathode Gauge	PKR 251	1000	$5 \cdot 10^{-9}$	▲	▲	▲	▲		
	PKR 261	1000	$5 \cdot 10^{-9}$	▲	▲	▲	▲		
Compact Process Ion Gauge	IMR 265	1000	$2 \cdot 10^{-6}$	▲	●	▲			
Compact FullRange™ Bayard-Alpert Gauge	PBR 260	1000	$5 \cdot 10^{-10}$	▲	▲	▲	▲		
ModulLine									
Pirani	TPR 010	1000	$8 \cdot 10^{-4}$	▲	▲	▲	▲	▲	▲
	TPR 017	1000	$8 \cdot 10^{-4}$	▲	▲	▲	▲	▲	●
	TPR 018	1000	$8 \cdot 10^{-4}$	▲	▲	▲	●	▲	●
Cold Cathode	IKR 050	$5 \cdot 10^{-3}$	$2 \cdot 10^{-9}$	▲	▲	●	▲		●
	IKR 060	$5 \cdot 10^{-3}$	$1 \cdot 10^{-10}$	▲	▲	●	▲		●
	IKR 070	$5 \cdot 10^{-3}$	$1 \cdot 10^{-11}$	▲	▲	●	▲		●

● Recommended ▲ Possible

Fundamentals of total pressure measurement

In the area of vacuum engineering there is no single method of measurement capable of covering the entire pressure range. It is necessary to use different sensors.

The criteria for selecting the sensor depends on differing basic conditions:

- ▶ Pressure range which is to be detected
- ▶ Gas composition (inert or corrosive)
- ▶ Required accuracy and repeatability
- ▶ Ambient conditions like radioactivity, for example

The commonly used methods of measurement for the various pressure ranges can be divided into two groups:

- ▶ Direct measurements, independent of the type of gas
- ▶ Indirect measurements, dependent on the type of gas

Direct measurements which are independent of the type of gas

Pressure is defined as the force acting on a surface area:

$$p = F/A$$

F = force

A = surface area

The SI unit is $\text{N m}^{-2} = \text{Pa}$

Other commonly used units of measurement are:

$$1 \text{ mbar} = 100 \text{ Pa}$$

$$1 \text{ Torr} = 133.322 \text{ Pa}$$

In pressure measurements which are independent of the type of gas, the same pressure readout is obtained irrespectively of which gas (He or Ar, for example) or which gas mixture is present in the vacuum chamber.

Diaphragm vacuum gauges

In a diaphragm vacuum gauge the pressure is detected in accordance with the definition. Design-wise it consists of a diaphragm exhibiting a defined surface area A and a sensor which detects the deflection being proportional to the force F.

In order to detect the deflection of the diaphragm, there exists either the piezoresistive or the capacitive method.

Piezo diaphragm vacuum gauges

A simple and very rugged method relies on a piezoresistive sensor. Its design (Fig. 1) consists of a sealed-off volume in which the reference pressure P_0 is present. This reference pressure is considerably lower than the pressure p which is to be measured. Within the diaphragm which seals off the chamber, a resistance bridge has been diffused in. The measured change in resistance due to the diaphragm being deflected is taken as a measure for the pressure. This sensor excels through its insensitivity to gas inrushes and its high accuracy.

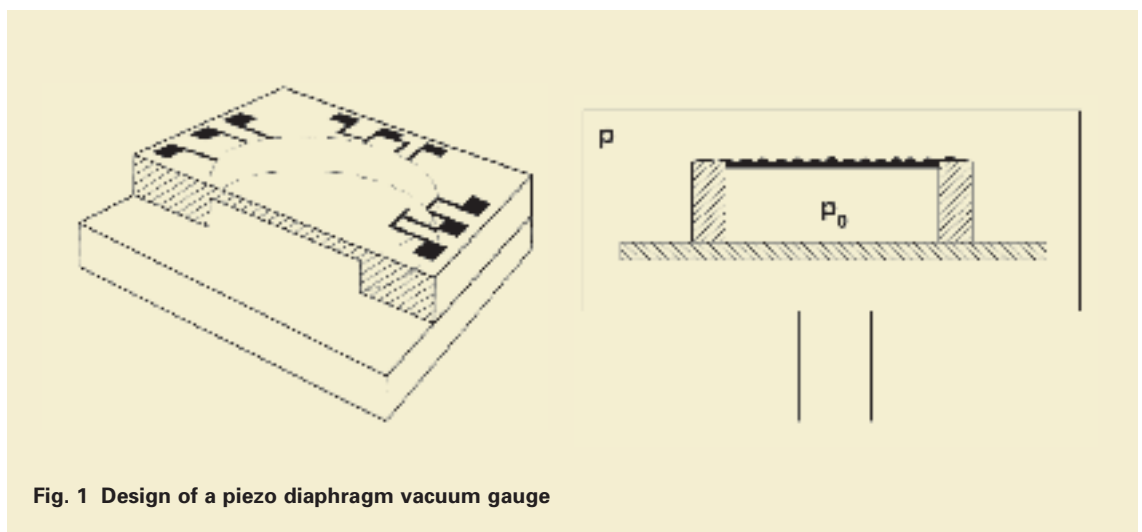


Fig. 1 Design of a piezo diaphragm vacuum gauge

Fundamentals of total pressure measurement

Capacitive diaphragm vacuum gauges

A capacitive diaphragm vacuum gauge (Fig. 2) is a diaphragm vacuum gauge in which the deflection of the diaphragm is measured through a change in electrical capacitance. Here the deflection is detected with the aid of a plate capacitor. The diaphragm consists either of a metallized ceramic material or stainless steel.

With this method of measurement up to four decades of pressure can be covered. Through the diaphragms of different thickness, the following graduations result:

- $1 \cdot 10^{-1} - 1100 \text{ mbar}$
- $1 \cdot 10^{-2} - 110 \text{ mbar}$
- $1 \cdot 10^{-3} - 11 \text{ mbar}$
- $1 \cdot 10^{-4} - 1,1 \text{ mbar}$
- $1 \cdot 10^{-5} - 0,11 \text{ mbar}$

The limiting effects are:

- 1) Changes in distance within the pressure sensor due to the influence of changing temperatures
- 2) Forces acting on the diaphragm which reduce lower pressures

The temperature influence can be eliminated by a built-in heater which keeps the sensor at a constant temperature.

The use of a ceramic diaphragm material has a positive effect on the stability of the measurements.

Pfeiffer Vacuum's capacitive diaphragm vacuum gauges which use a ceramic diaphragm material are designed to be used in many corrosive applications.

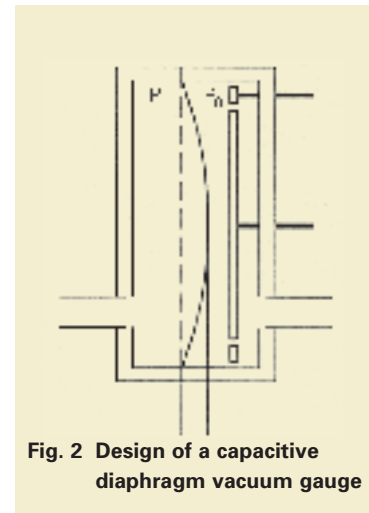


Fig. 2 Design of a capacitive diaphragm vacuum gauge

Indirect measurements which are dependent on the type of gas

Towards lower pressures, the influence of the force on a diaphragm becomes negligibly small. For this reason, the pressure is determined based on the particle number density which is proportional to the pressure.

For an ideal gas, the following equation of state applies:

$$p = nKT$$

- n = particle number density
- K = Boltzmann constant
- T = thermodynamic temperature

The particle number density n corresponds to the ratio between the number of particles (atoms, molecules) contained in a suitable volume unit and the volume unit (DIN 28 400, Part 1).

This equation holds for the pressures encountered in the area of vacuum engineering.

- A** Heat transfer through radiation and thermal conduction at the ends
- B** Pressure dependent heat transfer by the gas
- C** Heat transfer through thermal radiation and convection

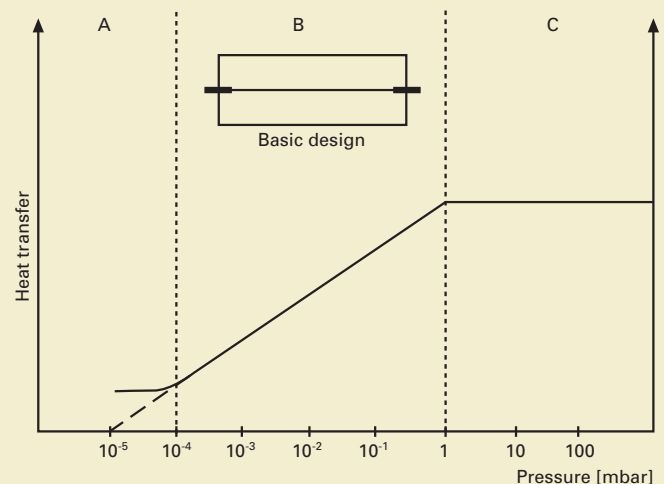


Fig. 3 Basic operation of the thermal conductivity vacuum gauge

Here different physical effects like heat transfer, ionization ability or electrical conductance are utilized. These quantities are not only dependent on

the pressure but also on the molar mass. This results in pressure measurements which produce different results for different heavy gases.

Thermal conductivity vacuum gauges (Pirani)

In the case of the Pirani thermal conductivity vacuum gauge, the heat conductance of gases at pressures below 1 mbar is utilized. Its design is based on a heated filament (usually wolfram), which is heated by a resistance heater to a temperature between 110 °C and 130 °C.

Here the heat transfer (convection), between filament and the surrounding pipe is a measure for the pressure (Fig. 3).

The change in resistance is detected with the aid of a Wheatstone bridge.

The limiting effects are:

- 1) The pressure independence existing in the range from 1 mbar to atmospheric pressure
- 2) The heat transfer at the ends of the filaments results in an offset which limits the measurement range in the direction of vacuum pressures below $1 \cdot 10^{-4}$ mbar
- 3) Thermal radiation

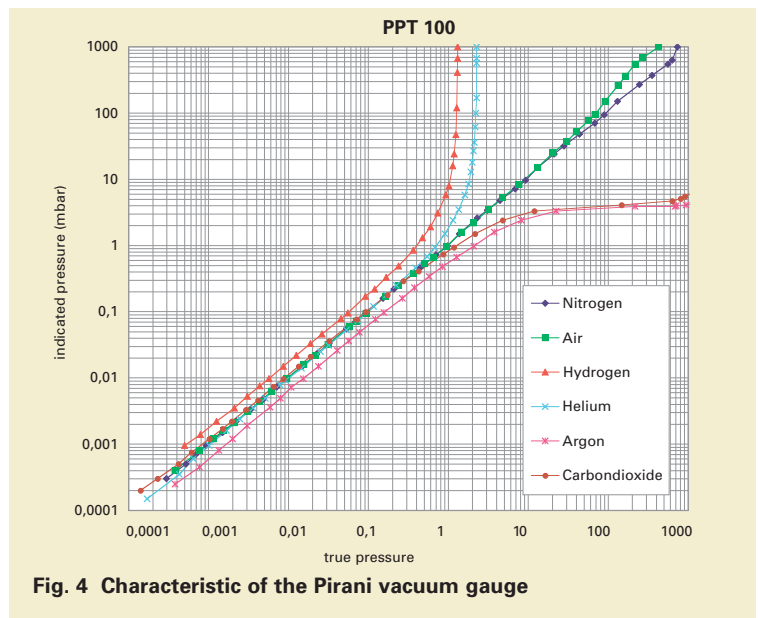


Fig. 4 Characteristic of the Pirani vacuum gauge

The characteristic (Fig. 4) shows the practical effect of the limitations in the direction of atmospheric pressure. For nitrogen and air, linearity is good, for lighter (He) and heavier gases (Ar), strong deviations are apparent.

For measurement methods which are dependent on the type of gas, one also uses the term nitrogen equivalent which is detected.

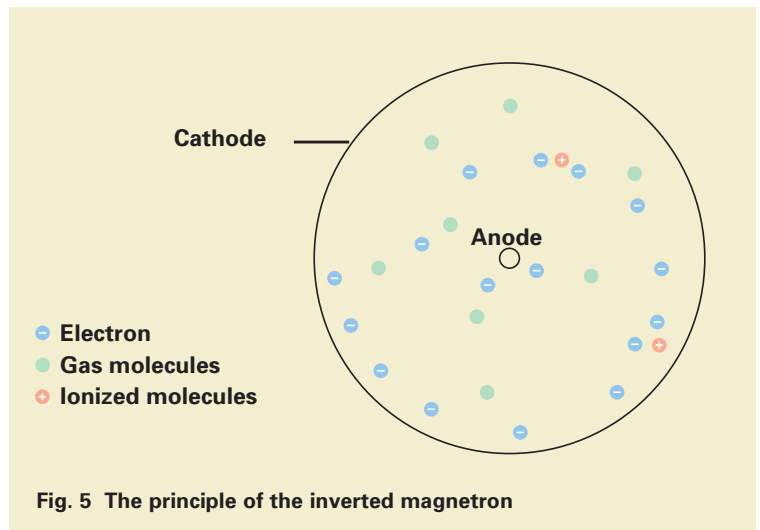


Fig. 5 The principle of the inverted magnetron

Cold cathode ionization vacuum gauges

Due to their high voltage difference (approximately 3 kV), electrons are forced out of the cathode. These free electrons then initiate a gas discharge. This discharge is a measure for the pressure. By means of a magnetic

field, the free electrons are forced to follow a spiral track. This longer track for the electrons increases the probability of igniting a gas discharge.

The dependence on the type of gas is due to the differing ionization probabilities for the different gases.

Vacuum measurement and control units

Measurement errors are due to the pumping effect (ion getter pump) of this principle of measurement. The sputtering effects appearing at pressures between 10^{-3} mbar and 10^{-2} mbar in connection with heavier gases like argon, produce a transition resistance between cathode and anode. Such contamination will result in a reduced ion current thereby incorrectly indicating a pressure which is lower than the true pressure. Additionally, there is a further problem in that it is difficult to start the ignition towards lower pressures ($<1 \cdot 10^{-6}$ mbar).

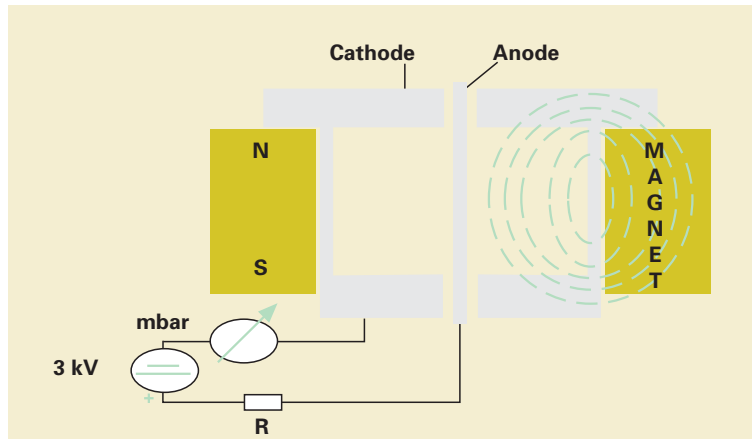


Fig. 6 Design of the inverted magnetron

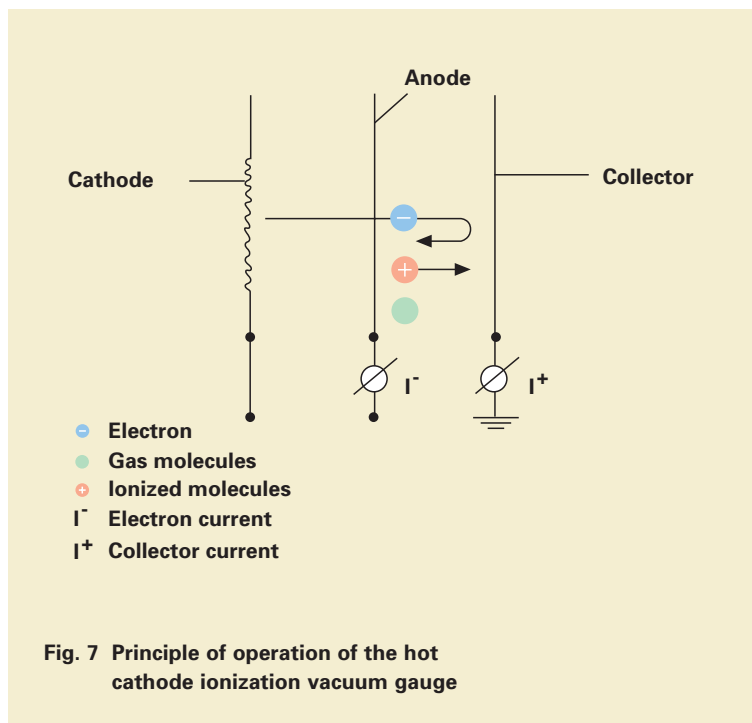


Fig. 7 Principle of operation of the hot cathode ionization vacuum gauge

Hot cathode ionization vacuum gauges

Electrons are accelerated from the cathode, being resistance heated, in the direction of the positively charged anode (Fig. 7). On their way, electrons are removed from the gas particles by means of electron impact. The now positively charged ions impinge on the collector. The measured collector current is a measure for the particle number density.

Measurement errors are due to the pumping effect of the sensor as well as through two further limiting effects:

X-ray bremsstrahlung:

X-rays are emitted by electrons impinging on the anode cage. If the X-rays arrive at the collector, so-called photoelectrons are released. Therefore the resulting photoelectric current produces a small offset which increases the pressure dependent collector current.

ESD ions:

ESD stands for Electron Simulated Desorption and means that electrons release deposited gas particles from the anode cage. These gas particles produce an additional offset on the true gas pressure.

The most popular design is the so-called Bayard-Alpert sensor. With this sensor and in consideration of the aforementioned limitations, pressures down to $1 \cdot 10^{-10}$ mbar can be measured with good accuracy.

Combination sensors

By a clever combination of two sensors in a single housing, the following advantages are the results:

- Extension of the measurement range
- Protection against damage by air inrushes
- Only one flange connection is required

In practice, the following variations are used:

Piezo and Pirani combination

Due to the pressure independence of the thermal conductivity effect at pressures over 1 mbar, the pressure in this range is measured directly with a diaphragm vacuum gauge. Thus, one obtains a characteristic allowing processes to be controlled in the pressure range from $1 \cdot 10^{-4}$ to 1200 mbar.

Pirani and capacitance combination

Operation of the combination of a capacitive diaphragm vacuum gauge and a Pirani sensor is similar to the combination Piezo and Pirani.

Pirani and hot cathode

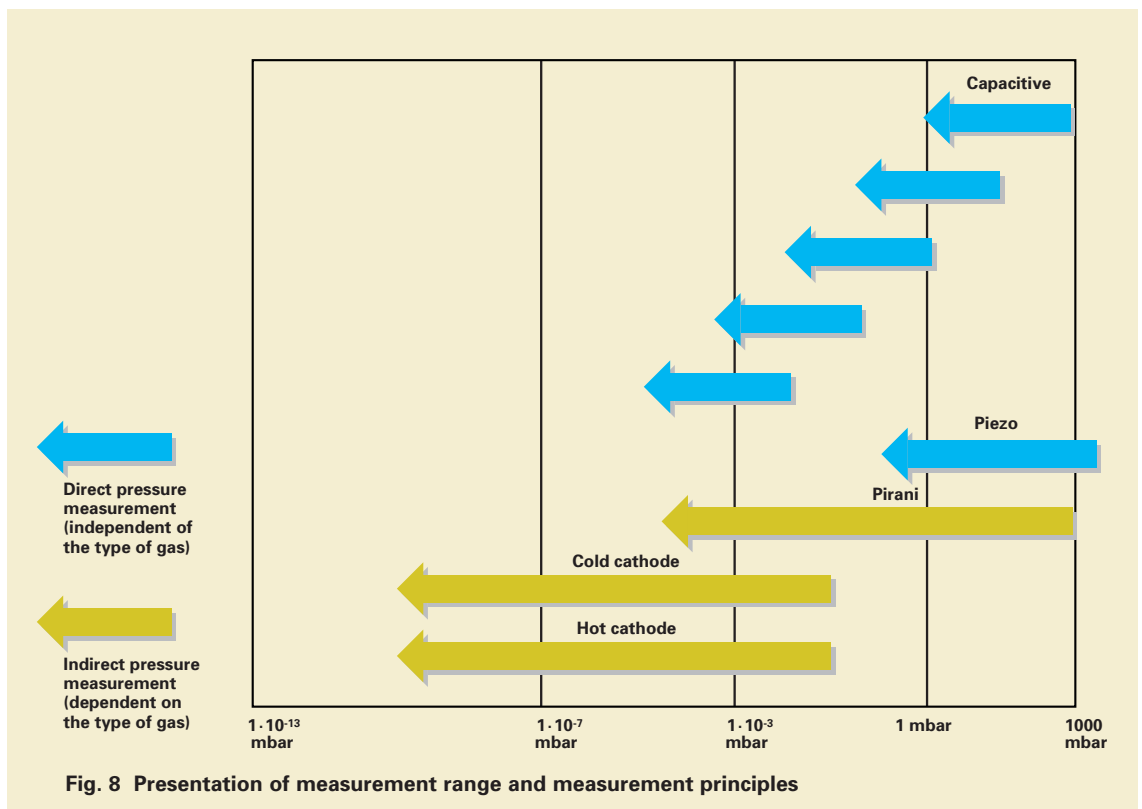
The combination of a Pirani and a hot cathode sensor is particularly useful. With the aid of the Pirani sensor it is possible to switch off the hot cathode sensor early enough so as to prevent the hot cathode from burning out. In this way, a very long service life and high accuracy is attained.

Pirani and cold cathode

Similarly, as in the case of the hot cathode sensors, the gas discharge is started through the Pirani sensor. The situation in this combination is similar to the situation described above. Through the pressure measured by the Pirani sensor, the gas discharge of the cold cathode sensor is started. Through this approach, unwanted switching on and thus premature contamination is avoided.

Type series

Generally a difference is made between total pressure sensors in which the electronics is a component of the sensor and those sensors which require a controller for processing the sensor signal. The term "Transmitter" is used for the first variant. Transmitters operate autonomously, i.e. a supply voltage is applied and a pressure signal is output. Transmitters can be found in the Pfeiffer Vacuum ActiveLine and the DigilLine™.





Total pressure measurement in a vacuum with digital signal output

Your advantages

Perfect for the industry

- ▶ Reliable data transfer through digital signals
- ▶ Serial interface RS 232/485 selectable
- ▶ Components freely combinable
- ▶ Data can be directly input to a PC
- ▶ With Profibus converter for integration in system controllers
- ▶ Suited for heavy duty industrial applications
- ▶ Directly transferable values, i.e., no complex characteristics are necessary
- ▶ Very easy to calibrate
- ▶ Connecting up all components without problems
- ▶ Other fieldbus converters upon request
- ▶ Low wiring complexity

Applications



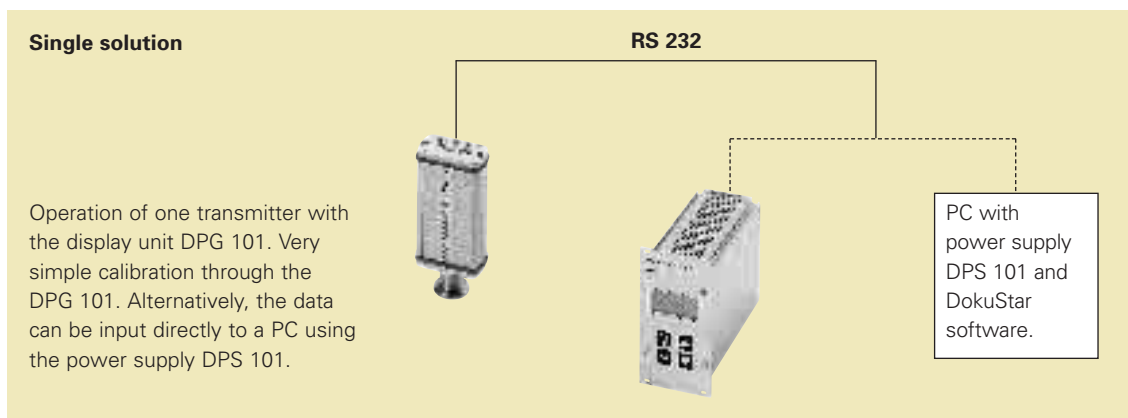
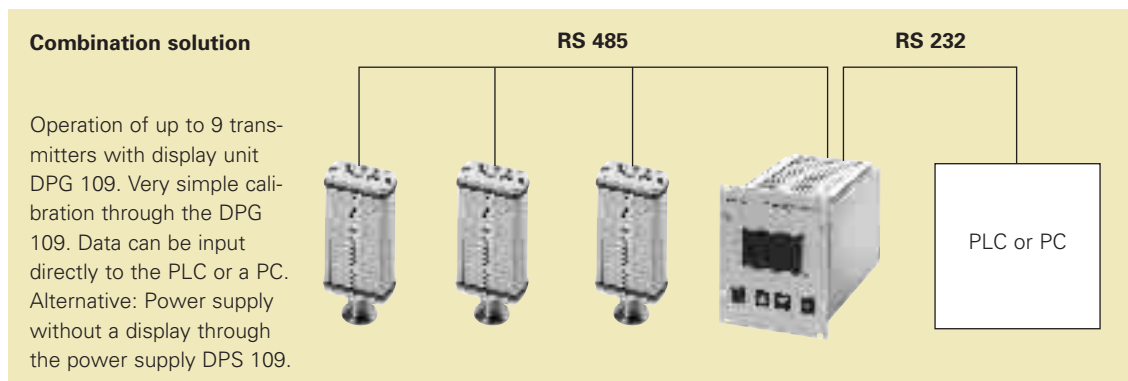
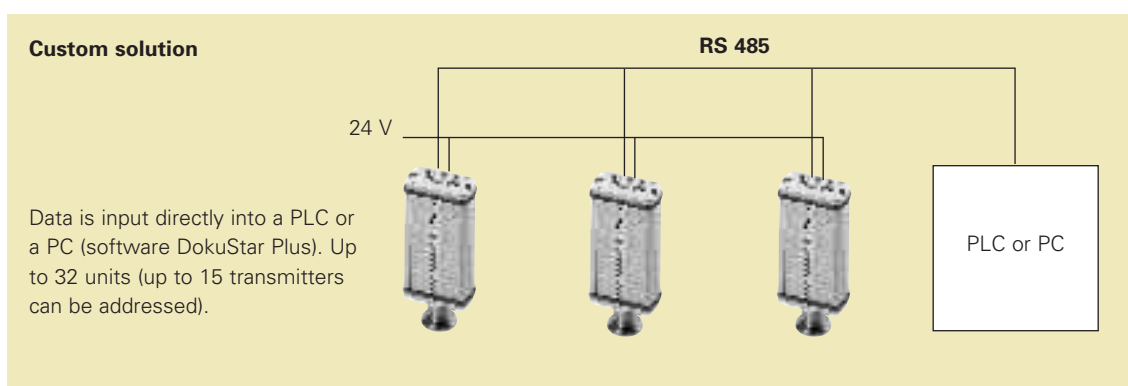
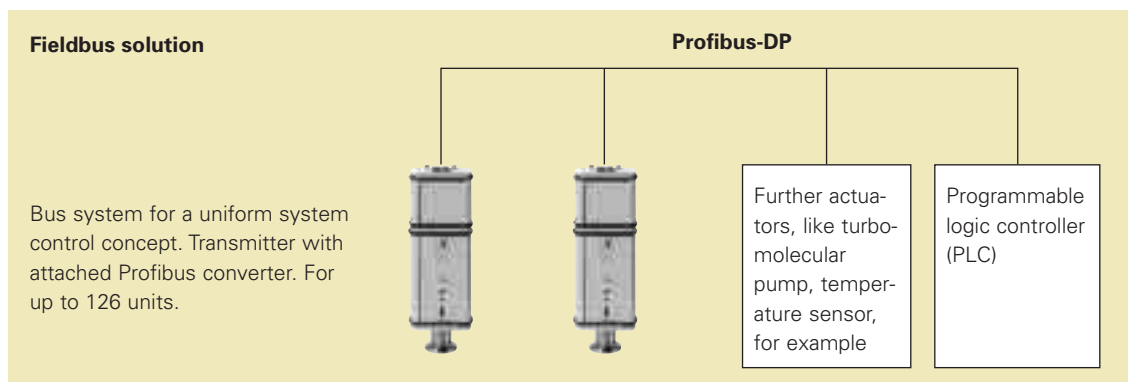
RPT 100 (Piezo/Pirani) replaces in a helium leak detection unit two conventional gauge heads. Data transfer through Profibus module.



HPT 100 (Pirani/Bayard-Alpert) and CPT 100 (Piezo) on a vacuum furnace for producing sintered metals.



The DigiLine™ concept





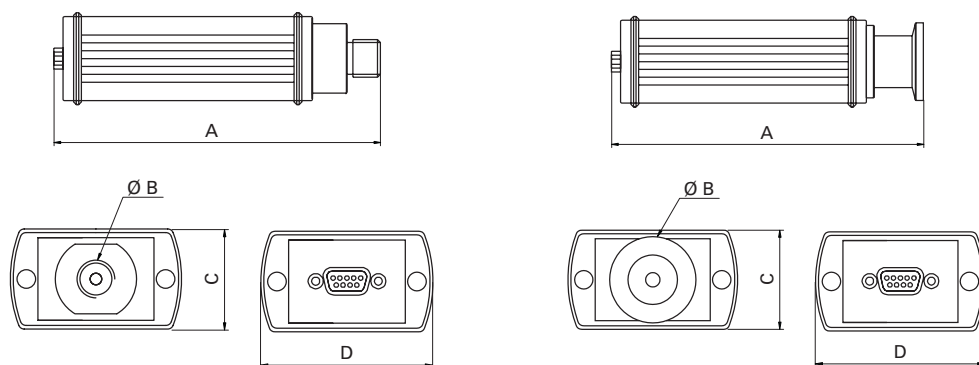
Digital Piezo Transmitter

CPT 100



- ▶ Measurement range from 1 mbar to 2000 mbar
- ▶ Pressure reading independent of gas type
- ▶ Corrosion resistant
- ▶ Profibus interface capability

Dimensions



G 1/4"

DN 16 ISO-KF

	G 1/4"	DN 16 ISO-KF
A:	120 mm	120 mm
B:	G 1/4"	30 mm
C:	35 mm	35 mm
D:	60 mm	60 mm

General technical data

Feedthrough	Glass
Pressure max.	4 bar
Weight	0.2 kg
Sensor cable length max.	1000 m
Interface: Connection	Digital RS-232 / RS-485, 9-pin, Sub-D-socket
Protection	IP 40 / IP 54
Temperature: Bakeout	70 °C
Temperature: Storage	-40 - +60 °C
Supply: Voltage	24 V DC
Temperature: Operating	+5 - +50 °C

Technical data

	G 1/4"	DN 16 ISO-KF
Method of measurement	Piezo	Piezo
Measurement range max.	2000 mbar	2000 mbar
Measurement range min.	1 mbar	1 mbar
Accuracy: % of measurement	1-1200 mbar: +/- 0.5 % F.S. >1200 mbar: +/- 2 % F.S.	1-1200 mbar: +/- 0.5 % F.S. >1200 mbar: +/- 2 % F.S.
Measuring cycle	40 ms	40 ms
Supply: Power consumption max.	0.5 W	0.5 W
Seal	Viton®	Viton®
Connector	G 1/4"	DN 16 ISO-KF
Materials in contact with media	Ceramic, Stainless Steel, Viton®	Ceramic, Stainless Steel, Viton®

Ordering Number

Transmitter	PT R31 230	PT R31 130
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Accessories

	Order.-No.
TIC 251, Profibus-Converter for CPT 100, PPT 100, RPT 100	PT 348 110
TIC 002, converter for DigiLine™ transmitters	PM 051 519-T



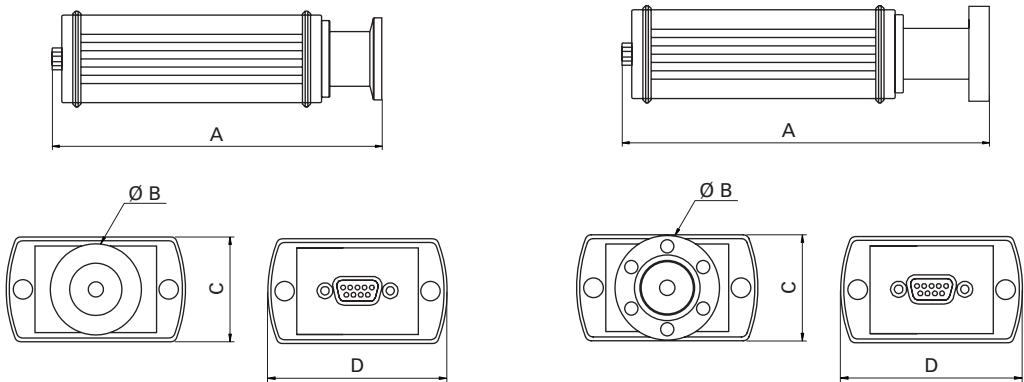
Digital Pirani Transmitter

PPT 100



- ▶ Measurement range
from 1·10⁻⁴ mbar to 1000 mbar
- ▶ Extremely accurate
- ▶ Profibus interface capability

Dimensions



DN 16 ISO-KF

DN 16 CF

	DN 16 ISO-KF	DN 16 CF
A:	120 mm	132 mm
B:	30 mm	34 mm
C:	35 mm	35 mm
D:	60 mm	60 mm

General technical data

Seal	Metal
Pressure max.	4 bar
Sensor cable length max.	1000 m
Interface: Connection	Digital RS-232 / RS-485, 9-pin, Sub-D-socket
Protection	IP 40 / IP 54
Temperature : Bakeout	70 °C
Temperature: Operating	+5 - +50 °C
Temperature Storage	-40 - +60 °C
Supply: Voltage	24 V DC

Technical data

	DN 16 ISO-KF	DN 16 CF
Method of measurement	Pirani	Pirani
Measurement range max.	1000 mbar	1000 mbar
Measurement range min.	$1 \cdot 10^{-4}$ mbar	$1 \cdot 10^{-4}$ mbar
Accuracy: % of measurement	$1 \cdot 10^{-3}$ - 1 mbar: +/-5 %	$1 \cdot 10^{-3}$ - 1 mbar: +/-5 %
Repeatability: % of measurement	$1 \cdot 10^{-3}$ - 1 mbar: +/-1 %	$1 \cdot 10^{-3}$ - 1 mbar: +/-1 %
Measuring cycle	40 ms	40 ms
Supply: Power consumption max.	2 W	2 W
Connector	DN 16 ISO-KF	DN 16 CF
Feedthrough	Glass	Glass
Weight	0.2 kg	0.2 kg
Materials in contact with media	Tungsten, Stainless Steel	Tungsten, Stainless Steel

Ordering Number

Transmitter	PT R33 130	PT R33 330
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Accessories

Accessories	Order.-No.
TIC 251, Profibus-Converter for CPT 100, PPT 100, RPT 100	PT 348 110
TIC 002, converter for DigiLine™ transmitters	PM 051 519-T



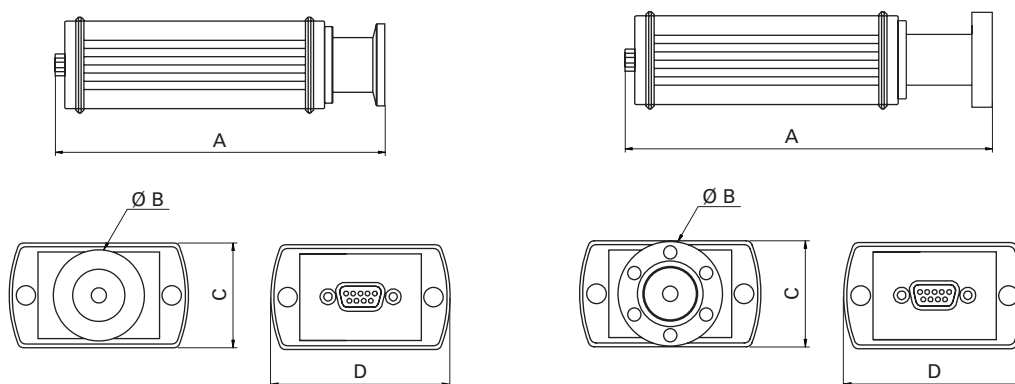
Digital Piezo/Pirani Transmitter

RPT 100



- ▶ Measurement range from $1 \cdot 10^{-4}$ mbar to 1200 mbar
- ▶ Highly accurate within the entire measurement range
- ▶ Especially suited for loadlock applications
- ▶ Profibus interface capability

Dimensions


DN 16 ISO-KF
DN 16 CF

	DN 16 ISO-KF	DN 16 CF
A:	120 mm	132 mm
B:	30 mm	34 mm
C:	35 mm	35 mm
D:	60 mm	60 mm

General technical data

Seal	Metal
Pressure max.	4 bar
Sensor cable length max.	1000 m
Interface: Connection	Digital RS-232 / RS-485, 9-pin, Sub-D-socket
Protection	IP 40 / IP 54
Temperature: Bakeout	70 °C
Temperature: Operating	+5 - + 50 °C
Temperature: Storage	-40 - +60 °C
Supply: Voltage	24 V DC

Technical data

	DN 16 ISO-KF	DN 16 CF
Method of measurement	Piezo/Pirani	Piezo/Pirani
Measurement range max.	1200 mbar	1200 mbar
Measurement range min.	1·10 ⁻⁴ mbar	1·10 ⁻⁴ mbar
Accuracy: % of measurement	5-1200 mbar: +/- 0.5 % F.S. 1·10 ⁻³ - 1 mbar: +/- 5 %	5-1200 mbar: +/- 0.5 % F.S. 1·10 ⁻³ - 1 mbar: +/- 5 %
Repeatability: % of measurement	5-1200 mbar: +/- 0.5 % F.S. 1·10 ⁻³ - 1 mbar: +/- 1 %	5-1200 mbar: +/- 0.5 % F.S. 1·10 ⁻³ - 1 mbar: +/- 1 %
Measuring cycle	40 ms	40 ms
Supply: Power consumption max.	2 W	2 W
Connector	DN 16 ISO-KF	DN 16 CF
Feedthrough	Glass	Glass
Weight	0.2 kg	0.2 kg
Materials in contact with media	Tungsten, Gold, Silicon	Tungsten, Gold, Silicon

Ordering Number

Transmitter	PT R32 130	PT R32 330
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Accessories

	Order.-No.
TIC 251, Profibus-Converter for CPT 100, PPT 100, RPT 100	PT 348 110
TIC 002, converter for DigiLine™ transmitters	PM 051 519-T



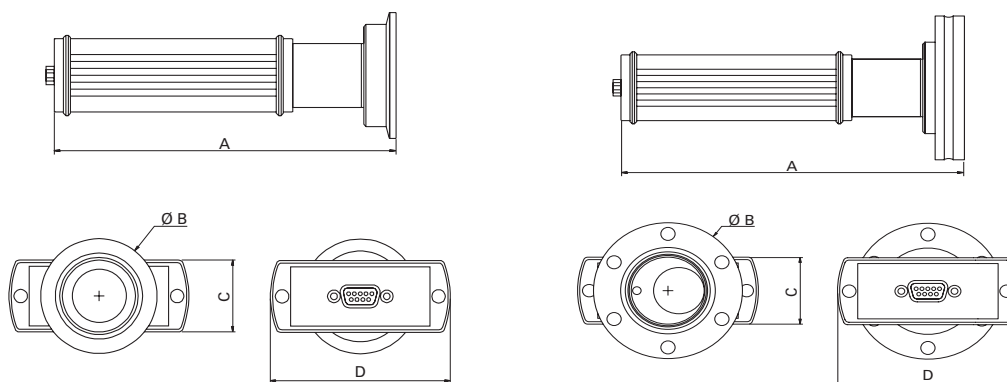
Digital Pirani/Bayard-Alpert Transmitter

HPT 100



- ▶ Measurement range from $1 \cdot 10^{-9}$ mbar to 1000 mbar
- ▶ Highly reliable with two filaments
- ▶ Profibus interface capability

Dimensions



DN 40 ISO-KF

DN 40 CF

	DN 40 ISO-KF	DN 40 CF
A:	147 mm	156 mm
B:	55 mm	70 mm
C:	35 mm	35 mm
D:	85 mm	85 mm

General technical data

Seal	Metal
Pressure max.	4 bar
Sensor cable length max.	1000 m
Interface: Connection	Digital RS-232 / RS-485, 9-pin, Sub-D-socket
Protection	IP 40 / IP 54
Temperature: Bakeout (electronics removed)	180 °C
Temperature: Operating	+5 - +50 °C
Temperature Storage	-40 - +60 °C
Supply: Voltage	24 V DC

Technical data

	DN 40 ISO-KF	DN 40 CF
Method of measurement	Pirani/ Bayard-Alpert	Pirani/ Bayard-Alpert
Measurement range max.	1000 mbar	1000 mbar
Measurement range min.	$1 \cdot 10^{-9}$ mbar	$1 \cdot 10^{-9}$ mbar
Accuracy: % of measurement	$1 \cdot 10^{-7}$ - 1 mbar: +/- 10 %	$1 \cdot 10^{-7}$ - 1 mbar: +/- 10 %
Repeatability: % of measurement	$1 \cdot 10^{-7}$ - 1 mbar: +/- 5 %	$1 \cdot 10^{-7}$ - 1 mbar: +/- 5 %
Measuring cycle	40 ms	40 ms
Supply: Power consumption max.	7.5 W	7.5 W
Connector	DN 40 ISO-KF	DN 40 CF
Number of filaments	2	2
Filament	iridium yttriated, twice	Iridium yttriated, twice
Feedthrough	Glass, Ceramic	Glass, Ceramic
Weight	0.4 kg	0.4 kg
Materials in contact with media	Tungsten, Stain- less Steel, Nickel	Tungsten, Stain- less Steel, Nickel

Ordering Number

Transmitter	PT R34 130	PT R34 330
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Accessories

	Order.-No.
TIC 252, Profibus-Converter for HPT 100	PT 348 111
TIC 002, converter for DigiLine™ transmitters	PM 051 519-T



Controllers with display and power supplies

DPG 101, for 1 transmitter
DPG 109, for 9 transmitters

Display instruments

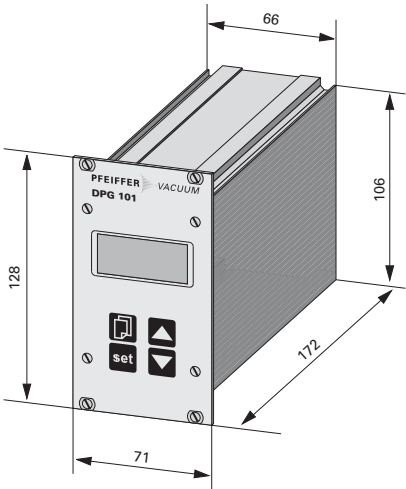


DPG 101
for connecting and powering of a
single transmitter with digital display

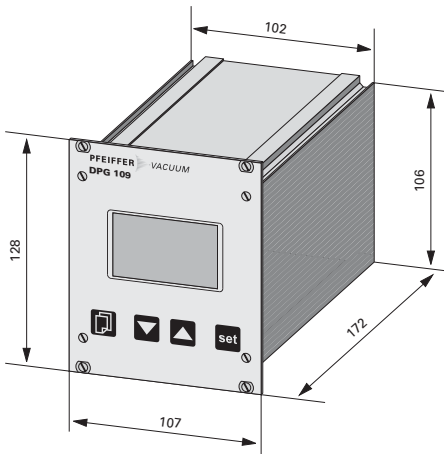
DPG 109
for connecting and powering of up to
9 transmitters with digital display



Dimensions (in mm)



DPG 101, for 1 transmitter



DPG 109, for 9 transmitter

General technical data

Display	LCD-Display, backlit, four digit
Measurement rate	30 1/s
Mains requirement: frequency (range)	50/60 Hz
Mains requirement: voltage (range)	90 - 260 V AC
Temperature: Operating	+5 - +50 °C

Technical data

	DPG 101	DPG 109
Weight	0.7 kg	1 kg
Mains requirement: power consumption	15 VA	48 VA
Set point: Voltage max.	260 V AC, 2 A 50 V DC, 2 A	50 V AC, 3 A 30 V DC, 3 A
Set point: Changeover contact, potential-free	2 pieces	8 pieces
Signal output: Measuring value, analog	0 - 10 V	-
Interface	-	RS 232 C
Temperature Storage	-20 - +60 °C	-20 - +50 °C
Connections for transmitter	1	9 (max. 4 HPT 100)

Ordering Number

Displays	PT G10 010	PT G15 010
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Accessories

Transmitter connecting cable for DPG 101, 3 m	PT 348 203-T	-
Transmitter connecting cable for DPG 101, 6 m	PT 348 206-T	-
Transmitter connecting cable for DPG 101, 10 m	PT 348 210-T	-
Mains cable, U.S. plug, 2.5 m	P4 564 309 YX	P4 564 309 YX
Mains cable, German plug, 2.5 m	P4 564 309 YU	P4 564 309 YU
Mains cable, Swiss plug, 2.5 m	P4 564 309 YR	P4 564 309 YR
Mains cable, U.K. plug, 2.5 m	P4 564 309 Y1	P4 564 309 Y1
Transmitter connecting cable for DPG / DPS 109, 3 m	-	PT 348 403-T
Transmitter connecting cable for DPG / DPS 109, 6 m	-	PT 348 406-T
Transmitter connecting cable for DPG / DPS 109, 10 m	-	PT 348 410-T
Software DokuStar Plus	-	PT 882 501
PC Data cable, 3 m	-	PT 348 130-T



Controllers with display and power supplies

DPS 101, for 1 transmitter, EU/US/UK

DPS 109, for max. 9 transmitters

Power supplies



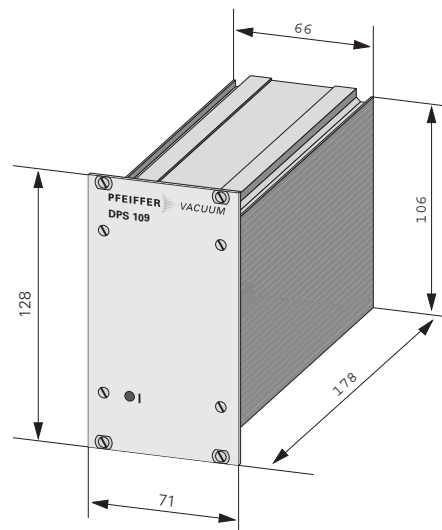
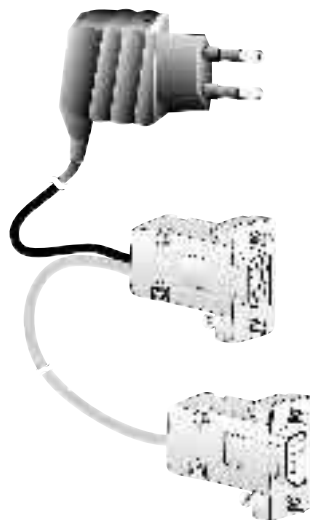
DPS 101

for powering a single transmitter
and for connection to a PC including
DokuStar Software

DPS 109

for powering up to 9 transmitters
and for connection to PC/PLC

Dimensions (in mm)



DPS 101, for 1 transmitter, EU

DPS 109, for max. 9 transmitter

Technical data

	DPS 101, for 1 Transmitter, EU	DPS 101, for 1 Transmitter, US	DPS 101, for 1 Transmitter, UK	DPS 109, for max. 9 Transmitter
Weight	0.3 kg	0.3 kg	0.3 kg	0.7 kg
Mains requirement: frequency (range)	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
Mains requirement: power consumption	18 VA	18 VA	18 VA	48 VA
Mains requirement: voltage (range)	100 - 240 V	100 - 240 V	100 - 240 V	90 - 260 V
Interface	RS-232 C	RS-232-C	RS-232-C	RS-232
Software DokuStar	included	included	included	-
Temperature: Operating	+5 - +50 °C	+5 - +50 °C	+5 - +50 °C	+5 - +50 °C
Temperature Storage	-30 - +50 °C	-30 - +50 °C	-30 - +50 °C	-20 - +60 °C
Connections for transmitter	1	1	1	9 (max. 4 HPT 100)

Ordering Number

Displays and power supplies	PT G20 010	PT G20 011	PT G20 012	PT G25 010
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Accessories

Software DokuStar Plus	-	-	-	PT 882 501
Transmitter connecting cable for DPG / DPS 109, 3 m	-	-	-	PT 348 403-T
Transmitter connecting cable for DPG / DPS 109, 6 m	-	-	-	PT 348 406-T
Transmitter connecting cable for DPG / DPS 109, 10 m	-	-	-	PT 348 410-T
Mains cable, U.S. plug, 2.5 m	-	-	-	P4 564 309 YX
Mains cable, German plug, 2.5 m	-	-	-	P4 564 309 YU
Mains cable, Swiss plug, 2.5 m	-	-	-	P4 564 309 YR
Mains cable, U.K. plug, 2.5 m	-	-	-	P4 564 309 Y1
PC Data cable, 3 m	-	-	-	PT 348 130-T



Accessories

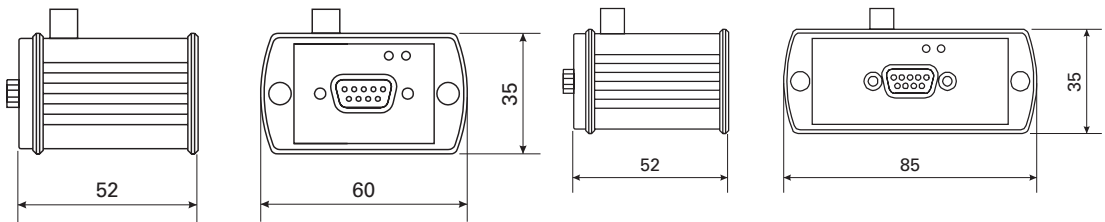
TIC 251/252 Profibus converter



Fieldbus converter modules mount directly to transmitter.



Dimensions (in mm)



TIC 251, for CPT 100, PPT 100, RPT 100

TIC 252, for HPT 100

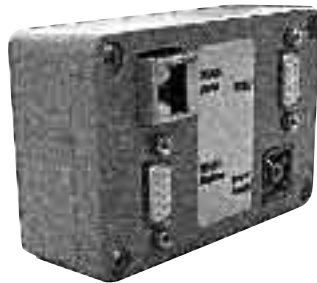
Technical data	TIC 251	TIC 252
Interface: Type	Profibus-DP	Profibus-DP
Temperature: Operating	+5 - +40 °C	+5 - +40 °C
Power	3.5 W (without transmitter)	3.5 W (without transmitter)
Voltage	Connection 21-30 V DC	Connection 21-30 V DC
Weight	0.1 kg	0.12 kg

Ordering Number

Converter	PT 348 110	PT 348 111
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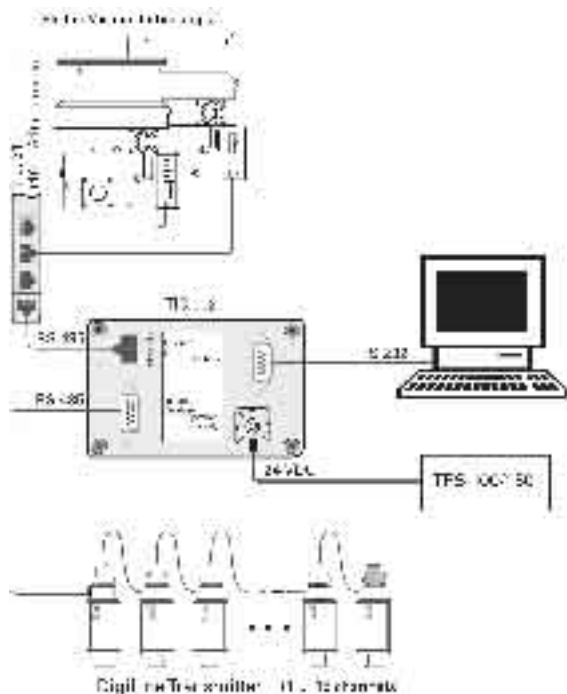
Accessories

TIC 002 Converter



- ▶ RS-485/RS-232 converter
- ▶ To control Pfeiffer Vacuum pumps and DigiLine™ transmitter
- ▶ Socket for 24 V supply voltage for DigiLine™ transmitter

Dimensions



TIC 002, Converter for DigiLine™ transmitter

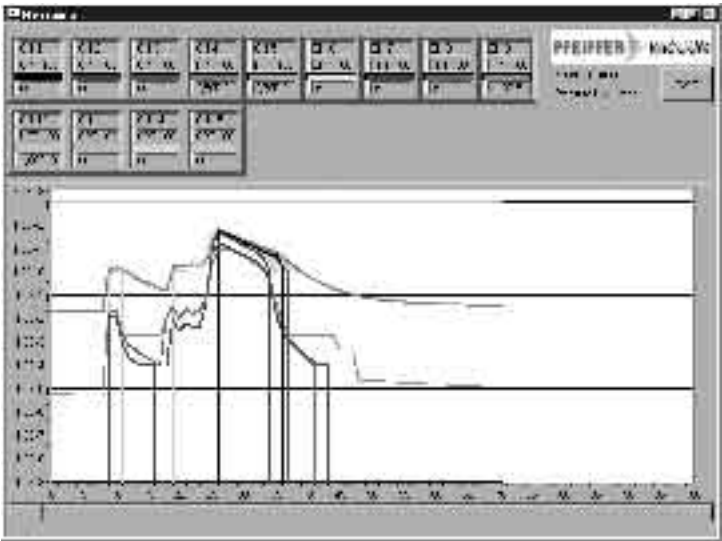
Technical data	TIC 002
Voltage	24 V DC
Power consumption	ca. 1 W

Ordering Number	
Converter	PM 051 519-T

Accessories	Order.-No.
PC Data cable, 3 m	PT 348 130-T
Bus termination, for RS 485	PT 348 100-T
Transmitter connecting cable for DPG / DPS 109, 3 m	PT 348 403-T
Transmitter connecting cable for DPG / DPS 109, 6 m	PT 348 406-T
Transmitter connecting cable for DPG / DPS 109, 10 m	PT 348 410-T

Accessories

Software DokuStar Plus



- Presentation and saving the data from 15 sensors
- Simple operation for displays and power supplies DPG 109 and DPS 109

System requirements

PC min.	Pentium 160 MHz
RAM	64 MB
Memory	15 MB free HD memory
Interface	RS-232

Ordering Number

Software DokuStar Plus	PT 882 501
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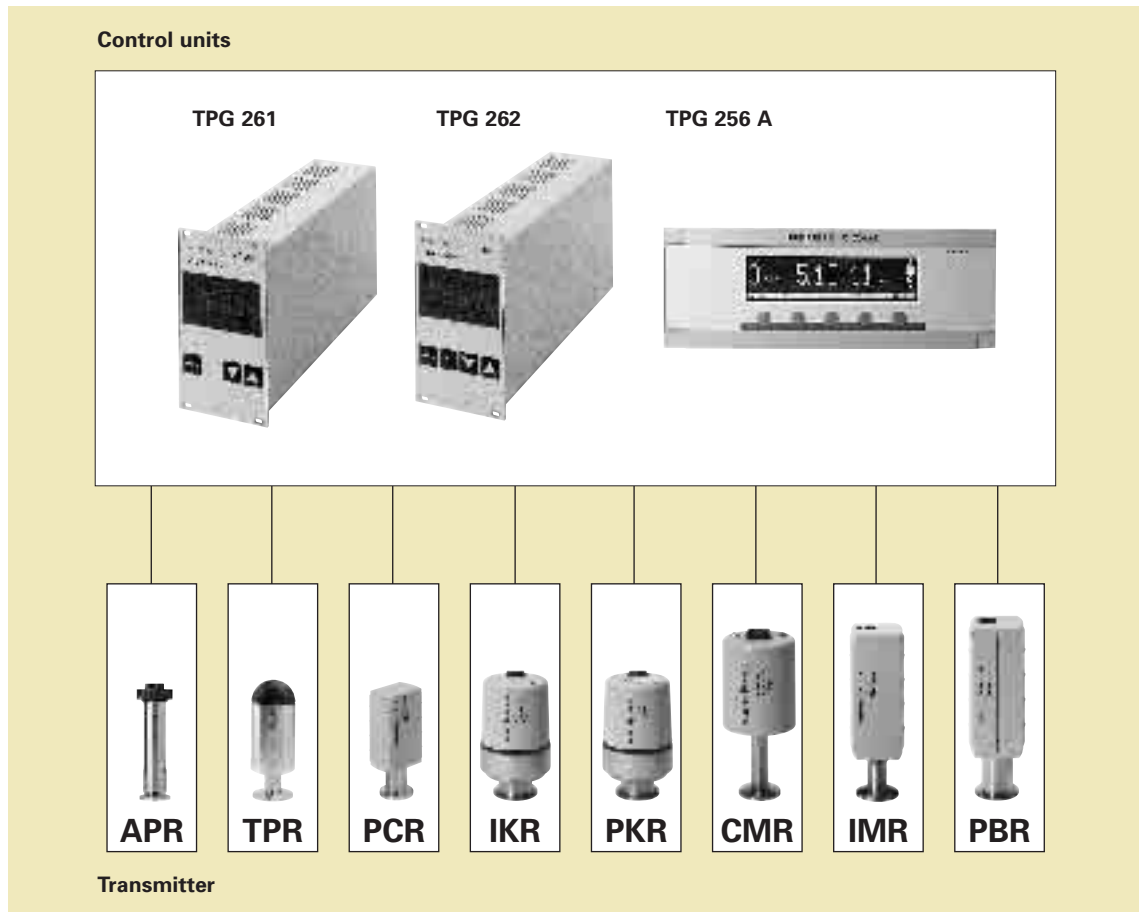


Total pressure measurement in a vacuum with analog signal output

Your advantage

- ▶ Large variety of transmitters to cover the entire pressure range (10⁻¹¹ to 55000 mbar)
- ▶ Compact design
- ▶ Easy integration
- ▶ Cost effective
- ▶ Integrated measurement connections
- ▶ Compact independent transmitter
- ▶ Output signal 0 – 10 V with integrated error signal
- ▶ Any pressure unit possible

The ActiveLine concept



- ▶ The ActiveLine comprises three controllers and 8 transmitters
- ▶ Control units for connecting of 1, 2 and 6 transmitters
- ▶ Each transmitter can be operated with every controller
- ▶ No cable mix-up – identical cables for connecting the transmitters to the controllers

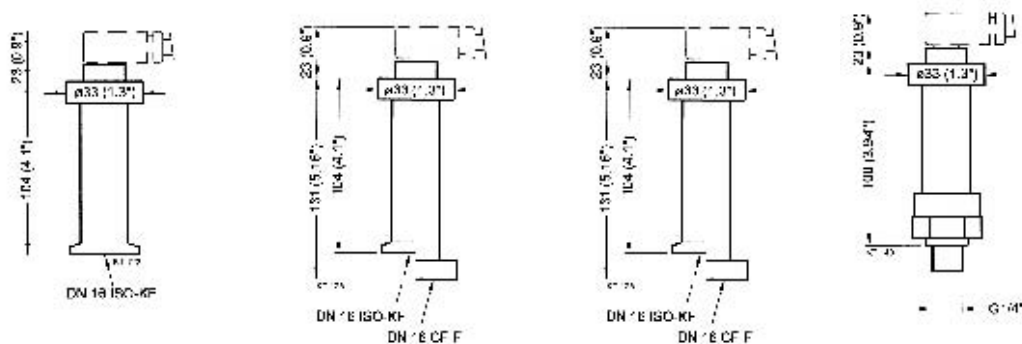
Compact Piezo Gauge

APR 250/260/262



- Measurement range from 0.1 mbar to 2200 mbar
- Pressure reading independent of gas type
- Corrosion resistant

Dimensions (in mm)



APR 250, DN 16 ISO-KF

APR 260, DN 16 ISO-KF

APR 260, DN 16 CF-F

APR 262, G1/4"

General technical data

Output signal: Sensor error below	0.4 V
Output signal: Pressure range	1.0-9.8 V
Output signal: Minimum load	10 kOhm
Sensor cable length	50 m
Temperature: Storage	-40 °C - +70 °C
Temperature: Operating	+10 - +60 °C
Supply: Voltage	13-30 V DC
Supply: Power consumption max.	0.2 W
Material	Stainless Steel

Technical data

	APR 250	APR 260	APR 260	APR 262
Connector	DN 16 ISO-KF	DN 16 ISO-KF	DN 16 CF-F	G 1/4"
Measurement range max.	1100 mbar	1100 mbar	1100 mbar	2200 mbar
Measurement range min.	$1 \cdot 10^{-1}$ mbar	$1 \cdot 10^{-1}$ mbar	$1 \cdot 10^{-1}$ mbar	$2 \cdot 10^{-1}$ mbar
Bakeout temperature	80 °C	80 °C	80 °C	80 °C
Pressure max.	3 bar	3 bar	3 bar	6 bar
Stability of sensitivity	0.5 %/year	0.2 %/year	0.2 %/year	0.2 %/year
Accuracy	2 % F.S.	1 % F.S.	1 % F.S.	2 % F.S.
Weight	120 g	120 g	150 g	120 g
Linearity and hysteresis	0.5 % F.S.	0.2 % F.S.	0.2 % F.S.	0.5 % F.S.
Zero stability	0.5 % F.S./year	0.3 % F.S./year	0.3 % F.S./year	0.5 % F.S./year
Thermal sensitivity drift	0.5 %	0.5 %	0.5 %	0.5 %
Thermal zero drift	0.5 % F.S.	0.2 % F.S.	0.2 % F.S.	0.5 % F.S.
Volume	2 cm ³	2 cm ³	6 cm ³	0.5 cm ³

The maximum absolute pressure is valid for inert gases and temperatures <55 °C.

Ordering Number

Compact Piezo Gauge	P 5215 102 TF	P 5215 112 TF	P 5215 114 TF	P 5215 120 TF
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Accessories

Order.-No.

Sensor cable AL, 3 m	PT 448 250-T
Plug for Compact Gauge	B 4707 283 MA



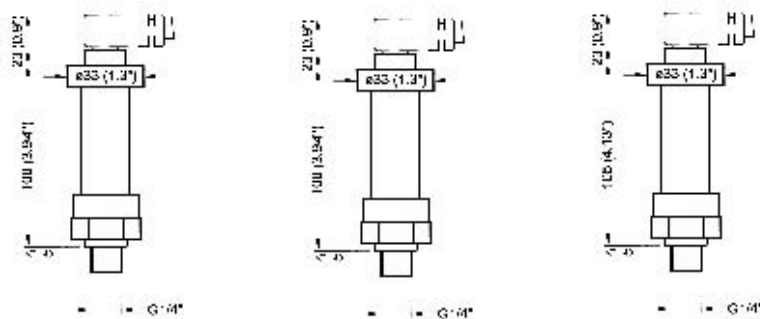
Compact Piezo Gauge

APR 265/266/267



- ▶ Measurement range from 0.5 mbar to 55 bar
- ▶ Pressure reading independent of gas type
- ▶ Corrosion resistant

Dimensions (in mm)



APR 265, G 1/4"

APR 266, G 1/4"

APR 267, G 1/4"

General technical data

Output signal: Sensor error below	0.4 V
Output signal: Pressure range	1.0-9.8 V
Output signal: Minimum load	10 kOhm
Sensor cable length	50 m
Temperature: Storage	-40 - +70 °C
Temperature: Operating	+10 - +60 °C
Supply: Voltage	13-30 V DC
Supply: Power consumption max.	0.2 W
Material	Stainless Steel

Technical data

	APR 265	APR 266	APR 267
Connector	G 1/4"	G 1/4"	G 1/4"
Measurement range max.	5500 mbar	11000 mbar	55000 mbar
Measurement range min.	0.5 mbar	1 mbar	5 mbar
Bakeout temperature	80 °C	80 °C	80 °C
Pressure max.	15 bar	30 bar	150 bar
Stability of sensitivity	0.2 %/year	0.2 %/year	0.2 %/year
Accuracy	2 % F.S.	2 % F.S.	2 % F.S.
Weight	120 g	120 g	120 g
Linearity and hysteresis	0.5 % F.S.	0.5 % F.S.	0.5 % F.S.
Zero stability	0.5 % F.S./year	0.5 % F.S./year	0.5 % F.S./year
Thermal sensitivity drift	0.5 %	0.5 %	0.5 %
Thermal zero drift	0.5 % F.S.	0.5 % F.S.	0.5 % F.S.
Volume	0.5 cm ³	0.5 cm ³	0.5 cm ³

The maximum absolute pressure is valid for inert gases and temperatures <55 °C.

Ordering Number

Compact Piezo Gauge	P 5215 126 TF	P 5215 132 TF	P5 215 138 TF
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Accessories

Order.-No.

Sensor cable AL, 3 m	PT 448 250-T
Plug for Compact Gauge	B 4707 283 MA



Compact Capacitance Diaphragm Gauge

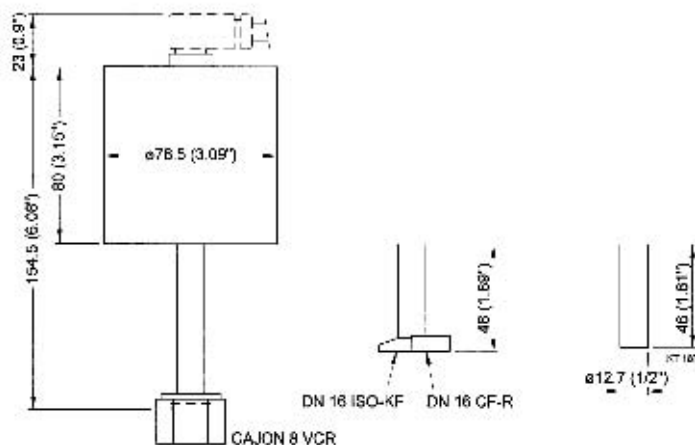
CMR 261/262/263/264

Temperature compensated



- ▶ Measurement range from $1 \cdot 10^{-4}$ mbar to 1100 mbar
- ▶ Pressure reading independent of gas type
- ▶ Corrosion resistant
- ▶ Excellent long-term and temperature stability due to ceramics design
- ▶ Marginal zero drift

Dimensions (in mm)



CMR 261, 262, 263, 264,
Cajon 8 VCR

CMR 261, 262, 263, 264,
DN 16 ISO-KF, DN 16 CF-R

CMR 261, 262, 263, 264,
Tube AD 1/2"

General technical data

Output signal: Sensor error below	0.4 V
Output signal: Pressure range	1.0-9.8 V
Output signal: Minimum load	10 kOhm
Membrane and measuring chamber	Al ₂ O ₃ , Vacon 70
Sensor cable length	120 m
Pipe and flange	Stainless Steel
Temperature: Storage	-40 - +65 °C
Temperature: Operating	+5 - +50 °C
Supply: Voltage	18-30 V DC
Supply: Power consumption max.	1.8 W

Technical data

	CMR 261	CMR 262	CMR 263	CMR 264
Measurement range max.	1100 mbar	110 mbar	11 mbar	1.1 mbar
Measurement range min.	1·10 ⁻¹ mbar	1·10 ⁻² mbar	1·10 ⁻³ mbar	1·10 ⁻⁴ mbar
Resolution	0.0015 % F.S.	0.0015 % F.S.	0.0015 % F.S.	0.0025 % F.S.
Bakeout temperature max. at the flange	110 °C	110 °C	110 °C	110 °C
Pressure max.	3 bar	2 bar	2 bar	2 bar
Accuracy	0.2 % of reading	0.2 % of reading	0.2 % of reading	0.2 % of reading
Temperature effect: on span	0.01 % of reading/°C	0.01 % of reading/°C	0.01 % of reading/°C	0.01 % of reading/°C
Temperature effect: on zero	0.005 % F.S./°C	0.005 % F.S./°C	0.005 % F.S./°C	0.019 % F.S./°C
Volume	5.75 cm ³	5.75 cm ³	5.75 cm ³	5.75 cm ³

Accuracy includes: Non-linearity, hysteresis, non-repeatability; at 20 °C +/- temperature effects.

Compact Capacitance Diaphragm Gauge

Flange (in)	Rohr AD 1/2"	Rohr AD 1/2"	Rohr AD 1/2"	Rohr AD 1/2"
Weight	260 g	260 g	260 g	260 g
Ordering number	PT R24 500	PT R24 510	PT R24 520	PT R24 530
Flange (in)	DN 16 ISO-KF	DN 16 ISO-KF	DN 16 ISO-KF	DN 16 ISO-KF
Weight	270 g	270 g	270 g	270 g
Ordering number	PT R24 501	PT R24 511	PT R24 521	PT R24 531
Flange (in)	DN 16 CF-R	DN 16 CF-R	DN 16 CF-R	DN 16 CF-R
Weight	280 g	280 g	280 g	280 g
Ordering number	PT R24 502	PT R24 512	PT R24 522	PT R24 532
Flange (in)	Cajon 8 VCR	Cajon 8 VCR	Cajon 8 VCR	Cajon 8 VCR
Weight	290 g	290 g	290 g	290 g
Ordering number	PT R24 503	PT R24 513	PT R24 523	PT R24 533

Accessories

	Order.-No.
Sensor cable AL, 3 m	PT 448 250-T
Plug for Compact Gauge	B 4707 283 MA



Compact Capacitance Diaphragm Gauge

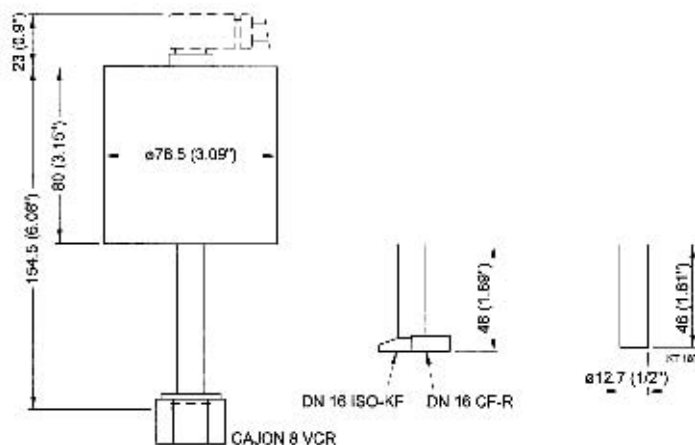
CMR 271/272/273

Temperature controlled (45 °C)



- ▶ Measurement range from $1 \cdot 10^{-3}$ mbar to 1100 mbar
- ▶ Pressure reading independent of gas type
- ▶ Corrosion resistant
- ▶ Excellent long-term and temperature stability due to ceramics design
- ▶ Marginal zero drift

Dimensions (in mm)



CMR 271, 272, 273
Cajon 8 VCR

CMR 271, 272, 273
DN 16 ISO-KF, DN 16 CF-R

CMR 271, 272, 273
Tube AD 1/2"

General technical data

Output signal: Sensor error below	0.4 V
Output signal: Pressure range	1.0-9.8 V
Output signal: Minimum load	10 kOhm
Membrane and measuring chamber	Al ₂ O ₃ , Vacon 70
Sensor cable length	65 m
Pipe and flange	Stainless Steel
Temperature: Storage	-40 - +65 °C
Temperature: Operating	+15 - +40 °C
Supply: Voltage	18-30 V DC
Supply: Power consumption max.	7.5 W

Technical data

	CMR 271	CMR 272	CMR 273
Measurement range max.	1100 mbar	110 mbar	11 mbar
Measurement range min.	1·10 ⁻¹ mbar	1·10 ⁻² mbar	1·10 ⁻³ mbar
Resolution	0.0015 % F.S.	0.0015 % F.S.	0.0015 % F.S.
Bakeout temperature max. at the flange	90 °C	90 °C	90 °C
Pressure max.	3 bar	2 bar	2 bar
Accuracy	0.15 % of reading	0.15 % of reading	0.15 % of reading
Temperature effect: on span	0.01 % of reading/°C	0.01 % of reading/°C	0.01 % of reading/°C
Temperature effect: on zero	0.0025 % F.S./°C	0.0025 % F.S./°C	0.0025 % F.S./°C
Temperature stabilization	45 °C	45 °C	45 °C
Volume	7 cm ³	7 cm ³	7 cm ³

Accuracy includes: Non-linearity, hysteresis, non-repeatability; at 20 °C +/- temperature effects.

Compact Capacitance Diaphragm Gauge

Flange (in)	Rohr AD 1/2"	Rohr AD 1/2"	Rohr AD 1/2"
Weight	485 g	485 g	485 g
Ordering number	PT R25 000	PT R25 010	PT R25 020
Flange (in)	DN 16 ISO-KF	DN 16 ISO-KF	DN 16 ISO-KF
Weight	495 g	495 g	495 g
Ordering number	PT R25 001	PT R25 011	PT R25 021
Flange (in)	DN 16 CF-R	DN 16 CF-R	DN 16 CF-R
Weight	505 g	505 g	505 g
Ordering number	PT R25 002	PT R25 012	PT R25 022
Flange (in)	Cajon 8 VCR	Cajon 8 VCR	Cajon 8 VCR
Weight	515 g	515 g	515 g
Ordering number	PT R25 003	PT R25 013	PT R25 023

Accessories

	Order.-No.
Sensor cable AL, 3 m	PT 448 250-T
Plug for Compact Gauge	B 4707 283 MA



Compact Capacitance Diaphragm Gauge

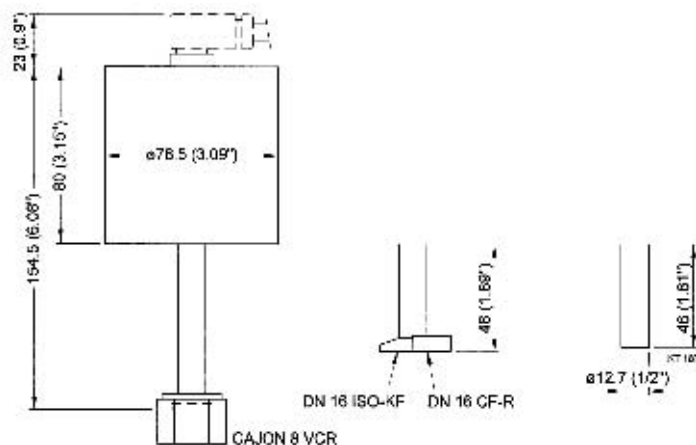
CMR 274/275

Temperature controlled (45 °C)



- ▶ Measurement range from $1 \cdot 10^{-5}$ mbar to 1.1 mbar
- ▶ Pressure reading independent of gas type
- ▶ Corrosion resistant
- ▶ Excellent long-term and temperature stability due to ceramics design
- ▶ Marginal zero drift

Dimensions (in mm)



CMR 274, 275
Cajon 8 VCR

CMR 274, 275
DN 16 ISO-KF, DN 16 CF-R

CMR 274, 275
Tube AD 1/2"

General technical data

Output signal: Sensor error below	0.4 V
Output signal: Pressure range	1.0-9.8 V
Output signal: Minimum load	10 kOhm
Membrane and measuring chamber	Al ₂ O ₃ , Vacon 70
Sensor cable length	65 m
Pipe and flange	Stainless Steel
Temperature: Storage	-40 - +65 °C
Temperature: Operating	+15 - +40 °C
Supply: Voltage	18-30 V DC
Supply: Power consumption max.	7.5 W

Technical data

	CMR 274	CMR 275
Measurement range max.	1.1 mbar	0.11 mbar
Measurement range min.	1·10 ⁻⁴ mbar	1·10 ⁻⁵ mbar
Resolution	0.0025 % F.S.	0.0025 % F.S.
Bakeout temperature max. at the flange	90 °C	90 °C
Pressure max.	2 bar	2 bar
Accuracy	0.15 % of reading	0.15 % of reading
Temperature effect: on span	0.01 % of reading/°C	0.01 % of reading/°C
Temperature effect: on zero	0.0025 % F.S./°C	0.0065 % F.S./°C
Temperature stabilization	45 °C	45 °C
Volume	7 cm ³	7 cm ³

Accuracy includes: Non-linearity, hysteresis, non-repeatability; at 20 °C +/- temperature effects.

Compact Capacitance Diaphragm Gauge

Flange (in)	Rohr AD 1/2"	Rohr AD 1/2"
Weight	485 g	485 g
Ordering number	PT R25 030	PT R25 040
Flange (in)	DN 16 ISO-KF	DN 16 ISO-KF
Weight	495 g	495 g
Ordering number	PT R25 031	PT R25 041
Flange (in)	DN 16 CF-R	DN 16 CF-R
Weight	505 g	505 g
Ordering number	PT R25 032	PT R25 042
Flange (in)	Cajon 8 VCR	Cajon 8 VCR
Weight	515 g	515 g
Ordering number	PT R25 033	PT R25 043

Accessories

	Order.-No.
Sensor cable AL, 3 m	PT 448 250-T
Plug for Compact Gauge	B 4707 283 MA



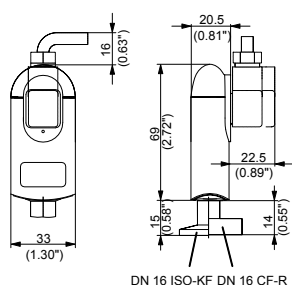
Compact Pirani Gauge

TPR 280



- ▶ Measurement range from $5 \cdot 10^{-4}$ mbar to 1000 mbar
- ▶ Compact and rugged
- ▶ Stable and rapid measurements
- ▶ For general vacuum applications

Dimensions (in mm)



**TPR 280, DN 16 ISO-KF,
DN 16 CF-R**

General technical data

Output signal: Sensor error below	0.5 V
Output signal: Pressure range	2.2-8.5 V
Output signal: Minimum load	10 kOhm
Feedthrough	Glass
Flange	Stainless Steel
Sensor cable length max.	200 m
Temperature: Storage	-20 - +65 °C
Supply: Voltage	14-30 V DC
Supply: Power consumption max.	1 W



Technical data

	TPR 280	TPR 280 extended housing
Measurement range max.	1000 mbar	1000 mbar
Measurement range min.	$5 \cdot 10^{-4}$ mbar	$5 \cdot 10^{-4}$ mbar
Bakeout temperature	80 °C	250 °C
Seal	Metal	Metal
Pressure max.	10 bar	10 bar
Accuracy: 10^{-3} - 10^2 mbar	+/- 15 %	+/- 15 %
Repeatability: 10^{-3} - 10^2 mbar	+/- 2 %	+/- 2 %
Filament	Tungsten	Tungsten
Temperature: Operating	+5 - +60 °C	+5 - +60 °C
Volume	1.5 cm ³	10 cm ³

The maximum absolute pressure is valid for inert gases

Compact Pirani Gauge

Flange (in)	DN 16 ISO-KF	DN 16 ISO-KF
Weight	80 g	130 g
Ordering number	PT R26 950	PT R26 960
Flange (in)	DN 16 CF-R	DN 16 CF-R
Weight	100 g	140 g
Ordering number	PT R26 951	PT R26 961

Accessories

	Order.-No.
Centering ring, with Poral filter, Viton®/Stainless Steel, DN 16 ISO-KF	PF 117 216-T
Fine filter for TPR 265, pore dimension 0,0004 mm	PT 120 132-T
Plug for Compact Gauge	B 4707 283 MA
Sensor cable AL, 3 m	PT 448 250-T



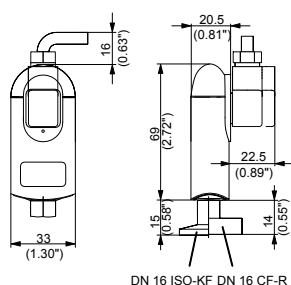
Compact Pirani Gauge

TPR 281



- ▶ Measurement range from $5 \cdot 10^{-4}$ mbar to 1000 mbar
- ▶ For corrosive media
- ▶ Compact and rugged
- ▶ Stable and rapid measurements

Dimensions (in mm)



**TPR 281, DN 16 ISO-KF,
DN 16 CF-R**

General technical data

Output signal: Sensor error below	0.5 V
Output signal: Pressure range	2.2-8.5 V
Output signal: Minimum load	10 kOhm
Feedthrough	Glass
Flange	Stainless Steel
Sensor cable length max.	200 m
Temperature: Storage	-20 - +65 °C
Supply: Voltage	14-30 V DC
Supply: Power consumption max.	1 W

Technical data

	TPR 281	TPR 281
		extended housing
Measurement range max.	1000 mbar	1000 mbar
Measurement range min.	$5 \cdot 10^{-4}$ mbar	$5 \cdot 10^{-4}$ mbar
Bakeout temperature	80 °C	250 °C
Seal	Metal	Metal
Pressure max.	10 bar	10 bar
Accuracy: 10^{-3} - 10^2 mbar	+/- 15 %	+/- 15 %
Repeatability: 10^{-3} - 10^2 mbar	+/- 2 %	+/- 2 %
Filament	Nickel	Nickel
Temperature: Operating	+5 - +60 °C	+5 - +60 °C
Volume	1.3 cm ³	10 cm ³

The maximum absolute pressure is valid for inert gases

Compact Pirani Gauge

Flange (in)	DN 16 ISO-KF	DN 16 ISO-KF
Weight	80 g	130 g
Ordering number	PT R21 950	PT R21 960
Flange (in)	DN 16 CF-R	DN 16 CF-R
Weight	100 g	140 g
Ordering number	PT R21 951	PT R21 961

Accessories

	Order.-No.
Centering ring, with Poral filter, Viton®/Stainless Steel, DN 16 ISO-KF	PF 117 216-T
Fine filter for TPR 265, pore dimension 0,0004 mm	PT 120 132-T
Plug for Compact Gauge	B 4707 283 MA
Sensor cable AL, 3 m	PT 448 250-T



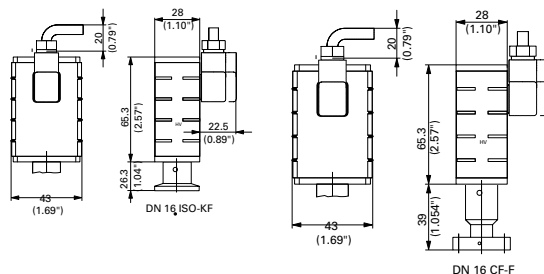
Compact Pirani Capacitance Gauge

PCR 260



- ▶ Measurement range from $5 \cdot 10^{-4}$ mbar to 1500 mbar
- ▶ Highly accurate within the entire measurement range
- ▶ Especially suited for loadlock applications

Dimensions (in mm)



PCR 260, DN 16 ISO-KF

PCR 260, DN 16 CF-F

General technical data

Output signal: Pressure range	2.2-8.68 V
Output signal: Minimum load	10 kOhm
Feedthrough	Glass
Flange	Stainless Steel
Sensor cable length	200 m
Temperature: Storage	-20 - +65 °C
Supply: Voltage	15-30 V DC
Supply: Power consumption max.	2.5 W



Technical data

PCR 260

Measurement range max.	1500 mbar
Measurement range min.	5·10 ⁻⁴ mbar
Bakeout temperature	80 °C
Seal	Metal
Pressure max.	5 bar
Accuracy	10 ⁻³ - 50 mbar: +/- 15 % 50 - 950 mbar: +/- 5 % 950 - 1050 mbar: +/- 2,5 %
Repeatability: 10 ⁻³ - 1100 mbar	+/- 2 %
Filament	Tungsten
Temperature: Operating	+10 - +50 °C
Volume	6 cm ³

Compact Pirani Gauge

Flange (in)	DN 16 ISO-KF
Weight	90 g
Ordering number	PT R26 850
Flange (in)	DN 16 CF-F
Weight	120 g
Ordering number	PT R26 851

Accessories

Order.-No.

Centering ring, with Poral filter, Viton®/Stainless Steel, DN 16 ISO-KF	PF 117 216-T
Plug for Compact Gauge	B 4707 283 MA



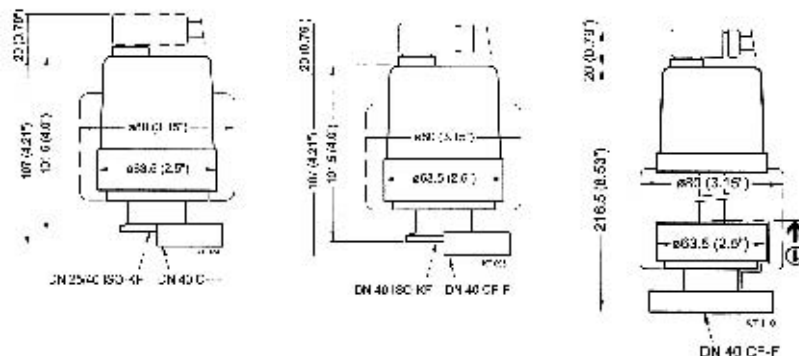
Compact Cold Cathode Gauge

IKR 251/261



- ▶ Measurement range from $2 \cdot 10^{-9}$ mbar to 0.01 mbar
- ▶ Cold cathode (inverted magnetron)
- ▶ Rugged and reliable
- ▶ Unaffected by air in-rush
- ▶ Corrosion resistant

Dimensions (in mm)



IKR 251, DN 25 ISO-KF,
DN 40 ISO-KF, DN 40 CF-F

IKR 261, DN 40 ISO-KF,
DN 40 CF-F

IKR 261, DN 40 CF-F,
extended housing

General technical data

Output signal: Sensor error below	0.5 V
Output signal: Pressure range	1.8-8.5 V
Output signal: Minimum load	10 kOhm
Feedthrough	Al ₂ O ₃
Flange	Stainless Steel
Sensor cable length	500 m
Temperature: Storage	-40 - +65 °C
Supply: Voltage	15-30 V
Supply: Power consumption max.	2 W

Technical data

	IKR 251	IKR 261	IKR 261
			extended housing
Measurement range max.	0.01 mbar	0.01 mbar	0.01 mbar
Measurement range min.	$2 \cdot 10^{-9}$ mbar	$2 \cdot 10^{-9}$ mbar	$2 \cdot 10^{-9}$ mbar
Bakeout temperature	150 °C	250 °C	250 °C
Seal	Viton®	Ag	Ag
Pressure max.	10 bar	10 bar	10 bar
Feature	interior Viton® sealed	metal sealed	metal sealed
Accuracy: 10^{-8} - 10^{-3} mbar	+/- 30 %	+/- 30 %	+/- 30 %
Repeatability: 10^{-8} - 10^{-3} mbar	+/- 5 %	+/- 5 %	+/- 5 %
Filament	Molybdenum	Molybdenum	Molybdenum
Temperature: Operating	+5 - +55 °C	+5 - +55 °C	+5 - +55 °C
Volume	20 cm ³	20 cm ³	20 cm ³

The maximum absolute pressure is valid for inert gases and temperatures < 55 °C. Electronic removed.

Compact Cold Cathode Gauge

Flange (in)	DN 25 ISO-KF		
Weight	700 g		
Ordering number	PT R25 500		
Flange (in)	DN 40 ISO-KF	DN 40 ISO-KF	
Weight	700 g	700 g	
Ordering number	PT R25 501	PT R25 750	
Flange (in)	DN 40 CF-F	DN 40 CF-F	DN 40 CF-F
Weight	950 g	950 g	1200 g
Ordering number	PT R25 502	PT R25 751	PT R25 761

Accessories

	Order.-No.
Sensor cable AL, 3 m	PT 448 250-T
Plug for Compact Gauge	B 4707 283 MA
Magnetic shield, for IKR/PKR	PT 443 155-X



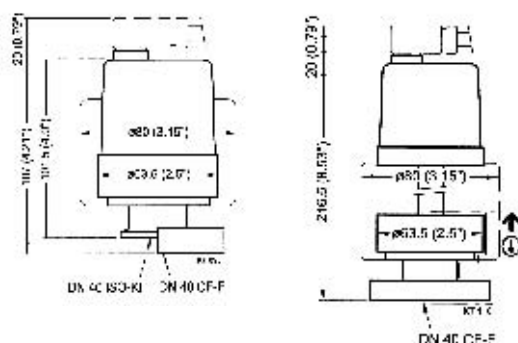
Compact Cold Cathode Gauge

IKR 270



- ▶ Measurement range from $5 \cdot 10^{-11}$ mbar to 0.01 mbar
- ▶ Cold cathode (inverted magnetron)
- ▶ Rugged and reliable
- ▶ Unaffected by air in-rush
- ▶ Corrosion resistant

Dimensions (in mm)



IKR 270, DN 40 CF-F

IKR 270, DN 40 CF-F,
extended housing

General technical data

Output signal: Sensor error below	0.5 V
Output signal: Pressure range	1.8-8.5 V
Output signal: Minimum load	10 kOhm
Feedthrough	Al ₂ O ₃
Flange	Stainless Steel
Cable length	500 m
Temperature: Storage	-40 - +65 °C
Supply: Voltage	15-30 V
Supply: Power consumption max.	2 W

Technical data

	IKR 270	IKR 270 extended housing
Measurement range max.	0.01 mbar	0.01 mbar
Measurement range min.	$5 \cdot 10^{-11}$ mbar	$5 \cdot 10^{-11}$ mbar
Bakeout temperature ¹⁾	250 °C	250 °C
Seal	Ag	Ag
Pressure max.	10 bar	10 bar
Feature	metal sealed	metal sealed
Accuracy: 10^{-9} - 10^{-3} mbar	+/- 30 %	+/- 30 %
Repeatability: 10^{-9} - 10^{-3} mbar	+/- 5 %	+/- 5 %
Filament	Molybdenum	Molybdenum
Temperature: Operating	+5 - +55 °C	+5 - +55 °C ²⁾
Volume	20 cm ³	20 cm ³

The maximum absolute pressure is valid for inert gases and temperatures < 55 °C.

¹⁾ Electronics removed

²⁾ Operating temperature: 250 °C, extended housing

Compact Cold Cathode Gauge

Flange (in)	DN 40 CF-F	DN 40 CF-F
Weight	950 g	1200 g
Ordering number	PT R21 251	PT R21 261

Accessories

	Order.-No.
Sensor cable AL, 3 m	PT 448 250-T
Plug for Compact Gauge	B 4707 283 MA
Magnetic shield, for IKR/PKR	PT 443 155-X



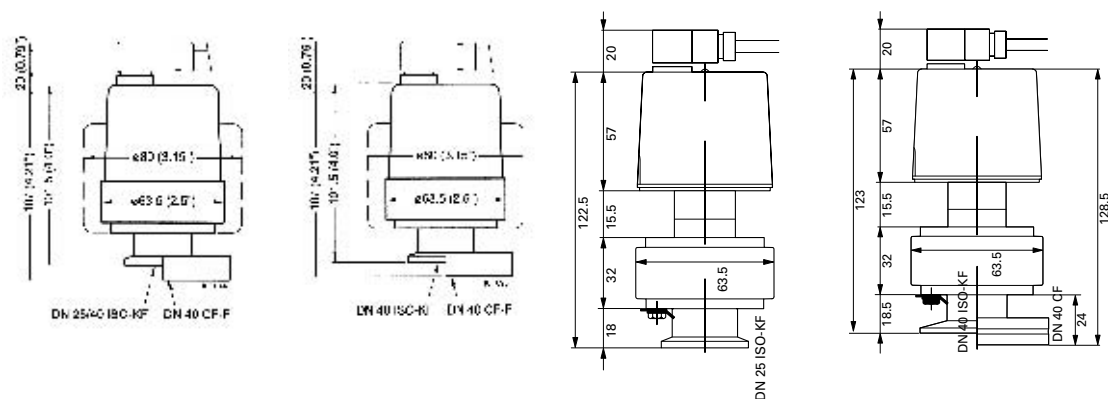
Compact FullRange™ CC Gauge

PKR 251/261



- ▶ Measurement range from $5 \cdot 10^{-9}$ mbar to 1000 mbar
- ▶ Two gauge heads in a single enclosure
- ▶ Pirani and cold cathode (inverted magnetron)
- ▶ A single flange from atmospheric to UHV pressure
- ▶ Corrosion resistant

Dimensions (in mm)



PKR 251, DN 25 ISO-KF,
DN 40 ISO-KF

PKR 251, DN 40 CF-F

PKR 261, DN 25 ISO-KF

PKR 261, DN 40 ISO-KF,
DN 40 CF

General technical data

Output signal: Sensor error above	9.5 V
Output signal: Sensor error below	0.5 V
Output signal: Pressure range	1.8-8.6 V
Output signal: Minimum load	10 kOhm
Feedthrough	Al ₂ O ₃ , Glass
Flange	Stainless Steel
Sensor cable length	300 m
Temperature: Operating	+5 - +55 °C
Temperature: Storage	-40 - +65 °C
Supply: Voltage	15-30 V DC
Supply: Power consumption max.	2 W

Technical data

	PKR 251	PKR 261
Measurement range max.	1000 mbar	1000 mbar
Measurement range min.	5·10 ⁻⁹ mbar	5·10 ⁻⁹ mbar
Bakeout temperature ¹⁾	150 °C	150 °C
Seal	Viton®	Ag, Cu
Pressure max.	10 bar	10 bar
Feature	interior Viton® sealed	metal sealed
Accuracy: 10 ⁻⁸ - 10 ² mbar	+/- 30 %	+/- 30 %
Repeatability: 10 ⁻⁸ - 10 ² mbar	+/- 5 %	+/- 5 %
Filament	Tungsten	Tungsten
Filament	Molybdenum	Molybdenum
Volume	20 cm ³	20 cm ³

The maximum absolute pressure is valid for inert gases and temperatures < 55 °C. ¹⁾ Electronics removed.

Compact FullRange™ Gauge

Flange (in)	DN 25 ISO-KF	DN 25 ISO-KF
Weight	700 g	700 g
Ordering number	PT R26 000	PT R26 250
Flange (in)	DN 40 ISO-KF	DN 40 ISO-KF
Weight	700 g	750 g
Ordering number	PT R26 001	PT R26 251
Flange (in)	DN 40 CF-F	DN 40 CF-F
Weight	950 g	995 g
Ordering number	PT R26 002	PT R26 252

Accessories

	Order.-No.
Sensor cable AL, 3 m	PT 448 250-T
Plug for Compact Gauge	B 4707 283 MA
Magnetic shield, for IKR/PKR	PT 443 155-X



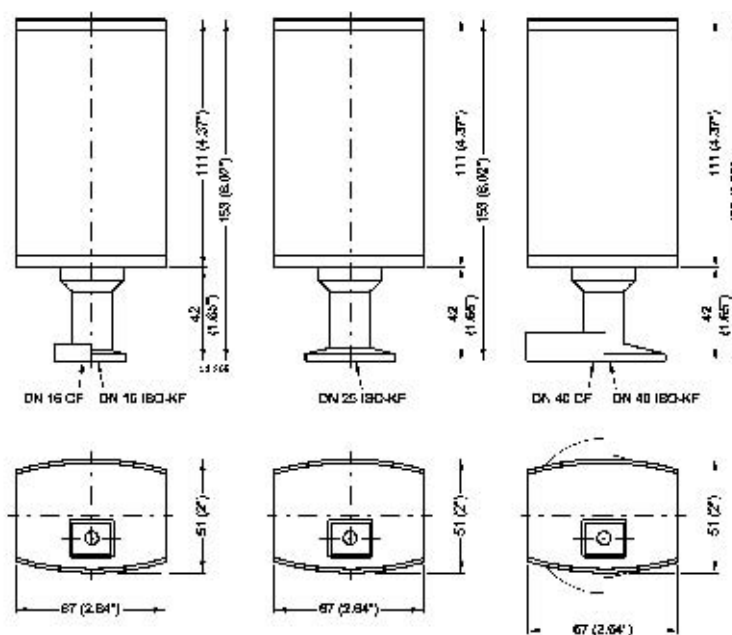
Compact Process Ion Gauge

IMR 265



- ▶ Measurement range from $2 \cdot 10^{-6}$ mbar to 1000 mbar
- ▶ Two gauge heads in a single enclosure (Pirani and hot cathode)
- ▶ High measurement accuracy, excellent reproducibility
- ▶ Automatic filament protection
- ▶ A single flange from atmospheric to UHV pressure
- ▶ Corrosion resistant

Dimensions (in mm)



IMR 265, DN 16 CF-F,
DN 16 ISO-KF

IMR 265, DN 25 ISO-KF

IMR 265, DN 40 ISO-KF,
DN 40 CF-F

General technical data

Output signal: Sensor error	0.5 V
Output signal: Pressure range Ioni	1.5-7.5 V
Output signal: Pressure range Pirani	8.5-9.75 V
Output signal: Minimum load	10 kOhm
Flange	Stainless Steel
Sensor cable length	100 m
Temperature: Operating	0 - +50 °C
Temperature: Storage	-20 - +70 °C
Supply: Voltage	20-30 V DC
Supply: Power consumption max.	16 W

Technical data

IMR 265

Measurement range max.	1000 mbar
Measurement range min.	2·10 ⁻⁶ mbar
Bakeout temperature ¹⁾	150 °C
Pressure max.	5 bar
Electron collector	Stainless Steel
Filament holder	Molybdenum, Platinum
Ion collector	Stainless Steel
Insulator	Glass
Filament	Iridium yttriated
Pirani measurement element	Copper, Tungsten
Volume	20 cm ³
Repeatability: 10 ⁻¹ - 10 ² mbar	30 % reading
Repeatability: 10 ⁻⁵ - 10 ⁻¹ mbar	2 % reading

The maximum absolute pressure is valid for inert gases and temperatures < 50 °C ¹⁾Electronics removed.

Compact Process Ion Gauge

Flange (in)	DN 25 ISO-KF
Weight	285 g
Ordering number	PT R26 500
Flange (in)	DN 40 ISO-KF
Weight	315 g
Ordering number	PT R26 501
Flange (in)	DN 16 CF-F
Weight	400 g
Ordering number	PT R26 502
Flange (in)	DN 40 CF-F
Weight	550 g
Ordering number	PT R26 503
Flange (in)	DN 16 ISO-KF
Weight	270 g
Ordering number	PT R26 504

Accessories

Order.-No.

Sensor cable AL, 3 m	PT 448 250-T
Plug for Compact Gauge	B 4707 283 MA



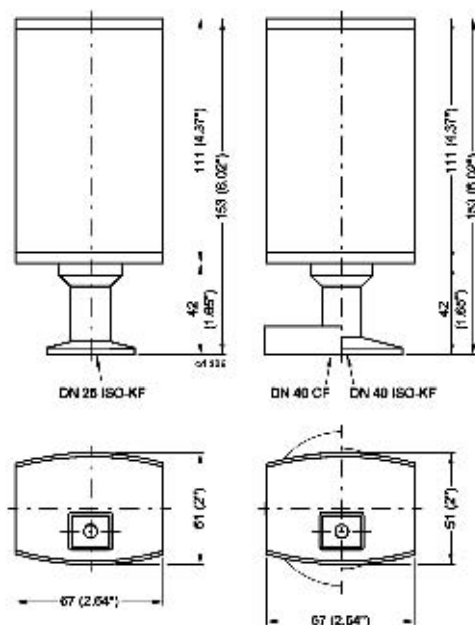
Compact FullRange™ BA Gauge

PBR 260



- ▶ Measurement range from $5 \cdot 10^{-10}$ mbar to 1000 mbar
- ▶ Hot cathode (BA) with Pirani in a compact enclosure
- ▶ Bayard-Alpert-Sensor is switched on/off automatically by the Pirani sensor
- ▶ Highly accurate
- ▶ A single flange from atmospheric to UHV pressure
- ▶ Corrosion resistant

Dimensions (in mm)



PBR 260, DN 25 ISO-KF

PBR 260, DN 40 ISO-KF,
DN 40 CF-R

General technical data

Output signal: Sensor error below	0.5 V
Output signal: Pressure range	0.774 - 10 V
Output signal: Minimum load	10 kOhm
Flange	Stainless Steel
Sensor cable length	100 m
Temperature: Storage	-20 - +70 °C
Temperature: Operating	0 - +50 °C
Supply: Voltage	20-28 V DC
Supply: Power consumption max.	16 W

Technical data

	PBR 260	PBR 260	PBR 260
Connector	DN 25 ISO-KF	DN 40 ISO-KF	DN 40 CF-R
Measurement range max.	1000 mbar	1000 mbar	1000 mbar
Measurement range min.	$5 \cdot 10^{-10}$ mbar	$5 \cdot 10^{-10}$ mbar	$5 \cdot 10^{-10}$ mbar
Bakeout temperature ¹⁾	150 °C	150 °C	150 °C
Pressure max.	2 bar	2 bar	2 bar
Accuracy: 10^{-8} - 10^{-2} mbar	15 % reading	15 % reading	15 % reading
Repeatability: 10^{-8} - 10^{-2} mbar	5 % reading	5 % reading	5 % reading
Weight	285 g	315 g	550 g
Filament	Tungsten	Tungsten	Tungsten
Filament	iridium yttriated	iridium yttriated	iridium yttriated
Materials in contact with media	Cu, W, glass, NiFe, Mo, Stainless Steel, NiCr	Cu, W, glass, NiFe, Mo, Stainless Steel, NiCr	Cu, W, glass, NiFe, Mo, Stainless Steel, NiCr
Volume	24 cm ³	24 cm ³	25 cm ³

The maximum absolute pressure is valid for inert gases and temperatures < 55 °C.¹⁾Electronics removed.

Ordering Number

Compact FullRange™ BA Gauge	PT R27 000	PT R27 001	PT R27 002
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Accessories

	Order.-No.
Sensor cable AL, 3 m	PT 448 250-T
Plug for Compact Gauge	B 4707 283 MA
Extension, for PBR 260	PT 590 300-T



Measuring instruments SingleGauge™ and Dual Gauge™

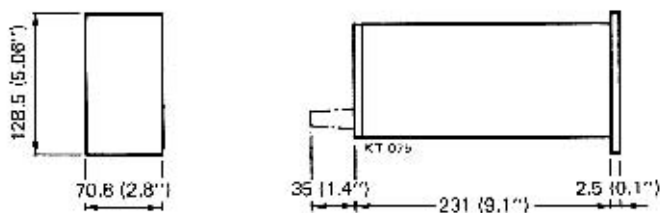
TPG 261/262



- ▶ TPG 261: For a single transmitter
- ▶ TPG 262: For two transmitters
- ▶ Selectable calibration factors for all gases
- ▶ Simple to operate
- ▶ Nonvolatile parameter memory
- ▶ Automatic diagnostics
- ▶ For operation of all ActiveLine gauge heads



Dimensions (in mm)



SingleGauge™ controller, DualGauge™ controller

General technical data

Display rate	10 1/s
Error signal: Working contact, potential-free	1 piece
Filter time constant	1.2 / 0.4 / 0.02 s
Weight	1.1 kg
Measurement range max.	55000 mbar
Measurement range min.	5·10 ⁻¹¹ mbar
Measurement rate	50 1/s
Mains requirement: frequency (range)	50/60 Hz
Mains requirement: power consumption	45 VA
Mains requirement: voltage (range)	90 - 250 V
Set point: Voltage max.	60 V DC
Set point: Current max.	1 A
Interface	RS-232-C
Protection	IP 30
Safety	EN61010-1 / EN 50081-1 / EN50082-2 / IEC1010
Signal output: Measuring value, analog	0-10 V
Temperature: Operating	+5 - +50 °C
Temperature: Storage	-20 - +65 °C

Technical data

	TPG 261	TPG 262
Connections for gauge	1	2
Automatic changeover: Pirani-cold cathode	-	$6 \cdot 10^{-3}$ mbar
Error signal: Switching voltage max.	60 V DC	-
Set point: Changeover contact, potential-free	2 pieces	4 pieces

Ordering Number

Measuring instruments	PT G28 030	PT G28 280
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Accessories

	Order.-No.
Sensor cable AL, 3 m	PT 448 250-T
Sensor cable AL, 6 m	PT 448 251-T
Sensor cable AL, 10 m	PT 448 252-T
Sensor cable AL, 15 m	PT 448 253-T
Sensor cable AL, 20 m	PT 448 254-T
Sensor cable AL, 25 m	PT 448 255-T
Sensor cable AL, 30 m	PT 448 256-T
Sensor cable AL, 35 m	PT 448 257-T
Sensor cable AL, 40 m	PT 448 258-T
Sensor cable AL, 45 m	PT 448 259-T
Sensor cable AL, 50 m	PT 448 260-T



SingleGauge™ Measuring systems

Measurement equipment with a single transmitter



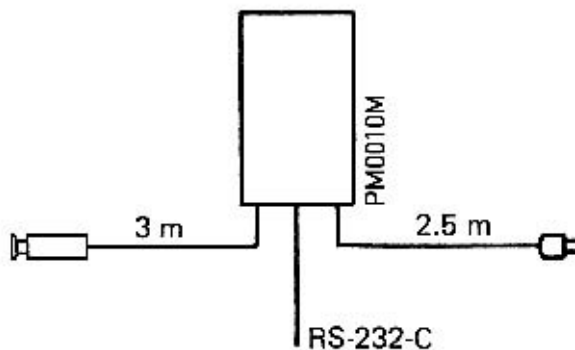
consisting of:

- ▶ SingleGauge™ TPG 261
- ▶ 1 compact gauge head
- ▶ Connection cable 3m
- ▶ Mains cord

Transmitter options:

- ▶ 1 TPR 265
- ▶ 1 IKR 251
- ▶ 1 PKR 251
- ▶ 1 PBR 260

Dimensions (in mm)



SingleGauge™ measuring units

Technical data

	1 TPR 265, 3 m	1 IKR 251, 3 m	1 PKR 251, 3 m	1 PBR 260, 3 m
	1 Compact Pirani Gauge	1 Compact Cold Cathode Gauge,	1 Compact FullRange™ Gauge,	1 Compact Bayard Alpert Pirani Gauge
	TPR 265	IKR 251	PKR 251	PBR 260
	DN 16 ISO-KF	DN 25 ISO-KF	DN 25 ISO-KF	DN 25 ISO-KF
Connections for gauge	1	1	1	1
Measurement range max.	1000 mbar	0.01 mbar	1000 mbar	1000 mbar
Measurement range min.	$5 \cdot 10^{-4}$ mbar	$2 \cdot 10^{-9}$ mbar	$5 \cdot 10^{-9}$ mbar	$5 \cdot 10^{-10}$ mbar
Gauge head	1 TPR 265	1 IKR 251	1 PKR 251	1 PBR 260
Mains requirement: voltage (range)	90 - 250 V, 50/60 Hz	90 - 250 V, 50/60 Hz	90 - 250 V, 50/60 Hz	90 - 250 V, 50/60 Hz
Interface	RS-232-C	RS-232-C	RS-232-C	RS-232-C

Ordering Number

SingleGauge™	PT 441 930-T	PT 441 933-T	PT 441 935-T	PT 441 938-T
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Accessories

Centering ring, with Poral filter, Viton®/Stainless Steel, DN 16 ISO-KF	-	-	-	PF 117 216-T
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DualGauge™ Measuring systems

Measurement equipment with two transmitters



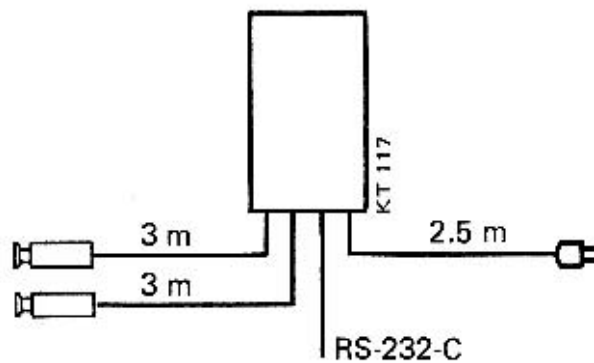
consisting of:

- ▶ DualGauge™ TPG 262
- ▶ 2 compact gauge heads
- ▶ 2 connection cables, 3 m
- ▶ Mains cord

Transmitter options:

- ▶ 2 TPR 265
- ▶ 2 PKR 251
- ▶ 1 TPR 265, 1 IKR 251
- ▶ 1 TPR 265, 1 PKR 251

Dimensions (in mm)



DualGauge™ measuring systems

Technical data

	2 TPR 265, 3 m	1 TPR 265, 1 IKR 251, 3 m	2 PKR 251, 3 m	1 TPR 265, 1 PKR 251, 3 m
	2 Compact Pirani Gauge TPR 265, DN 16 ISO-KF	1 Compact Pirani Gauge TPR 265, DN 16 ISO-KF 1 Compact Cold Cathode Gauge IKR 251 DN 25 ISO-KF	2 Compact FullRange™ Gauge PKR 251 DN 25 ISO-KF	1 Compact Pirani Gauge TPR 265, DN 16 ISO-KF 1 Compact FullRange™ Gauge PKR 251 DN 25 ISO-KF
Connections for gauge	2	2	2	2
Measurement range max.	1000 mbar	1000 mbar	1000 mbar	1000 mbar
Measurement range min.	5·10 ⁻⁴ mbar	2·10 ⁻⁹ mbar	5·10 ⁻⁹ mbar	5·10 ⁻⁹ mbar
Gauge head	2 TPR 265	1 TPR 265. 1 IKR 251	2 PKR 251	1 TPR 265. 1 PKR 251
Mains requirement: voltage (range)	90 - 250 V, 50/60 Hz	90 - 250 V, 50/60 Hz	90 - 250 V, 50/60 Hz	90 - 250 V, 50/60 Hz
Interface	RS-232-C	RS-232-C	RS-232-C	RS-232-C

Ordering Number

DualGauge™	PT 441 940-T	PT 441 943-T	PT 441 945-T	PT 441 948-T
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Accessories

Centering ring, with Poral filter, Viton®/Stainless Steel, DN 16 ISO-KF	PF 117 216-T	PF 117 216-T	-	PF 117 216-T
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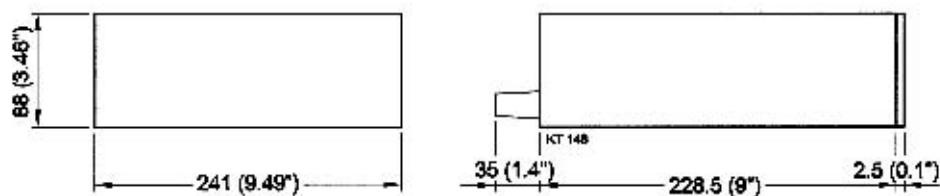
MaxiGauge® Controller unit

TPG 256 A



- ▶ For operation of 6 ActiveLine transmitters
- ▶ Simple to operate
- ▶ Six independant switching functions with relay output
- ▶ Electable calibration factors for all gases
- ▶ Nonvolatile parameter memory

Dimensions (in mm)



MaxiGauge® controller

General technical data

Connections for gauge	6 (max. 3 IMR 265 / PBR 260)
Display rate	4 1/s
Error signal: Working contact, potential-free	1 piece
Error signal: Switching voltage max.	60 V DC
Error signal: Switching current max.	3 A
Filter time constant	2.1/0.32/0.1 s
Weight	2.1 kg
Measurement range max.	55000 mbar
Measurement range min.	5·10 ⁻¹¹ mbar
Mains requirement: frequency (range)	50-60 Hz
Mains requirement: power consumption	60 VA
Mains requirement: voltage (range)	90-250 V
Set point: Voltage max.	60 V DC
Set point: Current max.	3 A
Set point: Changeover contact, potential-free	6 pieces
Protection	IP30
Signal output: Measuring value, analog	0-10 V DC
Temperature: Operating	+5-+40 °C
Temperature: Storage	-20-+60 °C

Technical data

	TPG 256 A	TPG 256 A
Switching voltage	240 V with RI 256	240 V with RI 256
Measurement rate	100 1/s	100 1/s
Interface	RS-232-C, RS-422	RS-232-C, RS-422, RS-422 isolated, RS-485 isolated
Safety	EN61010-1 / IEC 1010, EN60950, EN 50081-1 / EN50082-1	EN61010-1 / IEC 1010, EN60950, EN 50081-1&2
Signal output: Output resistance	660 Ohm	660 Ohm

Ordering Number

Measuring instruments	PT G28 760	PT G28 761
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Accessories

Sensor cable AL, 3 m	PT 448 250-T	PT 448 250-T
Sensor cable AL, 6 m	PT 448 251-T	PT 448 251-T
Sensor cable AL, 10 m	PT 448 252-T	PT 448 252-T
Sensor cable AL, 15 m	PT 448 253-T	PT 448 253-T
Sensor cable AL, 20 m	PT 448 254-T	PT 448 254-T
Sensor cable AL, 25 m	PT 448 255-T	PT 448 255-T
Sensor cable AL, 30 m	PT 448 256-T	PT 448 256-T
Sensor cable AL, 35 m	PT 448 257-T	PT 448 257-T
Sensor cable AL, 40 m	PT 448 258-T	PT 448 258-T
Sensor cable AL, 45 m	PT 448 259-T	PT 448 259-T
Sensor cable AL, 50 m	PT 448 260-T	PT 448 260-T
Interface RS-422 insulated, RS-485 insulated	PT 441 240-T	-
Stand to MaxiGauge™	PT 441 483	PT 441 483
Blank panel 1/2 rack width	PT 441 481	PT 441 481
Connection piece, for 1/2 blank panel with screws	PT 441 480-T	PT 441 480-T



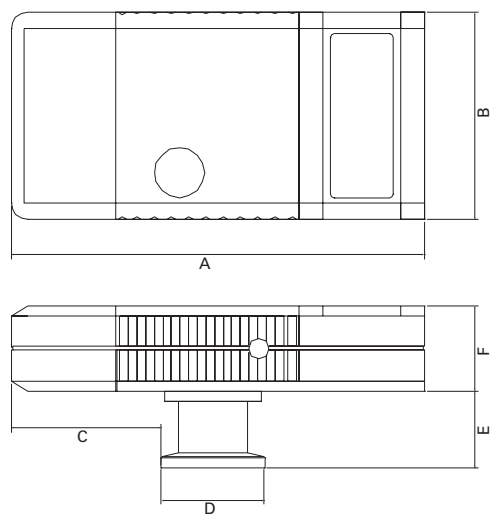
Pirani Measurement unit

TPG 201



- ▶ Sensor and display in a single enclosure
- ▶ Battery operated handheld measuring instrument
- ▶ Measurement range from $5 \cdot 10^{-4}$ mbar to 1000 mbar

Dimensions



TPG 201, Pirani pressure gauge

TPG 201	
A:	120 mm
B:	60 mm
C:	43.5 mm
D:	30 mm
E:	22 mm
F:	25 mm

Technical data

TPG 201

Method of measurement	Pirani
Measurement range max.	1000 mbar
Measurement range min.	5·10 ⁻⁴ mbar
Accuracy 10 - 100 mbar: % of measurement	ca. 30
Accuracy 10 ⁻² - 10 mbar: % of measurement	ca. 10
Temperature: Operating	+5 - +40°C
Battery type	9V Alkaline E bloc/ 6 LR61/6 AM 6 Litium E bloc
Seal	Metal
Materials in contact with media	Nickel, Stainless Steel, Tungsten, Glass- feedthroughs
Connection: Vacuum side	DN 16 KF
Protection	IP 20
Weight	0.195 kg

Ordering Number

Measuring instrument	PT G28 201
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Accessories

Sensor cables

Accessories	Order.-No.
Sensor cable AL, 3 m	PT 448 250-T
Sensor cable AL, 6 m	PT 448 251-T
Sensor cable AL, 10 m	PT 448 252-T
Sensor cable AL, 15 m	PT 448 253-T
Sensor cable AL, 20 m	PT 448 254-T
Sensor cable AL, 25 m	PT 448 255-T
Sensor cable AL, 30 m	PT 448 256-T
Sensor cable AL, 35 m	PT 448 257-T
Sensor cable AL, 40 m	PT 448 258-T
Sensor cable AL, 45 m	PT 448 259-T
Sensor cable AL, 50 m	PT 448 260-T



Accessories

MaxiGauge® Option

IF 256

- ▶ RS-422 interface, electrically isolated
- ▶ RS-485, electrically isolated

Accessories	Order.-No.
IF 256	PT 441 240-T

Note

Interface retrofit kit for MaxiGauge® ordering number PT G28 760 with RS-232-C and RS-422 interfaces.

Connection piece for 1/2 blank panel with screws

Accessories	Order.-No.
Connection piece, for 1/2 blank panel with screws	PT 441 480-T

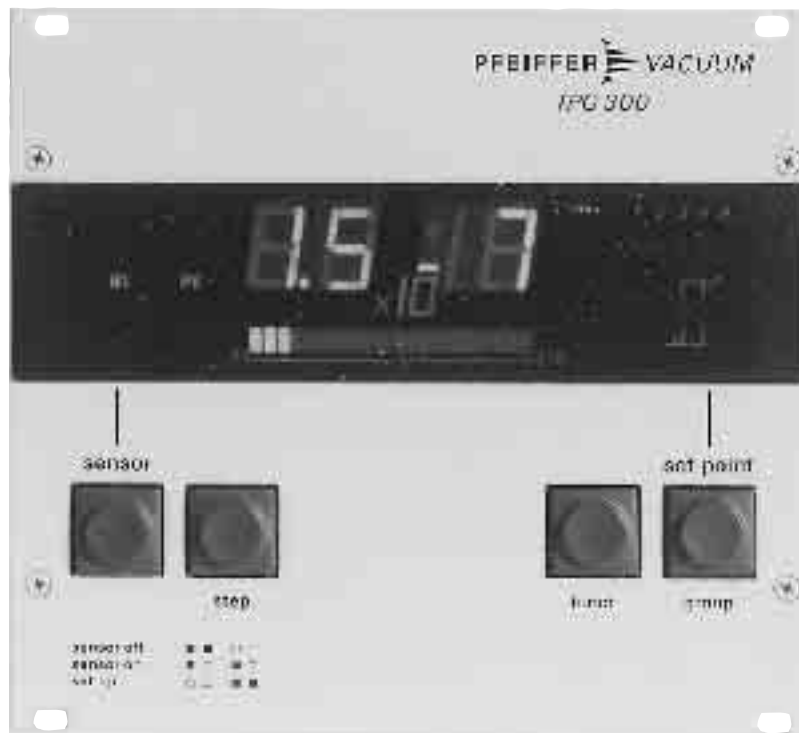
Blank panel 1/2 rack width

Accessories	Order.-No.
Blank panel 1/2 rack width	PT 441 481

Stand to MaxiGauge™

Accessories	Order.-No.
Stand to MaxiGauge™	PT 441 483





For applications in research and development

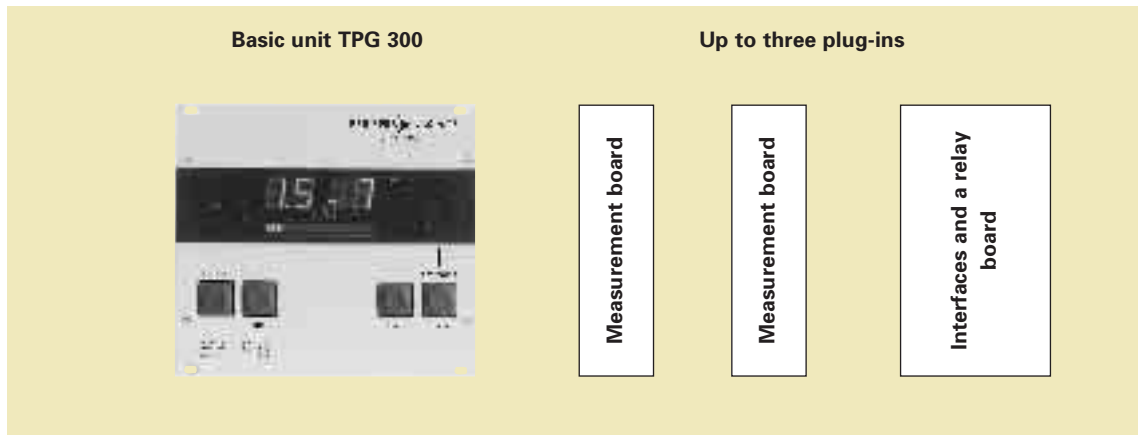
Your advantage

- ▶ Rugged and well proven design
- ▶ Basically unaffected by radioactivity and electromagnetic fields
- ▶ Is being used on all large accelerators
- ▶ Four different interface options (Profibus)
- ▶ Metal-sealed versions of the sensors are available
- ▶ Automatic switchover from Pirani to cold cathode sensor

Applications

- ▶ For use in critical areas like high radiation, for example
- ▶ For UHV

The ModulLine concept



- ▶ Two measurement boards are possible
- ▶ Up to 4 gauge heads max. can be connected
- ▶ Cable matching the respective gauge heads
- ▶ One interface and relay board
- ▶ Profibus is possible



Pirani gauges for TPG 300 measuring units

TPR 010

TPR 017



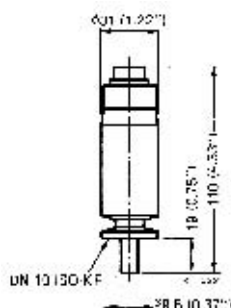
TPR 010

- For general vacuum applications
- Measurement range from $8 \cdot 10^{-4}$ mbar to 1000 mbar

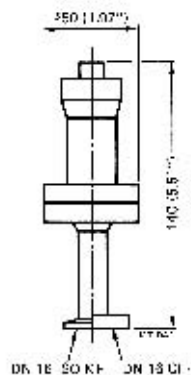
TPR 017

- For corrosive media
- Radiation resistant
- Measurement range from $8 \cdot 10^{-4}$ mbar to 1000 mbar

Dimensions (in mm)



TPR 010, DN 10 ISO-KF



TPR 017, DN 16 ISO-KF,
DN 16 CF-F

Technical data

	TPR 010	TPR 017	TPR 017
Connector	DN 10 ISO-KF	DN 16 ISO-KF	DN 16 CF-F
Bakeout temperature	100 °C	250 °C	250 °C
Operating temperature, high temperature sensor cable	-	0-120 °C	0-120 °C
Operating temperature, standard sensor cable	0 - 70 °C	0-80 °C	0-80 °C
Weight	0.14 kg	0.6 kg	0.6 kg
Insulator	Viton®	Al ₂ O ₃	Al ₂ O ₃
Measurement range max.	1000 mbar	1000 mbar	1000 mbar
Measurement range min.	8·10 ⁻⁴ mbar	8·10 ⁻⁴ mbar	8·10 ⁻⁴ mbar
Filament/holder	T/Ni	Ni/Ni	Ni/Ni
Chamber wall, inside	AlSiMg	Stainless Steel	Stainless Steel
Protective filter	Sintered bronze	-	-
Radiation resistance	-	1·10 ⁴ Gy	1·10 ⁴ Gy

Limited measurement and switching accuracy at pressures above 100 and below 10⁻³ mbar

Ordering Number

Gauge	PT R02 270	PT R13 270	PT R13 271
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Accessories

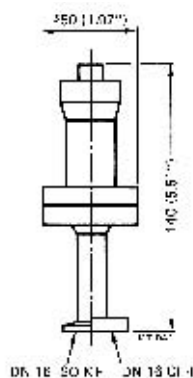
TPR, Sensor cable, 3 m, 80 °C	PT 548 402-T	PT 548 308-T	PT 548 308-T
TPR, Sensor cable, 6 m, 80 °C	PT 548 403-T	PT 548 309-T	PT 548 309-T
TPR, Sensor cable, 10 m, 80 °C	PT 548 450-T	PT 548 456-T	PT 548 456-T
TPR, Sensor cable, 15 m, 80 °C	PT 548 451-T	PT 548 457-T	PT 548 457-T
TPR, Sensor cable, 20 m, 80 °C	PT 548 452-T	PT 548 458-T	PT 548 458-T
TPR, Sensor cable, 25 m, 80 °C	PT 548 453-T	PT 548 459-T	PT 548 459-T
TPR, Sensor cable, 30 m, 80 °C	PT 548 415-T	PT 548 460-T	PT 548 460-T
TPR, Sensor cable, 35 m, 80 °C	PT 548 454-T	PT 548 461-T	PT 548 461-T
TPR, Sensor cable, 40 m, 80 °C	PT 548 416-T	PT 548 462-T	PT 548 462-T
TPR, Sensor cable, 45 m, 80 °C	PT 548 455-T	PT 548 463-T	PT 548 463-T
TPR, Sensor cable, 50 m, 80 °C	PT 548 417-T	PT 548 464-T	PT 548 464-T
Sensor extension cable, 10 m, 80 °C	PT 548 466-T	PT 548 466-T	PT 548 466-T
Sensor extension cable, 20 m, 80 °C	PT 548 468-T	PT 548 468-T	PT 548 468-T
Sensor extension cable, 30 m, 80 °C	PT 548 470-T	PT 548 470-T	PT 548 470-T
Sensor extension cable, 40 m, 80 °C	PT 548 472-T	PT 548 472-T	PT 548 472-T
Sensor extension cable, 50 m, 80 °C	PT 548 474-T	PT 548 474-T	PT 548 474-T
TPR, High temperature sensor cable, 3 m, 250 °C	-	PT 548 414-T	PT 548 414-T
TPR, High temperature sensor cable, 6 m, 250 °C	-	PT 548 465-T	PT 548 465-T
TPR, High temperature sensor cable, 10 m, 250 °C	-	PT 448 047-T	PT 448 047-T
TPR, High temperature sensor cable, 15 m, 250 °C	-	PT 448 043-T	PT 448 043-T
TPR, High temperature sensor cable, 20 m, 250 °C	-	PT 448 044-T	PT 448 044-T

Pirani gauges for TPG 300 measuring units

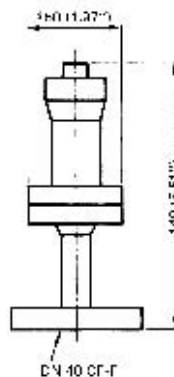
TPR 018

- For UHV applications
- Radiation resistant
- Measurement range from $8 \cdot 10^{-4}$ mbar to 1000 mbar

Dimensions (in mm)



TPR 018,
DN 16 ISO-KF, DN 16 CF-F



TPR 018, DN 40 CF-F

Technical data

	TPR 018	TPR 018	TPR 018
Flange (in)	DN 16 ISO-KF	DN 16 CF-F	DN 40 CF-F
Bakeout temperature	250 °C	250 °C	250 °C
Operating temperature, high temperature sensor cable	0-120 °C	0-120 °C	0-120 °C
Operating temperature, standard sensor cable	0-80 °C	0-80 °C	0-80 °C
Weight	0.6 kg	0.6 kg	0.6 kg
Insulator	Al ₂ O ₃	Al ₂ O ₃	Al ₂ O ₃
Measurement range max.	1000 mbar	1000 mbar	1000 mbar
Measurement range min.	8·10 ⁻⁴ mbar	8·10 ⁻⁴ mbar	8·10 ⁻⁴ mbar
Filament/holder	T/Ni	T/Ni	T/Ni
Chamber wall, inside	Stainless Steel	Stainless Steel	Stainless Steel
Radiation resistance	1·10 ⁴ Gy	1·10 ⁴ Gy	1·10 ⁴ Gy

Limited measurement and switching accuracy at pressures above 100 and below 10⁻³ mbar

Ordering Number

Gauge	PT R15 010	PT R15 011	PT R15 014
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Accessories

	Order.-No.
TPR, Sensor cable, 3 m, 80 °C	PT 548 308-T
TPR, Sensor cable, 6 m, 80 °C	PT 548 309-T
TPR, Sensor cable, 10 m, 80 °C	PT 548 456-T
TPR, Sensor cable, 15 m, 80 °C	PT 548 457-T
TPR, Sensor cable, 20 m, 80 °C	PT 548 458-T
TPR, Sensor cable, 25 m, 80 °C	PT 548 459-T
TPR, Sensor cable, 30 m, 80 °C	PT 548 460-T
TPR, Sensor cable, 35 m, 80 °C	PT 548 461-T
TPR, Sensor cable, 40 m, 80 °C	PT 548 462-T
TPR, Sensor cable, 45 m, 80 °C	PT 548 463-T
TPR, Sensor cable, 50 m, 80 °C	PT 548 464-T
Sensor extension cable, 10 m, 80 °C	PT 548 466-T
Sensor extension cable, 20 m, 80 °C	PT 548 468-T
Sensor extension cable, 30 m, 80 °C	PT 548 470-T
Sensor extension cable, 40 m, 80 °C	PT 548 472-T
Sensor extension cable, 50 m, 80 °C	PT 548 474-T
TPR, High temperature sensor cable, 3 m, 250 °C	PT 548 414-T
TPR, High temperature sensor cable, 6 m, 250 °C	PT 548 465-T
TPR, High temperature sensor cable, 10 m, 250 °C	PT 448 047-T
TPR, High temperature sensor cable, 15 m, 250 °C	PT 448 043-T
TPR, High temperature sensor cable, 20 m, 250 °C	PT 448 044-T



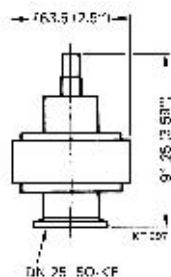
Cold cathode gauges for TPG 300 measuring units

IKR 050

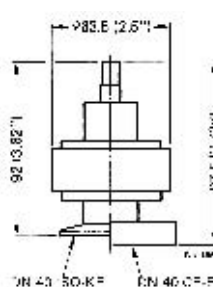


- For general vacuum applications
- Measurement range from $2 \cdot 10^{-9}$ mbar to $5 \cdot 10^{-3}$ mbar

Dimensions (in mm)



IKR 050, DN 25 ISO-KF



IKR 050, DN 40 ISO-KF,
DN 40 CF-F

Technical data

	IKR 050	IKR 050	IKR 050
Flange (in)	DN 25 ISO-KF	DN 40 ISO-KF	DN 40 CF-F
Bakeout temperature	150 °C	150 °C	150 °C
Operating temperature, high temperature sensor cable	5-150 °C	5-150 °C	5-150 °C
Operating temperature, standard sensor cable	5-80 °C	5-80 °C	5-80 °C
Internal seal	Viton®	Viton®	Viton®
Flange	Stainless Steel	Stainless Steel	Stainless Steel
Weight	0.6 kg	0.6 kg	0.85 kg
Insulator	Al ₂ O ₃	Al ₂ O ₃	Al ₂ O ₃
Measurement range max.	5·10 ⁻³ mbar	5·10 ⁻³ mbar	5·10 ⁻³ mbar
Measurement range min.	2·10 ⁻⁹ mbar	2·10 ⁻⁹ mbar	2·10 ⁻⁹ mbar

Ordering Number

Gauge	PT R18 500	PT R18 501	PT R18 502
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Accessories

	Order.-No.
IKR, Sensor cable, 3 m, 80 °C	PT 548 406-T
IKR, Sensor cable, 6 m, 80 °C	PT 548 407-T
IKR, Sensor cable, 10 m, 80 °C	PT 548 419-T
IKR, Sensor cable, 15 m, 80 °C	PT 548 483-T
IKR, Sensor cable, 20 m, 80 °C	PT 548 484-T
IKR, Sensor cable, 25 m, 80 °C	PT 548 485-T
IKR, Sensor cable, 30 m, 80 °C	PT 548 422-T
IKR, Sensor cable, 35 m, 80 °C	PT 548 486-T
IKR, Sensor cable, 40 m, 80 °C	PT 548 487-T
IKR, Sensor cable, 45 m, 80 °C	PT 548 488-T
IKR, Sensor cable, 50 m, 80 °C	PT 548 489-T
IKR, High temperature sensor cable, 3 m, 250 °C	PT 548 542-T
IKR, High temperature sensor cable, 6 m, 250 °C	PT 548 543-T
IKR, High temperature sensor cable, 10 m, 250 °C	PT 448 045-T
IKR, High temperature sensor cable, 15 m, 250 °C	PT 548 989-T
IKR, High temperature sensor cable, 20 m, 250 °C	PT 448 046-T



Cold cathode gauges for TPG 300 measuring units

IKR 060

IKR 070

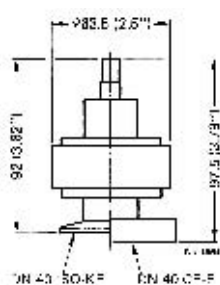
IKR 060

- For UHV applications, radiation resistant
- Measurement range from $1 \cdot 10^{-10}$ mbar to $5 \cdot 10^{-3}$ mbar

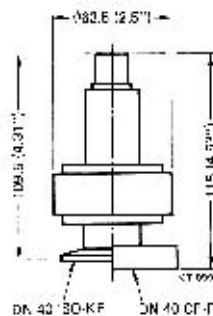
IKR 070

- For UHV applications, radiation resistant
- Measurement range from $1 \cdot 10^{-11}$ mbar to $5 \cdot 10^{-3}$ mbar

Dimensions (in mm)



IKR 060, DN 40 ISO-KF,
DN 40 CF-F



IKR 070, DN 40 ISO-KF,
DN 40 CF-F

Technical data

	IKR 060	IKR 060	IKR 070	IKR 070
Flange (in)	DN 40 ISO-KF	DN 40 CF-F	DN 40 ISO-KF	DN 40 CF-F
Bakeout temperature	250 °C	250 °C	250 °C	250 °C
Operating temperature, high temperature sensor cable	5-250 °C	5-250 °C	-	-
Operating temperature, standard sensor cable	5-80 °C	5-80 °C	5-80 °C	5-80 °C
Internal seal	Silver	Silver	Silver	Silver
Flange	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
Weight	0.6 kg	0.85 kg	0.6 kg	0.85 kg
Insulator	Al ₂ O ₃	Al ₂ O ₃	Al ₂ O ₃	Al ₂ O ₃
Measurement range max.	5·10 ⁻³ mbar	5·10 ⁻³ mbar	5·10 ⁻³ mbar	5·10 ⁻³ mbar
Measurement range min.	1·10 ⁻¹⁰ mbar	1·10 ⁻¹⁰ mbar	1·10 ⁻¹¹ mbar	1·10 ⁻¹¹ mbar

Ordering Number

Gauge	PT R18 753	PT R18 751	PT R20 501	PT R20 502
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Accessories

IKR, Sensor cable, 3 m, 80 °C	PT 548 406-T	PT 548 406-T	PT 548 306-T	PT 548 306-T
IKR, Sensor cable, 6 m, 80 °C	PT 548 407-T	PT 548 407-T	PT 548 317-T	PT 548 317-T
IKR, Sensor cable, 10 m, 80 °C	PT 548 419-T	PT 548 419-T	PT 548 490-T	PT 548 490-T
IKR, Sensor cable, 15 m, 80 °C	PT 548 483-T	PT 548 483-T	PT 548 491-T	PT 548 491-T
IKR, Sensor cable, 20 m, 80 °C	PT 548 484-T	PT 548 484-T	PT 548 492-T	PT 548 492-T
IKR, Sensor cable, 25 m, 80 °C	PT 548 485-T	PT 548 485-T	-	-
IKR, Sensor cable, 30 m, 80 °C	PT 548 422-T	PT 548 422-T	PT 548 493-T	PT 548 493-T
IKR, Sensor cable, 35 m, 80 °C	PT 548 486-T	PT 548 486-T	-	-
IKR, Sensor cable, 40 m, 80 °C	PT 548 487-T	PT 548 487-T	PT 548 494-T	PT 548 494-T
IKR, Sensor cable, 45 m, 80 °C	PT 548 488-T	PT 548 488-T	PT 548 495-T	PT 548 495-T
IKR, Sensor cable, 50 m, 80 °C	PT 548 489-T	PT 548 489-T	-	-
IKR, High temperature sensor cable, 3 m, 250 °C	PT 548 542-T	PT 548 542-T	-	-
IKR, High temperature sensor cable, 6 m, 250 °C	PT 548 543-T	PT 548 543-T	-	-
IKR, High temperature sensor cable, 10 m, 250 °C	PT 448 045-T	PT 448 045-T	-	-
IKR, High temperature sensor cable, 15 m, 250 °C	PT 548 989-T	PT 548 989-T	-	-
IKR, High temperature sensor cable, 20 m, 250 °C	PT 448 046-T	PT 448 046-T	-	-



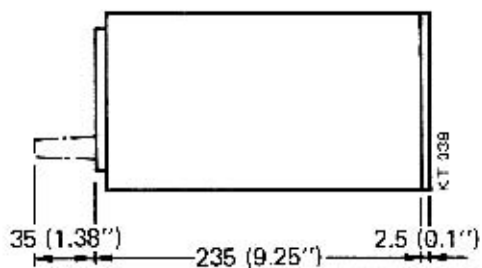
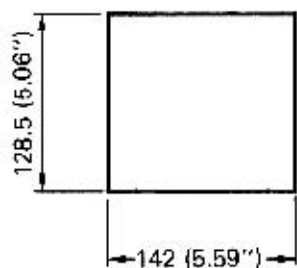
Measurement unit TPG 300

Basic unit



- ▶ Replaceable plug-in boards
- ▶ 12 freely programmable switching functions
- ▶ Ideal for extreme conditions like radiation and UHV

Dimensions (in mm)



TPG 300, Basic unit

Technical data

TPG 300

Measurement range max.	1000 mbar
Measurement range min.	1·10 ⁻¹¹ mbar
Measured value display	15 mm high numbers
Unit of measure	mbar, Torr, Pa
Error display	1 LED, red
Measurement rate	100 1/s
Mains requirement: voltage (range)	90-264 V AC
Mains requirement: frequency (range)	50-60 Hz
Mains requirement: power consumption	55 VA
Temperature Storage	-40 - +65 °C
Temperature: Operating	+5 - +50 °C
Safety	IEC 384, class 1, VDE 0411, part 2.80
Limit frequency	10 Hz, 1 Hz (standard), 0.1 Hz
Display rate	5 1/s
Weight: without boards	1.4 kg
Filter time constant	16 ms, 160 ms (standard), 1.6 s

Ordering Number

TPG 300, Basic unit	PT 546 900-T
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Accessories

Order.-No.

Blanking panel, for measurement board	PT 441 259
Blanking panel, for IF 300	PT 441 017



Interface and relay boards for the TPG 300 measurement units

IF 300 A/B

- For controlling processes
- For communication with a computer

Dimensions (in mm)



Interface and Relay Board

Technical data

	IF 300 A	IF 300 B
Weight	0.14 kg	0.15 kg
Relay: Connector 15 pole (pins)	D-Sub	GdsA-H, DIN 41612
Relay: Number	5 pieces	5 pieces
Relay: Switching capacity	45 W, 75 VA	120 W, 1000 VA
Relay: Switching voltage	30 V DC / 50 V AC	30 V DC / 250 V AC
Relay: Switching current	1.5 A	4 A
Relay: Changeover contacts, potential-free, per relay	1 piece	1 piece
Relay: Resistance (with connector)	125 mOhm	70 mOhm
Interface	RS-232-C	RS-232-C
Interface: Connection	D-sub connector, 9-pole, pins	Cable with D-sub connector, 9-pole, pins
Interface: Baud rates	300, 1200, 2400, 4800, 9600	300, 1200, 2400, 4800, 9600
Interface: Data format	ASCII, 1 start bit, 8 data bits, 1 stop bit, no parity bit	ASCII, 1 start bit, 8 data bits, 1 stop bit, no parity bit
Interface: Cable length max.	30 m	30 m
Interface: Type	RS-232-C asynchronous	RS-232-C asynchronous

Ordering Number

Interface and Relay boards	PT 441 130-T	PT 441 250-T
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Accessories

Mating, D-Sub, connector female for IF 300 A, RS-232-C	PT 441 128-T	-
Mating connector, D-Sub, female, 15 poles for IF 300 A/C, relay output	PT 441 129-T	-
Relay connector complete, for IF 300 B	-	PT 546 999-T
Interface cable 0.4 m, for IF 300 B, RS-232-C	-	PT 548 932-T

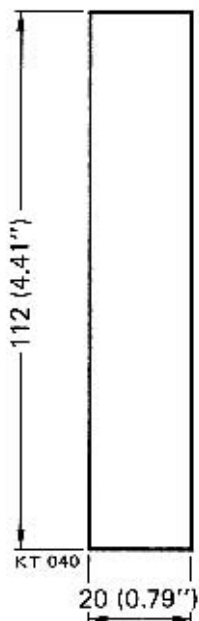


Interface and relay boards for the TPG 300 measurement units

IF 300 C/P

- For controlling processes
- For communication with a computer

Dimensions (in mm)



Interface and Relay Board

Technical data

	IF 300 C	IF 300 P
Weight	0.14 kg	0.16 kg
Relay: Connector 15 pole (pins)	D-Sub	D-Sub
Relay: Number	5 pieces	5 pieces
Relay: Switching capacity	45 W, 75 VA	45 W, 75 VA
Relay: Switching voltage	50 V AC / DC	50 V AC / DC
Relay: Switching current	1.5 A	1.5 A
Relay: Changeover contacts, potential-free, per relay	1 piece	1 piece
Relay: Resistance (with connector)	125 mOhm	125 mOhm
Interface	RS-422	Profibus-DP
Interface: Connection	D-sub connector, 9-pole, sockets	D-sub connector, 9-pole, Pins
Interface: Baud rates	300, 1200, 2400, 4800, 9600	12 Mbaud
Interface: Data format	ASCII, 1 start bit, 8 data bits, 1 stop bit, no parity bit	-
Interface: Cable length max.	1200 m	1200 m
Interface: Type	RS-422 asynchronous	Profibus-DP

Ordering Number

Interface and Relay boards	PT 441 390-T	PT 441 395-T
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Accessories

Mating connector, D-Sub, male for IF 300 C, RS-422	PT 441 145-T	-
Mating connector, D-Sub, female, 15 poles for IF 300 A/C, relay output	PT 441 129-T	-



Pirani-, Cold Cathode-, Pirani/Cold Cathode-Measurement Boards for the TPG 300 measurement units

PI 300 D

PI 300 DN

PE 300 DC9

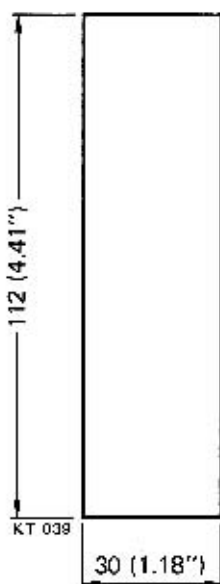
CP 300 C9

CP 300 C10

CP 300 T11

- ▶ Two measuring circuits
- ▶ One analog signal per measuring circuit
- ▶ Measuring circuits adjustable

Dimensions (in mm)



Pirani Measurement Boards



Technical data

	PI 300 D	PI 300 DN	PE 300 DC9
Measurement board	Pirani measurement boards	Pirani Measurement Boards	Cold Cathode Measurement Board
Number of measuring circuits	2	2	2
For gauge	TPR 010, TPR 018	TPR 017	IKR 050
Weight	0.14 kg	0.14 kg	0.26 kg
Measurement range max.	1000 mbar	1000 mbar	$5 \cdot 10^{-3}$ mbar
Measurement range min.	$8 \cdot 10^{-4}$ mbar	$8 \cdot 10^{-4}$ mbar	$1 \cdot 10^{-9}$ mbar
Sensor cable length	100 m	100 m	100 m
Reaction time of the output signal: Decay	600 ms*	600 ms*	
Reaction time of the output signal: Rise	50 ms*	50 ms*	16 ms

*At sudden pressure change: - Rise (10-90 %) from $<10^{-3}$ to 1000 mbar
- Decay (90-10 %) from 1000 to $<10^{-3}$ mbar

Ordering Number

Measurement Boards	PT 546 920-T	PT 549 214-T	PT 441 375-T
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Technical data

	CP 300 C9	CP 300 C10	CP 300 T11
Measurement board	Pirani/cold cathode measurement board	Pirani/Cold Cathode Measurement Board	Pirani/cold cathode measurement board
Number of measuring circuits	1 each	1 each	1 each
For gauge	TPR 010, TPR 018, IKR 050	TPR 010, TPR 018, IKR 060	TPR 010, TPR 018, IKR 070
Weight	0.21 kg	0.23 kg	0.25 kg
Measurement range max.	1000 mbar	1000 mbar	1000 mbar
Measurement range min.	$5 \cdot 10^{-9}$ mbar	$1 \cdot 10^{-10}$ mbar	$1 \cdot 10^{-11}$ mbar
Sensor cable length	100 m	100 m	100 m
Reaction time of the output signal: Rise	10 ms*	50 ms*	50 ms*

*Sudden pressure changes: - Rise (10-90 %) from $<10^{-9}$ to $<10^{-3}$ to mbar

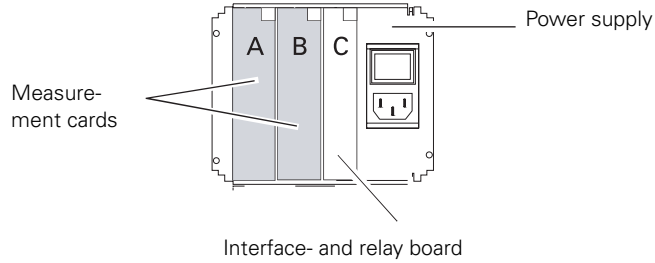
Ordering Number

Measurement Boards	PT 441 000-T	PT 441 114-T	PT 441 080-T
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Complete measurement units

containing basic unit and the following
measurement and relay carts

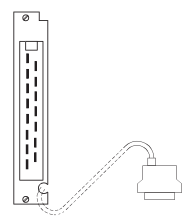
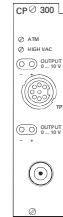


Pirani

Pirani/Cold cathode combined

RS-232-C-Inter-
face and relay

RS-232-C-Inter-
face and relay



PI 300 D

CP 300 C9

CP 300 C10

IF 300 A

IF 300 B

	PI 300 D	CP 300 C9	CP 300 C10	IF 300 A	IF 300 B
PT G25 250	1	-	-	-	-
PT G25 306	1	-	-	1	-
PT G25 251	1	-	-	-	1
PT G25 290	-	1	-	-	-
PT G25 307	-	1	-	1	-
PT G25 297	-	1	-	-	1
PT G25 256	-	-	1	-	-
PT G25 312	-	-	1	1	-
PT G25 257	-	-	1	-	1
PT G25 252	2	-	-	-	-
PT G25 310	2	-	-	1	-
PT G25 253	2	-	-	-	1
PT G25 294	-	2	-	-	-
PT G25 311	-	2	-	1	-
PT G25 295	-	2	-	-	1
PT G25 292	1	1	-	-	-
PT G25 302	1	1	-	1	-
PT G25 293	1	1	-	-	1
PT G25 262	1	-	1	-	-
PT G25 313	1	-	1	1	-
PT G25 263	1	-	1	-	1



Measurement unit TPG 300

TPG 300, complete measuring units



- ▶ Easy to replace plug-in circuit boards
- ▶ 12 adjustable switching points
- ▶ Ideal for extreme conditions such as radiation and UHV

General technical data

Display rate	5 1/s
Error display	1 LED, red
Filter time constant	16 ms, 160 ms (standard), 1.6 s
Weight: without boards	1.4 kg
Limit frequency	10 Hz, 1 Hz (standard), 0.1 Hz
Unit of measure	mbar, Torr, Pa
Measurement rate	100 1/s
Measured value display	15 mm high numbers
Mains requirement: frequency (range)	50-60 Hz
Mains requirement: power consumption	55 VA
Mains requirement: voltage (range)	90-264 V AC
Safety	IEC 384, class 1, VDE 0411, part 2.80
Temperature: Operating	+5 - +50 °C
Temperature: Storage	-40 - +65 °C

Technical data

	PI 300 D	PI 300 D, IF 300 A	PI 300 D, IF 300 B
Measurement range max.	1000 mbar	1000 mbar	1000 mbar
Measurement range min.	$8 \cdot 10^{-4}$ mbar	$8 \cdot 10^{-4}$ mbar	$8 \cdot 10^{-4}$ mbar
Measurement board	PI 300 D for 2 Pirani Gauge TPR 010/018	PI 300 D for 2 Pirani Gauge TPR 010/018	PI 300 D for 2 Pirani Gauge TPR 010/018
Relay: Switching voltage	-	30 V DC / 50 V AC	30 V DC / 250 V AC
Interface	-	RS-232-C, IF 300 A	RS-232-C, IF 300 B

Ordering Number

Complete measuring unit	PT G25 250	PT G25 306	PT G25 251
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Technical data

	CP 300 C9	CP 300 C9, IF 300 A	CP 300 C9, IF 300 B
Measurement range max.	1000 mbar	1000 mbar	1000 mbar
Measurement range min.	$5 \cdot 10^{-9}$ mbar	$5 \cdot 10^{-9}$ mbar	$5 \cdot 10^{-9}$ mbar
Measurement board	CP 300 C9 for 1 Pirani- and 1 Cold Cathode Gauge TPR 010/018, IKR 050	CP 300 C9 for 1 Pirani- and 1 Cold Cathode Gauge TPR 010/018, IKR 050	CP 300 C9 for 1 Pirani- and 1 Cold Cathode Gauge TPR 010/018, IKR 050
Relay: Switching voltage	-	30 V DC / 50 V AC	30 V DC / 250 V AC
Interface	-	RS-232-C, IF 300 A	RS-232-C, IF 300 B

Ordering Number

Complete measuring unit	PT G25 290	PT G25 307	PT G25 291
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Technical data

	CP 300 C10	CP 300 C10, IF 300 A	CP 300 C10, IF 300 B
Measurement range max.	1000 mbar	1000 mbar	1000 mbar
Measurement range min.	$1 \cdot 10^{-10}$ mbar	$1 \cdot 10^{-10}$ mbar	$1 \cdot 10^{-10}$ mbar
Measurement board	CP 300 C10 for 1 Pirani- and 1 Cold Cathode Gauge TPR 010/018, IKR 060	CP 300 C10 for 2 Pirani- and 2 Cold Cathode Gauge TPR 010/018, IKR 060	CP 300 C10 for 1 Pirani- and 1 Cold Cathode Gauge TPR 010/018, IKR 060
Relay: Switching voltage	-	30 V DC / 50 V AC	30 V DC / 250 V AC
Interface	-	RS-232-C, IF 300 A	RS-232-C, IF 300 B

Ordering Number

Complete measuring unit	PT G25 256	PT G25 312	PT G25 257
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Measurement unit TPG 300

TPG 300, complete measuring units



- Easy to replace plug-in circuit boards
- 12 adjustable switching points
- Ideal for extreme conditions such as radiation and UHV

General technical data

Display rate	5 1/s
Error display	1 LED, red
Filter time constant	16 ms, 160 ms (standard), 1.6 s
Weight: without boards	1.4 kg
Limit frequency	10 Hz, 1 Hz (standard), 0.1 Hz
Unit of measure	mbar, Torr, Pa
Measurement rate	100 1/s
Measured value display	15 mm high numbers
Mains requirement: frequency (range)	50-60 Hz
Mains requirement: power consumption	55 VA
Mains requirement: voltage (range)	90-264 V AC
Safety	IEC 384, class 1, VDE 0411, part 2.80
Temperature: Operating	+5 - +50 °C
Temperature: Storage	-40 - +65 °C

Technical data

	2 PI 300 D	2 PI 300 D, IF 300 A	2 PI 300 D, IF 300 B
Measurement range max.	1000 mbar	1000 mbar	1000 mbar
Measurement range min.	$8 \cdot 10^{-4}$ mbar	$8 \cdot 10^{-4}$ mbar	$8 \cdot 10^{-4}$ mbar
Measurement board	2 PI 300 D for 4 Pirani Gauge TPR 010/018	2 PI 300 D for 4 Pirani Gauge TPR 010/018	2 PI 300 D for 4 Pirani Gauge TPR 010/018
Relay: Switching voltage	-	30 V DC / 50 V AC	30 V DC / 250 V AC
Interface	-	RS-232-C, IF 300 A	RS-232-C, IF 300 B

Ordering Number

Complete measuring unit	PT G25 252	PT G25 310	PT G25 253
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Technical data

	2 CP 300 C9	2 CP 300 C9, IF 300 A	2 CP 300 C9, IF 300 B
Measurement range max.	1000 mbar	1000 mbar	1000 mbar
Measurement range min.	$5 \cdot 10^{-9}$ mbar	$5 \cdot 10^{-9}$ mbar	$5 \cdot 10^{-9}$ mbar
Measurement board	2 CP 300 C9 for 2 Pirani- and 2 Cold Cathode Gauge TPR 010/018, IKR 050	2 CP 300 C9 for 2 Pirani- and 2 Cold Cathode Gauge TPR 010/018, IKR 050	2 CP 300 C9 for 2 Pirani- and 2 Cold Cathode Gauge TPR 010/018, IKR 050
Relay: Switching voltage	-	30 V DC / 50 V AC	30 V DC / 250 V AC
Interface	-	RS-232-C, IF 300 A	RS-232-C, IF 300 B

Ordering Number

Complete measuring unit	PT G25 294	PT G25 311	PT G25 295
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Measurement unit TPG 300

TPG 300, complete measuring units



- Easy to replace plug-in circuit boards
- 12 adjustable switching points
- Ideal for extreme conditions such as radiation and UHV

General technical data

Display rate	5 1/s
Error display	1 LED, red
Filter time constant	16 ms, 160 ms (standard), 1.6 s
Weight: without boards	1.4 kg
Limit frequency	10 Hz, 1 Hz (standard), 0.1 Hz
Unit of measure	mbar, Torr, Pa
Measurement rate	100 1/s
Measured value display	15 mm high numbers
Mains requirement: frequency (range)	50-60 Hz
Mains requirement: power consumption	55 VA
Mains requirement: voltage (range)	90-264 V AC
Safety	IEC 384, class 1, VDE 0411, part 2.80
Temperature: Operating	+5 - +50 °C
Temperature: Storage	-40 - +65 °C

Technical data

	PI 300 D, CP 300 C9	PI 300 D,CP 300 C9,IF 300 A	PI 300 D,CP 300 C9,IF 300 B
Measurement range max.	1000 mbar	1000 mbar	1000 mbar
Measurement range min.	$5 \cdot 10^{-9}$ mbar	$5 \cdot 10^{-9}$ mbar	$5 \cdot 10^{-9}$ mbar
Measurement board	PI 300 D, CP 300 C9 for 3 Pirani- and 1 Cold Cathode Gauge TPR 010/018, IKR 050	PI 300 D, CP 300 C9 for 3 Pirani- and 1 Cold Cathode Gauge TPR 010/018, IKR 050	PI 300 D, CP 300 C9 for 3 Pirani- and 1 Cold Cathode Gauge TPR 010/018, IKR 050
Relay: Switching voltage	-	30 V DC / 50 V AC	30 V DC / 250 V AC
Interface	-	RS-232-C, IF 300 A	RS-232-C, IF 300 B

Ordering Number

Complete measuring unit	PT G25 292	PT G25 302	PT G25 293
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Technical data

	PI 300 D,CP 300 C10	PI 300 D, CP 300 C10, IF 300 A	PI 300 D,CP 300 C10,IF 300 B
Measurement range max.	1000 mbar	1000 mbar	1000 mbar
Measurement range min.	$1 \cdot 10^{-10}$ mbar	$1 \cdot 10^{-10}$ mbar	$1 \cdot 10^{-10}$ mbar
Measurement board	PI 300 D, CP 300 C10 for 3 Pirani- and 1 Cold Cathode Gauge TPR 010/018, IKR 060	PI 300 D, CP 300 C10 for 3 Pirani- and 1 Cold Cathode Gauge TPR 010/018, IKR 060	PI 300 D, CP 300 C10 for 3 Pirani- and 1 Cold Cathode Gauge TPR 010/018, IKR 060
Relay: Switching voltage	-	30 V DC / 50 V AC	30 V DC / 250 V AC
Interface	-	RS-232-C, IF 300 A	RS-232-C, IF 300 B

Ordering Number

Complete measuring unit	PT G25 262	PT G25 313	PT G25 263
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Available from April 2005

**SmartTest helium leak detector. The solution
for your quality assurance requirements**



Contents

	Page
Selection aid	506
The advantages of helium leak detection/Your advantages	507
Leak detection methods	508
Leak detectors SmartTest	
HLT 550 without backing pump	510
HLT 560 with rotary vane pump, 5 m ³ /h	512
HLT 565 with rotary vane pump, 30 m ³ /h	514
HLT 570 with diaphragm pump, 2 m ³ /h	516
HLT 572 with XtraDry™, 7.5 m ³ /h	518
HLT 575 with scroll pump, 28 m ³ /h	520
Accessories	
Remote control	522
Software for SmartTest	523
Sniffer probe	524
Calibrated sniffer test leak	525
Bypass option	526
Cart for SmartTest	527
Calibrated vacuum test leak	528
Helium pistol	529



Helium leak detectors

Selection aid

	Leak detector backing pump [m³/h]		Pumpdown time until ready for operation [s]			Applications										
	Rotary vane pump	Dry pump	Volume of the test sample													
	Pumping speed	Pumping speed	0.5 l	10 l	100 l	Semiconductor production	Vacuum furnaces	Lamp production	Vacuum coating systems	Vehicle manufacture	Refrigerating, air conditioning	Particle accelerators	Pharmaceutical	Manufacture of fuel cells	UHV engineering	Packaging
Leak detectors																
HLT 550 without backing pump						▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
HLT 560 with built-in rotary vane pump	5		1	45	590		●	●	●	●	●	▲	▲	●	●	●
HLT 565 with UNO 30 M and cart	30		1	16	160		●	●	●	●	▲			▲	●	▲
HLT 570 with built-in diaphragm pump		2	1	125	1300	●	▲	▲	▲	▲	▲	▲	▲			●
HLT 572 with XtraDry™ and cart		7.5	1	35	410	●	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
HLT 575 with scroll pump and cart		28	1	16	160	●	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲

● Recommended ▲ Possible



The advantages of helium leak detection

Leak testing is necessary in order to:

- ▶ Ensure the quality of the product
- ▶ Increase the yield of production processes
- ▶ Attain the feasibility of involved experiments
- ▶ Optimize energy consumption
- ▶ Minimize detrimental influences on the environment

Leak detection with helium offers the following advantages compared to other test methods:

- ▶ Highest sensitivity for detecting the smallest leaks
- ▶ Leaks can be quantified
- ▶ Highest possible repeatability of the measurements
- ▶ The helium test gas is not toxic and not combustible

Your advantages

- | | |
|--|--|
| ▶ Single key operation | → Very easy to operate |
| ▶ Rugged design | → Reliable and durable |
| ▶ Modular design | → User specific solutions are possible |
| ▶ Pfeiffer Vacuum turbomolecular pump | → Highest possible inlet pressure 25 mbar, extremely fast recovery |
| ▶ Interfaces (DI/DO, AO) | → For easy integration within control systems |
| ▶ Tried and tested reliable analyzer | → Minimum servicing complexity |
| ▶ For sniffing and vacuum leak detection – all purpose leak detector | |



Helium leak detectors

Leak detection methods

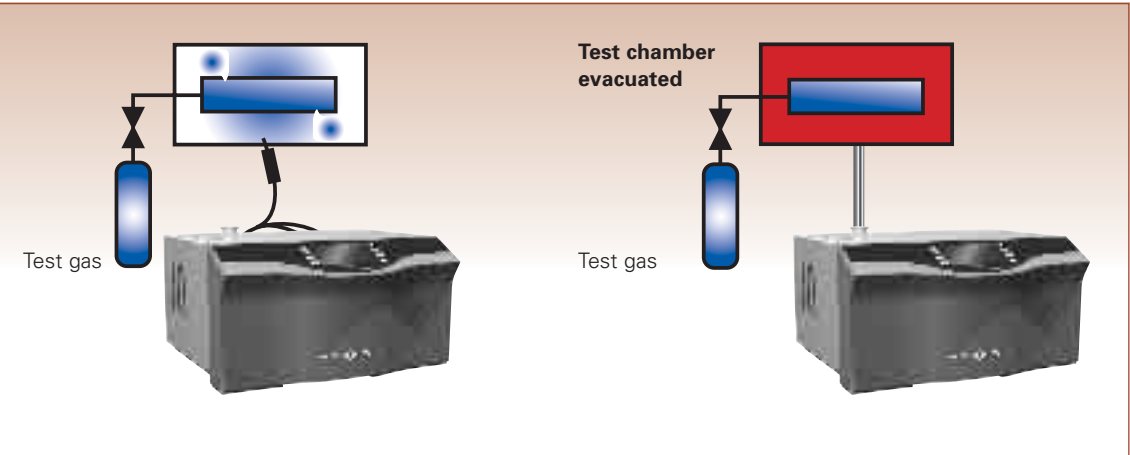
Integral leak detection – Determination of the total leak rate

Sniffer leak detection

- ▶ Over pressure resistant sample
- ▶ Use of a sniffer probe
- ▶ Detection limit $5 \cdot 10^{-8}$ mbar l/s

Vacuum leak detection

- ▶ Vacuum-tight sample
- ▶ Unit under test filled with helium
- ▶ Detection limit $5 \cdot 10^{-12}$ mbar l/s



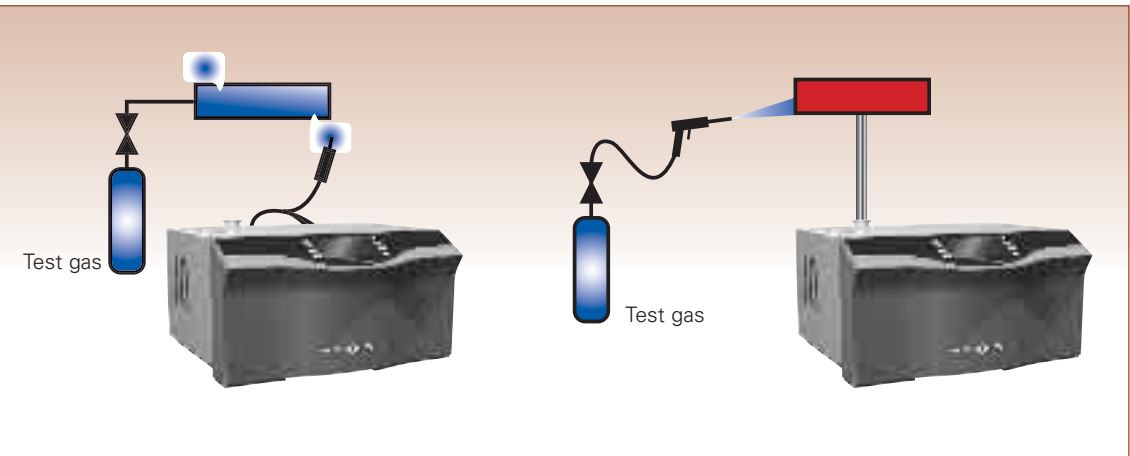
Local leak detection – finding of leaks

Sniffer leak detection

- ▶ Sniffing the sample filled with helium
- ▶ Over pressure resistant sample
- ▶ Detection limit $5 \cdot 10^{-8}$ mbar l/s

Vacuum leak detection

- ▶ Spraying with helium
- ▶ Vacuum-tight sample
- ▶ Detection limit $5 \cdot 10^{-12}$ mbar l/s





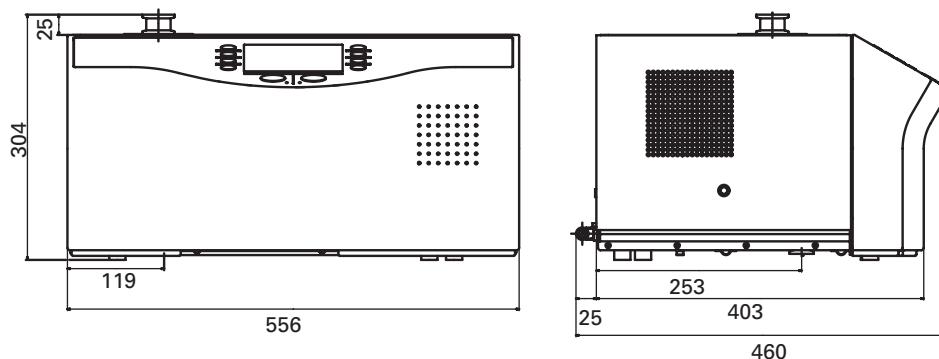
SmartTest - base unit without backing pump

HLT 550



- ▶ User selected backing pump to match any application
- ▶ Very simple to operate
- ▶ Rugged - reliable - accurate
- ▶ Vacuum and sniffer standard operating modes
- ▶ Analog and digital inputs and outputs for industrial applications
- ▶ Long life and industrially well proven mass spectrometer
- ▶ Simple maintenance - low cost of ownership
- ▶ Test leak integrated

Dimensions (in mm)



General technical data

Smallest detectable leak rate for He	$5 \cdot 10^{-12}$ mbar l/s
Sniffer probe, detectable leak rate	$5 \cdot 10^{-8}$ mbar l/s
Detectable gases	^4He , ^3He , H_2
Leak rate display	10^{-12} - 1 mbar l/s
Cold start to ready	3 min
Response time	0.5 s
Pumping speed: for He	2.5 l/s
Inlet pressure max.	25 mbar
Ambient temperature	+10 to +35 °C in process
Power consumption	150 VA
Weight	34 kg
Input: Analog	CompactGauge
Input: Digital	Start/Stop, Zero, Calibration, bypass identification
Interface	RS-232-C, RS-485
Output: Analog	Leakage rate signal 2x 0-10 V, lin/log
Output: Digital	Ready pump, Ready measure, Leak, Error, Bypass
Relay: Switching capacity	2x 230 V AC
Relay: Switching current	3 A



Technical data

HLT 550
100-230 V,
50/60 Hz

Flange (in)	DN 25 ISO-KF
Test method	Vacuum and sniffing leak detection
Supply	100-230 V, 50/60 Hz
Roughing pump	without

Ordering Number

HLT 550	PT L02 020
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Accessories

Remote control

Remote control unit	PT 445 400
Connection cable for remote control, 4 m	PT 445 401
Extension cable, 8 m	PT 445 402

External test leak

CT408, He-Test leak rate approx. 10^{-8} mbar l/s, DN 10 ISO-KF	B8 116 557
CT446, He-Test leak adjustable 10^{-6} - 10^{-4} mbar l/s, DN 10 ISO-KF	B8 115 580

Bypass option

with mains cable, german plug	PT 445 410-T
with mains cable, UL	PT 445 412-T

Cart for SmartTest

100 - 120 V, without pump	PT 445 416
230 V, without pump	PT 445 415

Sniffer probe

LP 503, with standard tip, 3 m	BG 449 207-T
LP 505, with standard tip, 5 m	BG 449 208-T
LP 510, with standard tip, 10 m	BG 449 209-T

Sniffer probe

CL 004, He, leak rate approx. 10^{-4} mbar l/s	BG 447 704-T
CL 004, He, leak rate approx. 10^{-5} mbar l/s	BG 447 705-T
CL 004, He, leak rate approx. 10^{-6} mbar l/s	BG 447 706-T
CL 002 A, Mixture He : H ₂ = 95 % : 5 %, Leak rate H ₂ approx. 10^{-6} mbar l/s	BG 449 025A

Software

Software for Helium Leak Detector SmartTest	PT 882 610-T
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Other accessories

Centering ring with poral filter, DN 25 ISO-KF	PF 117 225-T
Helium pistol	BG 512 125-T
Transport case for SmartTest, Dimensions: 730 mm x 570 mm x 500 mm, weight: 18 kg	PT 445 403



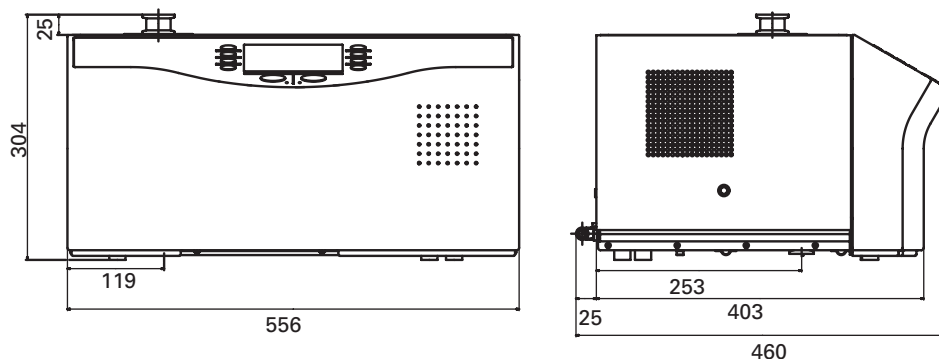
SmartTest with 5 m³/h rotary vane pump

HLT 560



- ▶ Rugged - reliable - accurate
- ▶ Very simple to operate
- ▶ Vacuum and sniffer standard operating modes
- ▶ Analog and digital inputs and outputs for industrial applications
- ▶ Long life and industrially well proven mass spectrometer
- ▶ Simple maintenance - low cost of ownership
- ▶ Bypass option
- ▶ Test leak integrated

Dimensions (in mm)



General technical data

Smallest detectable leak rate for He	5·10 ⁻¹² mbar l/s
Sniffer probe, detectable leak rate	5·10 ⁻⁸ mbar l/s
Detectable gases	⁴ He, ³ He, H ₂
Leak rate display	10 ⁻¹² - 1 mbar l/s
Cold start to ready	3 min
Response time	0.5 s
Pumping time to ready: 0.5 l test volume	1 s
Pumping time to ready: 10 l test volume	45 s
Pumping time to ready: 100 l test volume	590 s
Pumping speed: for He	2.5 l/s
Inlet pressure max.	25 mbar
Ambient temperature	+10 to +35 °C in process
Power consumption	400 VA
Weight	44 kg
Input: Analog	CompactGauge
Input: Digital	Start/Stop, Zero, Calibration, bypass identification
Interface	RS-232-C, RS-485
Output: Analog	Leakage rate signal 2x 0-10 V, lin/log
Output: Digital	Ready pump, Ready measure, Leak, Error, Bypass
Relay: Switching capacity	2x 230 V AC
Relay: Switching current	3 A



Technical data

	230 V, 50 Hz	HLT 560 120 V, 60 Hz	100 V, 50/60 Hz
Flange (in)	DN 25 ISO-KF	DN 25 ISO-KF	DN 25 ISO-KF
Test method	Vacuum and sniffing leak detection	Vacuum and sniffing leak detection	Vacuum and sniffing leak detection
Supply	230 V, 50 Hz	120 V, 60 Hz	100 V, 50/60 Hz
Roughing pump	Rotary vane pump 5 m³/h	Rotary vane pump 5 m³/h	Rotary vane pump 5 m³/h

Ordering Number

HLT 560	PT L02 000	PT L02 001	PT L02 002
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Accessories

Remote control

Remote control unit	PT 445 400	PT 445 400	PT 445 400
Connection cable for remote control, 4 m	PT 445 401	PT 445 401	PT 445 401
Extension cable, 8 m	PT 445 402	PT 445 402	PT 445 402

External test leak

CT408, He-Test leak rate approx. 10^{-8} mbar l/s, DN 10 ISO-KF	B8 116 557	B8 116 557	B8 116 557
CT446, He-Test leak adjustable 10^{-6} - 10^{-4} mbar l/s, DN 10 ISO-KF	B8 115 580	B8 115 580	B8 115 580

Bypass option

with mains cable, german plug	PT 445 410-T	PT 445 410-T	PT 445 410-T
with mains cable, UL	PT 445 412-T	PT 445 412-T	PT 445 412-T

Cart for SmartTest

100 - 120 V, without pump	-	PT 445 416	PT 445 416
230 V, without pump	PT 445 415	-	-

Sniffer probe

LP 503, with standard tip, 3 m	BG 449 207-T	BG 449 207-T	BG 449 207-T
LP 505, with standard tip, 5 m	BG 449 208-T	BG 449 208-T	BG 449 208-T
LP 510, with standard tip, 10 m	BG 449 209-T	BG 449 209-T	BG 449 209-T

Sniffer probe

CL 004, He, leak rate approx. 10^{-4} mbar l/s	BG 447 704-T	BG 447 704-T	BG 447 704-T
CL 004, He, leak rate approx. 10^{-5} mbar l/s	BG 447 705-T	BG 447 705-T	BG 447 705-T
CL 004, He, leak rate approx. 10^{-6} mbar l/s	BG 447 706-T	BG 447 706-T	BG 447 706-T
CL 002 A, Mixture He : H ₂ = 95 % : 5 %, Leak rate H ₂ approx. 10^{-6} mbar l/s	BG 449 025A	BG 449 025A	BG 449 025A

Software

Software for Helium Leak Detector SmartTest	PT 882 610-T	PT 882 610-T	PT 882 610-T
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Other accessories

Centering ring with poral filter, DN 25 ISO-KF	PF 117 225-T	PF 117 225-T	PF 117 225-T
Connection flange (input), DN 16 ISO-KF to connect a external, additional backing pump	PM 043 687	PM 043 687	PM 043 687
Helium pistol	BG 512 125-T	BG 512 125-T	BG 512 125-T
Transport case for SmartTest, Dimensions: 730 mm x 570 mm x 500 mm, weight: 18 kg	PT 445 403	PT 445 403	PT 445 403



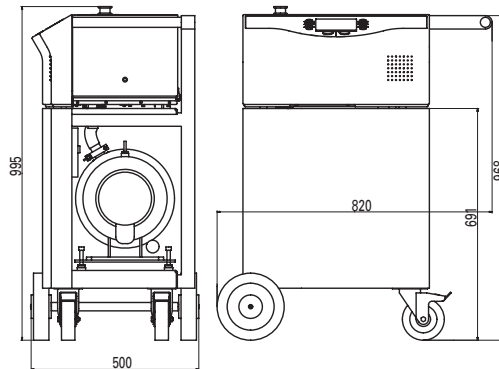
SmartTest with cart and 30 m³/h rotary vane pump

HLT 565



- ▶ Rugged - reliable - accurate
- ▶ Very simple to operate
- ▶ Vacuum and sniffer standard operating modes
- ▶ Analog and digital inputs and outputs for industrial applications
- ▶ Long life and industrially well proven mass spectrometer
- ▶ Simple maintenance - low cost of ownership
- ▶ Bypass option
- ▶ Test leak integrated

Dimensions (in mm)



General technical data

Smallest detectable leak rate for He	5·10 ⁻¹² mbar l/s
Sniffer probe, detectable leak rate	5·10 ⁻⁸ mbar l/s
Detectable gases	⁴ He, ³ He, H ₂
Leak rate display	10 ⁻¹² - 1 mbar l/s
Cold start to ready	3 min
Response time	0.5 s
Pumping time to ready: 0.5 l test volume	1 s
Pumping time to ready: 10 l test volume	16 s
Pumping time to ready: 100 l test volume	160 s
Pumping speed: for He	2.5 l/s
Inlet pressure max.	25 mbar
Ambient temperature	+10 to +35 °C in process
Power consumption	900 VA/50 Hz, 1050 VA/60 Hz
Weight	133 kg
Input: Analog	CompactGauge
Input: Digital	Start/Stop, Zero, Calibration, bypass identification
Interface	RS-232-C, RS-485
Output: Analog	Leakage rate signal 2x 0-10 V, lin/log
Output: Digital	Ready pump, Ready measure, Leak, Error, Bypass
Relay: Switching capacity	2x 230 V AC
Relay: Switching current	3 A



Technical data

	HLT 565 230 V, 50 Hz	HLT 565 100-120 V, 50/60 Hz
Flange (in)	DN 25 ISO-KF	DN 25 ISO-KF
Test method	Vacuum and sniffing leak detection	Vacuum and sniffing leak detection
Supply	230 V, 50 Hz	100-120 V, 50/60 Hz
Roughing pump	Rotary vane pump UNO 30M, 30 m³/h	Rotary vane pump UNO 30M, 30 m³/h

Ordering Number

HLT 565	PT L02 050	PT L02 051
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Accessories

Remote control

Remote control unit	PT 445 400	PT 445 400
Connection cable for remote control, 4 m	PT 445 401	PT 445 401
Extension cable, 8 m	PT 445 402	PT 445 402

External test leak

CT408, He-Test leak rate approx. 10^{-8} mbar l/s, DN 10 ISO-KF	B8 116 557	B8 116 557
CT446, He-Test leak adjustable 10^{-6} - 10^{-4} mbar l/s, DN 10 ISO-KF	B8 115 580	B8 115 580

Bypass option

with mains cable, german plug	PT 445 410-T	PT 445 410-T
with mains cable, UL	PT 445 412-T	PT 445 412-T

Sniffer probe

LP 503, with standard tip, 3 m	BG 449 207-T	BG 449 207-T
LP 505, with standard tip, 5 m	BG 449 208-T	BG 449 208-T
LP 510, with standard tip, 10 m	BG 449 209-T	BG 449 209-T

Sniffer probe

CL 004, He, leak rate approx. 10^{-4} mbar l/s	BG 447 704-T	BG 447 704-T
CL 004, He, leak rate approx. 10^{-5} mbar l/s	BG 447 705-T	BG 447 705-T
CL 004, He, leak rate approx. 10^{-6} mbar l/s	BG 447 706-T	BG 447 706-T
CL 002 A, Mixture He : H ₂ = 95 % : 5 %, Leak rate H ₂ approx. 10^{-6} mbar l/s	BG 449 025A	BG 449 025A

Software

Software for Helium Leak Detector SmartTest	PT 882 610-T	PT 882 610-T
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Other accessories

Centering ring with poral filter, DN 25 ISO-KF	PF 117 225-T	PF 117 225-T
Helium pistol	BG 512 125-T	BG 512 125-T



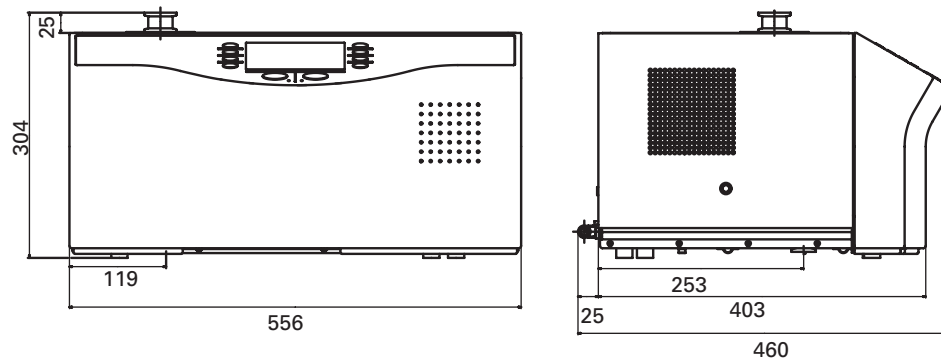
SmartTest with 2 m³/h diaphragm pump

HLT 570



- ▶ Entirely oilfree
- ▶ Rugged - reliable - accurate
- ▶ Very simple to operate
- ▶ Vacuum and sniffer standard operating modes
- ▶ Analog and digital inputs and outputs for industrial applications
- ▶ Long life and industrially well proven mass spectrometer
- ▶ Simple maintenance - low cost of ownership
- ▶ Bypass option
- ▶ Test leak integrated

Dimensions (in mm)



General technical data

Smallest detectable leak rate for He	5·10 ⁻¹² mbar l/s
Sniffer probe, detectable leak rate	5·10 ⁻⁸ mbar l/s
Detectable gases	⁴ He, ³ He, H ₂
Leak rate display	10 ⁻¹² - 1 mbar l/s
Cold start to ready	3 min
Response time	0.5 s
Pumping time to ready: 0.5 l test volume	1 s
Pumping time to ready: 10 l test volume	125 s
Pumping time to ready: 100 l test volume	1300 s
Pumping speed: for He	2.5 l/s
Inlet pressure max.	25 mbar
Ambient temperature	+10 to +35 °C in process
Power consumption	300 VA
Weight	44 kg
Input: Analog	Compact Gauge
Input: Digital	Start/Stop, Zero, Calibration, bypass identification
Interface	RS-232-C, RS-485
Output: Analog	Leakage rate signal 2x 0-10 V, lin/log
Output: Digital	Ready pump, Ready measure, Leak, Error, Bypass
Relay: Switching capacity	2x 230 V AC
Relay: Switching current	3 A



Technical data

	230 V, 50 Hz	HLT 570 120 V, 60 Hz	100 V, 50/60 Hz
Flange (in)	DN 25 ISO-KF	DN 25 ISO-KF	DN 25 ISO-KF
Test method	Vacuum and sniffing leak detection	Vacuum and sniffing leak detection	Vacuum and sniffing leak detection
Supply	230 V, 50 Hz	120 V, 60 Hz	100 V, 50/60 Hz
Roughing pump	Diaphragm pump 2 m³/h	Diaphragm pump 2 m³/h	Diaphragm pump 2 m³/h

Ordering Number

HLT 570	PT L02 010	PT L02 011	PT L02 012
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Accessories

Remote control			
Remote control unit	PT 445 400	PT 445 400	PT 445 400
Connection cable for remote control, 4 m	PT 445 401	PT 445 401	PT 445 401
Extension cable, 8 m	PT 445 402	PT 445 402	PT 445 402
External test leak			
CT408, He-Test leak rate approx. 10^{-8} mbar l/s, DN 10 ISO-KF	B8 116 557	B8 116 557	B8 116 557
CT446, He-Test leak adjustable 10^{-6} - 10^{-4} mbar l/s, DN 10 ISO-KF	B8 115 580	B8 115 580	B8 115 580
Bypass option			
with mains cable, german plug	PT 445 410-T	PT 445 410-T	PT 445 410-T
with mains cable, UL	PT 445 412-T	PT 445 412-T	PT 445 412-T
Cart for SmartTest			
100 - 120 V, without pump	-	PT 445 416	PT 445 416
230 V, without pump	PT 445 415	-	-
Sniffer probe			
LP 503, with standard tip, 3 m	BG 449 207-T	BG 449 207-T	BG 449 207-T
LP 505, with standard tip, 5 m	BG 449 208-T	BG 449 208-T	BG 449 208-T
LP 510, with standard tip, 10 m	BG 449 209-T	BG 449 209-T	BG 449 209-T
Sniffer probe			
CL 004, He, leak rate approx. 10^{-4} mbar l/s	BG 447 704-T	BG 447 704-T	BG 447 704-T
CL 004, He, leak rate approx. 10^{-5} mbar l/s	BG 447 705-T	BG 447 705-T	BG 447 705-T
CL 004, He, leak rate approx. 10^{-6} mbar l/s	BG 447 706-T	BG 447 706-T	BG 447 706-T
CL 002 A, Mixture He : H ₂ = 95 % : 5 %, Leak rate H ₂ approx. 10^{-6} mbar l/s	BG 449 025A	BG 449 025A	BG 449 025A
Software			
Software for Helium Leak Detector SmartTest	PT 882 610-T	PT 882 610-T	PT 882 610-T
Other accessories			
Centering ring with poral filter, DN 25 ISO-KF	PF 117 225-T	PF 117 225-T	PF 117 225-T
Connection flange (input), DN 16 ISO-KF to connect a external, additional backing pump	PM 043 687	PM 043 687	PM 043 687
Helium pistol	BG 512 125-T	BG 512 125-T	BG 512 125-T
Transport case for SmartTest, Dimensions: 730 mm x 570 mm x 500 mm, weight: 18 kg	PT 445 403	PT 445 403	PT 445 403



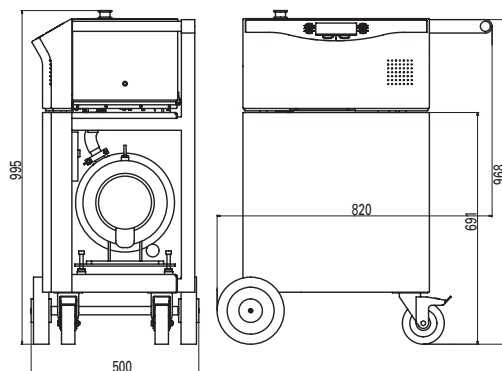
SmartTest with cart and 7.5 m³/h XtraDry

HLT 572



- ▶ Entirely oilfree
- ▶ Rugged - reliable - accurate
- ▶ Very simple to operate
- ▶ Vacuum and sniffer standard operating modes
- ▶ Analog and digital inputs and outputs for industrial applications
- ▶ Long life and industrially well proven mass spectrometer
- ▶ Simple maintenance - low cost of ownership
- ▶ Bypass option
- ▶ Test leak integrated

Dimensions (in mm)



General technical data

Smallest detectable leak rate for He	5·10 ⁻¹² mbar l/s
Sniffer probe, detectable leak rate	5·10 ⁻⁸ mbar l/s
Detectable gases	⁴ He, ³ He, H ₂
Leak rate display	10 ⁻¹² - 1 mbar l/s
Cold start to ready	3 min
Response time	0.5 s
Pumping time to ready: 0.5 l test volume	1 s
Pumping time to ready: 10 l test volume	35 s
Pumping time to ready: 100 l test volume	410 s
Pumping speed: for He	2.5 l/s
Inlet pressure max.	25 mbar
Ambient temperature	+10 to +35 °C in process
Power consumption	700 VA
Weight	119 kg
Input: Analog	CompactGauge
Input: Digital	Start/Stop, Zero, Calibration, bypass identification
Interface	RS-232-C, RS-485
Output: Analog	Leakage rate signal 2x 0-10 V, lin/log
Output: Digital	Ready pump, Ready measure, Leak, Error, Bypass
Relay: Switching capacity	2x 230 V AC
Relay: Switching current	3 A



Technical data

	HLT 572 230 V, 50 Hz	HLT 572 100-120 V, 50/60 Hz
Flange (in)	DN 25 ISO-KF	DN 25 ISO-KF
Test method	Vacuum and sniffing leak detection	Vacuum and sniffing leak detection
Supply	230 V, 50 Hz	115 V, 50/60 Hz
Roughing pump	XtraDry, 7.5 m ³ /h	XtraDry, 7.5 m ³ /h

Ordering Number

HLT 572	PT L02 060	PT L02 061
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Accessories

Remote control

Remote control unit	PT 445 400	PT 445 400
Connection cable for remote control, 4 m	PT 445 401	PT 445 401
Extension cable, 8 m	PT 445 402	PT 445 402

External test leak

CT408, He-Test leak rate approx. 10 ⁻⁸ mbar l/s, DN 10 ISO-KF	B8 116 557	B8 116 557
CT446, He-Test leak adjustable 10 ⁻⁶ - 10 ⁻⁴ mbar l/s, DN 10 ISO-KF	B8 115 580	B8 115 580

Bypass option

with mains cable, german plug	PT 445 410-T	PT 445 410-T
with mains cable, UL	PT 445 412-T	PT 445 412-T

Sniffer probe

LP 503, with standard tip, 3 m	BG 449 207-T	BG 449 207-T
LP 505, with standard tip, 5 m	BG 449 208-T	BG 449 208-T
LP 510, with standard tip, 10 m	BG 449 209-T	BG 449 209-T

Sniffer probe

CL 004, He, leak rate approx. 10 ⁻⁴ mbar l/s	BG 447 704-T	BG 447 704-T
CL 004, He, leak rate approx. 10 ⁻⁵ mbar l/s	BG 447 705-T	BG 447 705-T
CL 004, He, leak rate approx. 10 ⁻⁶ mbar l/s	BG 447 706-T	BG 447 706-T
CL 002 A, Mixture He : H ₂ = 95 % : 5 %, Leak rate H ₂ approx. 10 ⁻⁶ mbar l/s	BG 449 025A	BG 449 025A

Software

Software for Helium Leak Detector SmartTest	PT 882 610-T	PT 882 610-T
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Other accessories

Centering ring with poral filter, DN 25 ISO-KF	PF 117 225-T	PF 117 225-T
Helium pistol	BG 512 125-T	BG 512 125-T



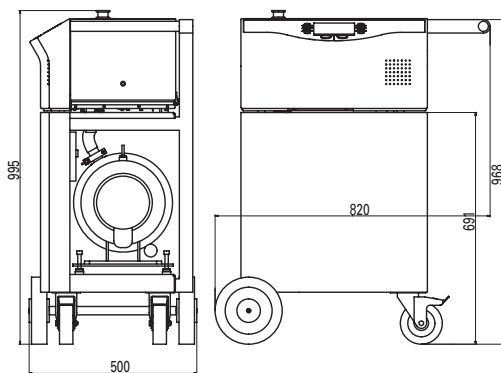
SmartTest with cart and 28 m³/h scroll pump

HLT 575



- ▶ Entirely oilfree
- ▶ Rugged - reliable - accurate
- ▶ Very simple to operate
- ▶ Vacuum and sniffer standard operating modes
- ▶ Analog and digital inputs and outputs for industrial applications
- ▶ Long life and industrially well proven mass spectrometer
- ▶ Simple maintenance - low cost of ownership
- ▶ Bypass option
- ▶ Test leak integrated

Dimensions (in mm)



General technical data

Smallest detectable leak rate for He	5·10 ⁻¹² mbar l/s
Sniffer probe, detectable leak rate	5·10 ⁻⁸ mbar l/s
Detectable gases	⁴ He, ³ He, H ₂
Leak rate display	10 ⁻¹² - 1 mbar l/s
Cold start to ready	3 min
Response time	0.5 s
Pumping time to ready: 0.5 l test volume	1 s
Pumping time to ready: 10 l test volume	16 s
Pumping time to ready: 100 l test volume	160 s
Pumping speed: for He	2.5 l/s
Inlet pressure max.	25 mbar
Ambient temperature	+10 to +35 °C in process
Power consumption	900 VA
Weight	140 kg
Input: Analog	CompactGauge
Input: Digital	Start/Stop, Zero, Calibration, bypass identification
Interface	RS-232-C, RS-485
Output: Analog	Leakage rate signal 2x 0-10 V, lin/log
Output: Digital	Ready pump, Ready measure, Leak, Error, Bypass
Relay: Switching capacity	2x 230 V AC
Relay: Switching current	3 A



Technical data

	HLT 575 230 V, 50 Hz	HLT 575 100-120 V, 50/60 Hz
Flange (in)	DN 25 ISO-KF	DN 25 ISO-KF
Test method	Vacuum and sniffing leak detection	Vacuum and sniffing leak detection
Supply	230 V, 50 Hz	100-120 V, 50/60 Hz
Roughing pump	Scrollpump 28 m³/h	Scrollpump 28 m³/h

Ordering Number

HLT 575	PT L02 065	PT L02 066
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Accessories

Remote control

Remote control unit	PT 445 400	PT 445 400
Connection cable for remote control, 4 m	PT 445 401	PT 445 401
Extension cable, 8 m	PT 445 402	PT 445 402

External test leak

CT408, He-Test leak rate approx. 10^{-8} mbar l/s, DN 10 ISO-KF	B8 116 557	B8 116 557
CT446, He-Test leak adjustable 10^{-6} - 10^{-4} mbar l/s, DN 10 ISO-KF	B8 115 580	B8 115 580

Bypass option

with mains cable, german plug	PT 445 410-T	PT 445 410-T
with mains cable, UL	PT 445 412-T	PT 445 412-T

Sniffer probe

LP 503, with standard tip, 3 m	BG 449 207-T	BG 449 207-T
LP 505, with standard tip, 5 m	BG 449 208-T	BG 449 208-T
LP 510, with standard tip, 10 m	BG 449 209-T	BG 449 209-T

Sniffer probe

CL 004, He, leak rate approx. 10^{-4} mbar l/s	BG 447 704-T	BG 447 704-T
CL 004, He, leak rate approx. 10^{-5} mbar l/s	BG 447 705-T	BG 447 705-T
CL 004, He, leak rate approx. 10^{-6} mbar l/s	BG 447 706-T	BG 447 706-T
CL 002 A, Mixture He : H ₂ = 95 % : 5 %, Leak rate H ₂ approx. 10^{-6} mbar l/s	BG 449 025A	BG 449 025A

Software

Software for Helium Leak Detector SmartTest	PT 882 610-T	PT 882 610-T
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Other accessories

Centering ring with poral filter, DN 25 ISO-KF	PF 117 225-T	PF 117 225-T
Helium pistol	BG 512 125-T	BG 512 125-T

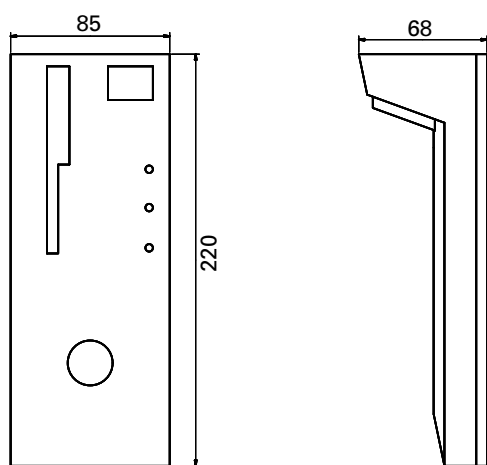


Remote control for SmartTest



- ▶ Rugged and reliable
- ▶ Easy to operate
- ▶ Clear cut display
- ▶ Integrated magnet mounting
- ▶ Up to 30 m extension cable

Dimensions (in mm)



Ordering Number

Remote control unit to SmartTest	PT 445 400
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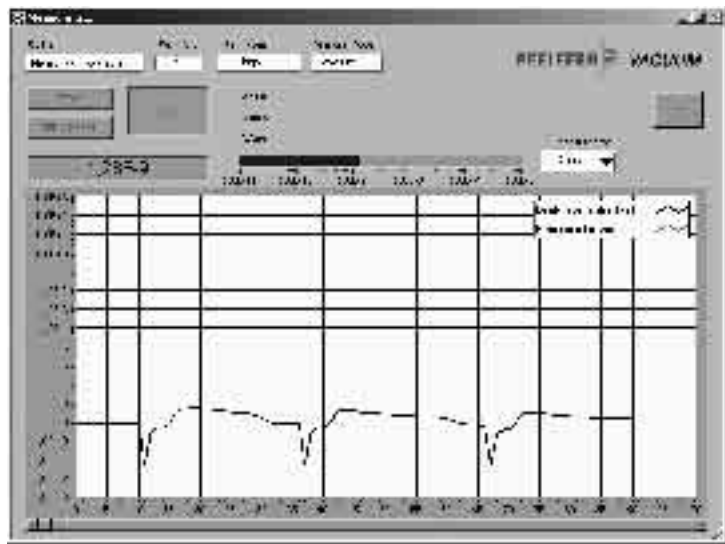
Accessories

Order.-No.

Lead to remote control unit, 4 m	PT 445 401
Extension cord to remote control unit, 8 m	PT 445 402



Software for SmartTest



- For displaying and saving leak test data
- For operation of the leak detector through a PC

Technical data

System requirements

Operating System	Windows 98, Windows NT 4.0 Windows 2000, Windows XP (admin privileges required)
Hardware	Pentium-PC (166 MHz or better) 32 MB RAM (128 MB recommended) 20 MB free hard disk capacity graphics card: 800 x 600 24 Bit True Color no fonts
	Free COM Port
	Local Printer

Ordering Number

Software for SmartTest helium leak detection, for the representation and storage of licking data as well as for the operation	PT 882 610-T
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Sniffer probe



- ▶ Pass/fail indicator LED's
- ▶ Background suppression control
- ▶ Probe, rigid, 120 mm long
- ▶ Capillary filter

Ordering Number

LP 503, Sniffer probe with standard tip, 3 m	BG 449 207-T
LP 505, Sniffer probe with standard tip, 5 m	BG 449 208-T
LP 510, Sniffer probe with standard tip, 10 m	BG 449 209-T

Accessories

Order.-No.

TP 312, Sniffer tip stiff, 120 mm	BG 449 215-T
TP 385, Sniffer tip stiff, 385 mm	BG 449 216-T
TF 312, Sniffer tip flexible, 120 mm	BG 449 217-T
TF 385, Sniffer tip flexible, 385 mm	BG 449 218-T
Capillary filter, metal version, for sniffer tip	BG 449 140-T

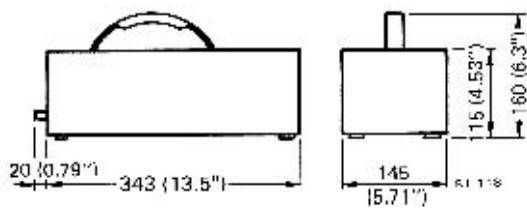


Calibrated sniffer test leak CL 002 A and CL 004



- ▶ Calibrated in accordance with DIN 28417
- ▶ Highly accurate
- ▶ Long service life
- ▶ Rugged design
- ▶ CL 002 A for hydrogen applications
- ▶ CL 004 for helium applications
- ▶ With integrated manometer and gas reservoir

Dimensions (in mm)

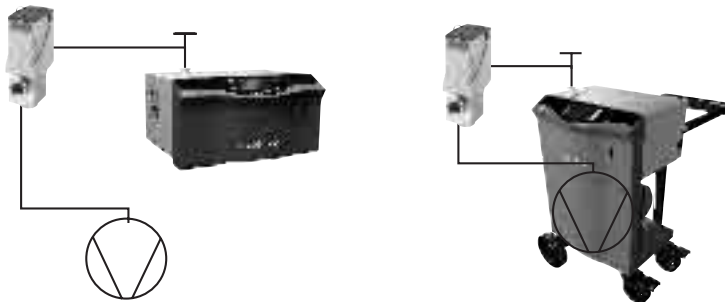


Ordering Number

CL 004, Sniffer test leak, He leak rate approx. 10^{-4} mbar l/s, He	BG 447 704-T
CL 004, Sniffer test leak, He. Leak rate approx 10^{-5} mbar l/s, He	BG 447 705-T
CL 004, Sniffer test leak, He Leak rate approx 10^{-6} mbar l/s, He	BG 447 706-T
CL 002 A Sniffer test leak Mixture He : H ₂ = 95 % : 5 % Leak rate H ₂ approx. 10^{-6} mbar l/s	BG 449 025A



Bypass-option for SmartTest



- ▶ To protect the leak detector from contamination
- ▶ For vacuum leak detection on big vessels due to free choice of backing pump
- ▶ Complete setup simple operation

Ordering Number

Bypass option

with mains cable, german plug

PT 445 410-T

with mains cable, UL

PT 445 412-T

Shipment

Angel valve, solenoid actuated EVB 25 MA, 90-265 V AC including control and mains cable

Flexible metal hose DN 25 KF 500 mm

Flange components, clamping rings and centerring rings

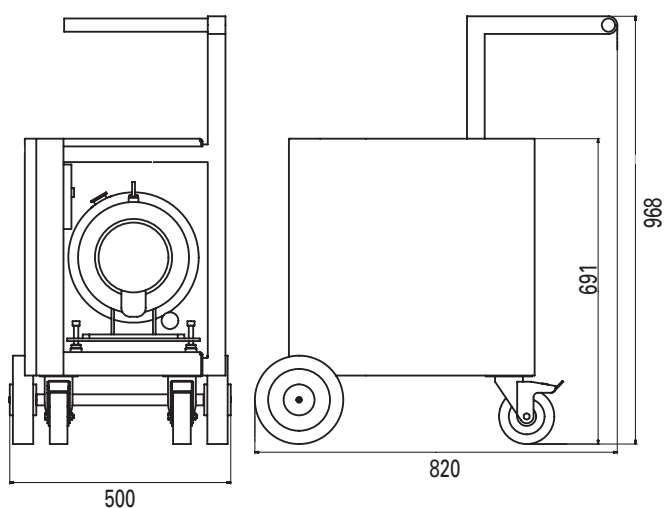


Cart for SmartTest



- ▶ Prepared for rotary vane pump, XtraDry™ and Scroll pump
- ▶ Simple installation with the help of plug connections
- ▶ Optional support for helium gas cylinder
- ▶ Virtually Tipp over prove

Dimensions (in mm)



Ordering Number

Cart for SmartTest, 100-120 V, without pump	PT 445 416
Cart for SmartTest, 230 V, without pump	PT 445 415

Accessories

Flexible metal hose for cart for SmartTest	BG 449 337-X
--	---------------------

Order.-No.



Calibrated test leak for vacuum applications



- ▶ Adjustable leak rate approx. 10^{-6} - 10^{-4} mbar l/s
- ▶ With manually operated valve
- ▶ With integrated gas reservoir

Technical data	CT 446	CT 408
Flange (in)	DN 10 ISO-KF	DN 10 ISO-KF
Application	Leak rate adjustable; range 10^{-6} - 10^{-4} mbar l/s	Leak rate, fix approx. 10^{-8} mbar l/s
Ordering Number		
Testleak	B8 115 580	B8 116 557



Helium spray gun



- ▶ For pinpointing leaks in assemblies and systems
- ▶ Connection by means of a plastic hose to the helium cylinder with pressure reducer
- ▶ Rugged
- ▶ Simple dosing
- ▶ R 1/4" spiral hose connection

Ordering Number

Helium pistol

BG 512 125-T

Miscellaneous accessories

Order.-No.

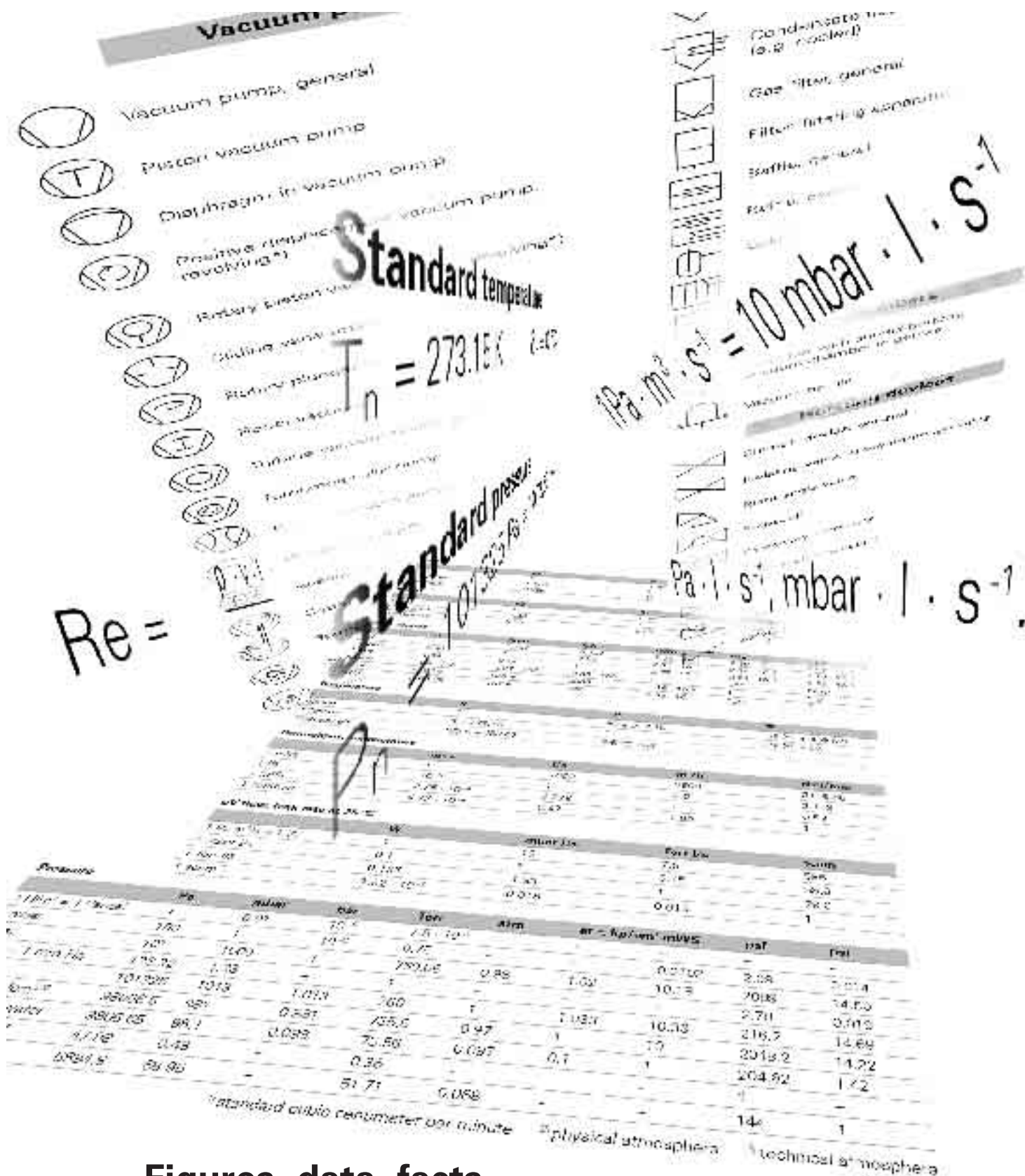
Carrying case for SmartTest, Mass: 730 mm x 570 mm x 500 mm; Weight: 18 kg

PT 445 403

Connection flange (input), DN 16 ISO-KF to connect a external, additional backing pump for HLT 560 and 570

PM 043 687





Figures, data, facts

Contents

	Page
Vacuum engineering terms	532
Units and symbols	535
Conversion tables	537
Vacuum symbols	538
General Terms and Conditions of Sale and Supply	540
Imprint/Note	541

Vacuum engineering terms

A

Absorption

Absorption is a sorption in which the gas (absorbate) enters inside a solid object or liquid (absorbent).

Adsorption

Adsorption is a sorption in which the gas (adsorbate) is bound to the surface of a solid object or a liquid (adsorbent).

B

Backing pump

A backing pump is a vacuum pump which within a vacuum pump combination together with another vacuum pump allows for its operation by providing on the outlet side of the other pump the necessary lower pressure.

C

Cold trap

A cold trap is a trap, the effect of which is based on the condensation of gases on cooled surfaces.

Compression chamber

A compression chamber is that chamber within a stator of some positive displacement vacuum pumps, the volume of which is reduced and in which the gas is compressed before being ejected.

Compression ratio

The compression ratio is the ratio between the exhaust pressure and the inlet pressure of a pump for a certain gas.

D

Degassing

Degassing is a desorption which is accelerated by means of physical processes.

Desorption

Desorption is the process where sorbed gases are released from a sorbent. This release may be spontaneous or accelerated through physical processes.

Diffusion

Gas diffusion is the movement of a gas due to its concentration gradient in an other medium. This medium may be gaseous, liquid or solid.

F

Final pressure

The final pressure is that value which is asymptotically approximated by the pressure in the case of a blanked off vacuum pump during normal operation and without admitting gas.

Flow

Viscous flow

Viscous flow is the passage of a gas through a duct under conditions such that the mean free path is very small in comparison with the smallest internal dimension of a cross section of the duct. The flow is therefore dependent on the viscosity of the gas and may be laminar or turbulent. In the case of viscous flow the resistance is a function of the pressure.

Turbulent flow

Turbulent flow (eddy flow) is a viscous flow with mixing motion above a critical Reynolds number (for circular cylindrical pipes $Re=2300$).

Laminar flow

Laminar flow (parallel flow) is a viscous flow without mixing motion at small Reynolds numbers.

Molecular flow

Molecular flow is the passage of a gas through a duct under conditions such that the mean free path is very large in comparison with the largest internal dimensions of a cross section of the duct.

In the case of molecular flow, the resistance is independent of the pressure.

Flow resistance

In most applications the vacuum pump is connected via a pipe to the vacuum chamber. This pipe exhibits a flow resistance which is defined by the ratio between the pressure difference Δp and at the gas flow q . In the high vacuum and ultrahigh vacuum range, the flow resistance is independent of the pressure. The unit of flow resistance is: $s \cdot m^{-3}$, $s \cdot l^{-1}$.

Forevacuum pressure

The forevacuum pressure is the required pressure on the delivery side of a vacuum pump which itself is not capable of operating against the atmospheric pressure.

G

Gas

Gas in a narrower sense is matter in the gaseous state which at the prevailing temperature cannot be brought by compression into the liquid or solid state.

Gas ballast

Admission of a controlled quantity of a gas, usually into the compression chamber of a positive displacement pump for the purpose of avoiding the formation of condensate within the pump.

Gas load

The gas load is defined as the pV flow conveyed towards a vacuum pump. The unit is mbar l/s or sccm (standard cubic centimeters per minute). Standard conditions are 1013.25 mbar and 273.15 K.

At 20 °C 1 mbar l/s = 55.18 sccm

Gettering

Gettering is bonding of gas, preferably by means of a chemical reaction. Often getters (getter materials) have large surfaces.

K

Knudsen number

The flow ranges are characterized by the ratio between the mean free path and the pipe diameter. This ratio is expressed through the Knudsen number $Kn = \bar{l}/d$.

L

Laminar flow

The laminar flow is a viscous flow without mixture movement at small Reynolds numbers.

Leak

Leaks in a vacuum apparatus are leakages in the wall or at joints, caused by faulty material or processing or incorrect handling of the sealing elements.

Leak rate

The leak rate is defined as the pV flow of a gas through a leak. The leak rate is dependent on type of gas, pressure difference and temperature. The unit of the leak rate is

$$1 \text{ Pa} \cdot \text{m}^3 \cdot \text{s}^{-1} = 10 \text{ mbar} \cdot \text{l} \cdot \text{s}^{-1}$$

M

Mass flow

The mass flow is defined through the ratio between the mass of a gas flowing during a certain time span through a line cross-section and the time span. It can also be stated in sccm.

Mean free path

The mean free path is the average distance that a particle travels between two successive collisions with other particles.

Multistage vacuum pump

A multistage vacuum pump consists of several pumping systems in a common enclosure.

O

Occlusion

Occlusion is the incorporation of quantities of gas in solids or liquids.

Oil separator on vacuum pumps

An oil separator on vacuum pumps is a separator on the delivery side of positive displacement vacuum pumps for the purpose of collecting and, if required, returning vacuum pump oil back to the vacuum pump. If the oil accumulates by way of droplets, the facility is also called oil mist separator or oil mist filter.

Outgassing

Outgassing is a spontaneous desorption.

P

Partial pressure

The partial pressure is the pressure arising from a certain type of gas or vapor within a mixture of gases and/or vapors.

Particle number density

The particle number density is the ratio between the number of particles contained in a volume unit and the volume of that volume unit.

Permeation

Permeation is the transfer of a gas through a solid material or a liquid of finite thickness.

Pressure

The pressure of a gas on a limiting wall is defined as the ratio between the normal component of the force which is exerted by the gas on a surface unit of the wall and the area of that surface unit.

Pressure units

The legal pressure units are "Pascal" as SI unit, unit Pa; "Bar", unit bar, as a special unit designation for 10^5 Pa.

$$1 \text{ Pa} = 1 \text{ Nm}^{-2}$$

$$1 \text{ bar} = 1000 \text{ mbar} = 10^5 \text{ Nm}^{-2} = 10^5 \text{ Pa}$$

The unit commonly used in the area of vacuum engineering is millibar (mbar).

Pumping speed

The pumping speed S is the mean volume flow through the cross-section of the intake opening of a pump. Units of pumping speed are: $\text{m}^3 \cdot \text{s}^{-1}$, $\text{l} \cdot \text{s}^{-1}$, $\text{m}^3 \cdot \text{h}^{-1}$.

pV flow

The pV flow is the ratio between the pV value of a gas which flows during a time span at a specific prevailing temperature through a line cross-section and the time span.

pV value

The pV value is the product of pressure and volume of a certain quantity of gas at a specific prevailing temperature. If the pV value is to be taken as a measure for the quantity of substance or the mass of a gas, it needs to be an ideal gas, the temperature of which must be stated.

R

Reynolds number

Dimension less number

$$Re = \frac{\rho \cdot v \cdot l}{\eta}$$

ρ = Density of the liquid

v = Mean velocity of the flow

l = Characteristic length

(pipe diameter, for example)

η = Dynamic viscosity

$Re < 2300$: laminar flow

$Re > 4000$: turbulent flow

S

Saturation vapor pressure

The saturation vapor pressure is that pressure which is exerted by a vapor which, at the prevailing temperature, is at a thermodynamic equilibrium with its condensing phases.

Separator on vacuum pumps

Separators on vacuum pumps are devices at the intake or delivery side of vacuum pumps designed for collecting condensates which may form in the vacuum lines or in parts of the vacuum pump or which also collect solid substances accumulating in vacuum lines and vacuum pumps while pumping vapors.

Sorption

Sorption is binding of gas (sorbate) by a solid or a liquid (sorbent). Sorbents are also called sorption agents.

Standard pressure

$P_n = 101325 \text{ Pa} = 1013.25 \text{ mbar}$

Standard reference conditions

The standard reference conditions is the state of solid, liquid or gaseous matter defined by standard temperature and a standard pressure.

Standard temperature

$T_n = 273.15 \text{ K} \quad \delta_n = 0 \text{ }^\circ\text{C}$

T

Throughput

The throughput of a vacuum pump is the pV flow of the gas being pumped. The units of throughput are: $\text{Pa} \cdot \text{l} \cdot \text{s}^{-1}$, $\text{mbar} \cdot \text{l} \cdot \text{s}^{-1}$.

Total pressure

The total pressure is the total of the partial pressures of the gases or vapors present. This term is used when the shorter designation "pressure" in the given context does not allow for differentiating between the individual partial pressures and their total.

Trap

A trap is a device in which the partial pressures of unwanted constituents of a gas mixture are reduced by physical or chemical means.

Turbulent flow

The turbulent flow is a viscous flow with mixing movement above a critical Reynolds number Re (for cylindrical pipes $Re = 2300$).

V

Vacuum pump oil

Vacuum pump oil is a liquid which is used for sealing, cooling and lubrication within oil-sealed vacuum pumps.

Vane

A vane is a sliding component, which divides the space (compression chamber) between rotor and stator in some positive displacement vacuum pumps into different chambers.

Vapor

Vapor is matter in the gaseous state which is either in a thermodynamic equilibrium with its liquid or solid state (saturated vapor) or which at the prevailing temperature can be brought to a thermal equilibrium (condensed) by means of compression (unsaturated vapor).

Remark:

In the area of vacuum engineering, the word "gas" is used in an extended sense both for a non-condensable gas as well as for all vapors in those cases where it is not necessary to differentiate.

Vapor pressure

Vapor pressure is the partial pressure of a vapor.

Volume flow

The volume flow is the ratio between the volume of a gas which during a time span at a specific prevailing pressure and temperature, flows through a line cross-section and the time span itself.

W

Water vapor capacity C_{w0}

The water vapor capacity is the greatest quantity of water which a vacuum pump is capable of continuously taking in and pumping per unit of time under the ambient conditions of $20 \text{ }^\circ\text{C}$ and 1013 mbar by way of water vapor.

Water vapor tolerance p_{w0}

The water vapor tolerance states the highest intake pressure for pure water vapor the pump is continuously capable of pumping. The water vapor tolerance is stated in units of mbar.

Vacuum ranges	mbar	Particle number density	Mean free path (l)
Rough vacuum (GV)	$1000 - 1$	$2.5 \cdot 10^{25} - 2.5 \cdot 10^{22} \text{ m}^{-3}$	$l \ll d$
Medium vacuum (FV)	$1 - 10^{-3}$	$2.5 \cdot 10^{22} - 2.5 \cdot 10^{19} \text{ m}^{-3}$	$l \approx d$
High vacuum (HV)	$10^{-3} - 10^{-7}$	$2.5 \cdot 10^{19} - 2.5 \cdot 10^{15} \text{ m}^{-3}$	$l > d$
Ultrahigh vacuum (UHV)	$< 10^{-7}$	$< 2.5 \cdot 10^{15} \text{ m}^{-3}$	$l \gg d$

The particle number densities apply at a temperature of $20 \text{ }^\circ\text{C}$.
d = pipe diameter

Units and symbols

Decimal multiples and divisions

Power of ten	Combining form	Combining symbol
10^9	Giga	G
10^6	Mega	M
10^3	Kilo	k
10^{-2}	Centi	c
10^{-3}	Milli	m
10^{-6}	Micro	μ
10^{-9}	Nano	n
10^{-12}	Pico	p

Lengths, surface areas, volumes

Quantity	Symbol	SI units	Recommended units
Length	l	m	m, mm, μ m, nm
Width	b	m	m, mm, μ m
Height	h	m	m, mm, μ m
Thickness	d	m	m, mm, μ m, nm
Radius	r	m	m, mm, μ m
Diameter	d	m	m, mm, μ m
Path	s	m	m, mm, μ m, nm
Wavelength	λ	m	nm
Surface area	A	m^2	m^2 , mm^2 , μm^2
Volumen ¹⁾	V	m^3	m^3 , dm^3 , cm^3 , mm^3
Standard volumen ^{1) 2)}	V_n	m^3	m^3 , dm^3 , cm^3 , mm^3

Electrical and magnetic quantities

Quantity	Symbol	SI units	Recommended units
Electric current	I	A	A, mA, μ A, nA
Electric voltage	U	V	kV, V, mV, μ V
Electric resistance	R	Ω	M Ω , k Ω , Ω , m Ω
Electric conductance	G	S	S
Electric conductivity	κ	S/m	
Permeability	μ	V s/A m	

Temperature and heat

Quantity	Symbol	SI units	Recommended units
Thermodynamic temperature	t	K	K
Celsius temperature	t		$^{\circ}$ C
Temperature difference	ΔT , $\Delta\vartheta$	K	K
Quantity of heat	Q	J	KJ, J
Heat capacity	C	J/K	KJ/K, J/K
Specific heat capacity	c	J/kg K	kJ/kg K, J/g K

Mass

Quantity	Symbol	SI units	Recommended units
Mass	m	kg	kg, g, mg
Mass per unit area	m''	kg/m^2	g/cm^2 , mg/cm^2
Density	δ	kg/m^3	kg/m^3 , g/cm^3
Mass momentum of inertia	J	$kg\ m^2$	$kg\ m^2$

¹⁾ liter (l) as a special designation for 1 dm^3

²⁾ At 0 $^{\circ}$ C and 1013.25 mbar

Force, energy, power

Quantity	Symbol	SI units	Recommended units
Force	F	N	kN, N, mN
Weight	G	N	kN, N, mN
Mass (weight)	m	kg	mg, g, kg, t
Impulse	b	N s	N s
Moment of momentum	L	N s m	N s m
Pressure	p	N/m ² , Pa	bar, mbar
Torque	M	N m	N m
Energy	E	J	kJ, kW h, W s, eV
Work	W	J	kJ, kW h, W s
Power	P	W	MW, kW, W
Efficiency	η	1	1

Time

Quantity	Symbol	SI units	Recommended units
Time span, duration	t	s	h, min, s, ms, μ s
Period	T	s	s
Frequency	f	Hz	Hz, kHz, MHz
Rotational speed	n	1/s	1/s, 1/min
Velocity	v	m/s	m/s, mm/s
Acceleration	a	m/s ²	m/s ²
Angular velocity	ω	1/s; rad/s	
Angular acceleration	α	1/s ² ; rad/s ²	

Vacuum engineering quantities

Quantity	Symbol	SI units	Recommended units
Pressure, absolute	p	N/m ² , Pa	bar, mbar
Total pressure	p _t		mbar
Partial pressure of the gas constituent „i“	p _i		mbar (e. g. P _{H₂} , P _{N₂})
Saturation vapor pressure	p _s		mbar
Vapor pressure	p _d		mbar
Residual total pressure	p _r		mbar
Residual gas pressure	p _{rg}		mbar
Residual vapor pressure	p _{rd}		mbar
Final pressure	p _{end}		mbar
Mean free path	T, l	m	m, cm
Collision rate	z	1/s	s ⁻¹
Collision rate per unit area	z''	1/s m ²	s ⁻¹ m ⁻² , s ⁻¹ cm ⁻²
Particle number density	n	1/m ³	m ⁻³ , cm ⁻³
Throughput	q _{pv}	N m/s	mbar l/s
Leak rate	q _L	N m/s	mbar l/s
Pumping speed	S	m ³ /s	l/s, m ³ /h
Flow conductance	C	m ³ /s	m ³ /s, l/s
Flow resistance	R	s/m ³	s/m ³ , s/l

Conversion tables

Length

	m	ft	in
1 m	1	3.28	39.37
1 ft (foot)	0.305	1	12.2
1 in (inch)	0.025	0.08	1

Mass

	kg	lb	oz
1 kg	1	2.20	35.27
1 lb (pound)	0.45	1	16
1 oz (ounce)	0.03	0.06	1

Work, energy

	J	kpm	lbft	kWh	kcal	BTU
1 J	1	0.102	0.737	$2.78 \cdot 10^{-7}$	$2.39 \cdot 10^{-4}$	$9.48 \cdot 10^{-4}$
1 kpm	9.81	1	7.23	$2.72 \cdot 10^{-6}$	$2.34 \cdot 10^{-3}$	$9.29 \cdot 10^{-3}$
1 lbft	1.36	0.14	1	$3.77 \cdot 10^{-7}$	$3.24 \cdot 10^{-4}$	$1.29 \cdot 10^{-3}$
1 kWh	$3.6 \cdot 10^6$	$3.67 \cdot 10^6$	$2.65 \cdot 10^6$	1	860	3412
1 kcal	4186.8	426.9	3088	$1.16 \cdot 10^{-3}$	1	3.97
1 BTU	1055.06	107.6	778	$2.93 \cdot 10^{-4}$	0.25	1

Temperature

	K	°C	°F
Kelvin	1	°C + 273.15	5/9 (°F + 459.67)
°Celsius	K – 273.15	1	5/9 (°F – 32)
°Fahrenheit	9/5 K – 459.67	9/5 °C + 32	1

Pumping speed, conductance

	m³/s	l/s	m³/h	cbft/min
1 m³/s	1	1000	3600	2118.88
1 l/s	10^{-3}	1	3.6	2.119
1 m³/h	$2.78 \cdot 10^{-4}$	0.278	1	0.59
1 cbft/min	$4.72 \cdot 10^{-4}$	0.47	1.69	1

pV flow, leak rate at 25 °C

	W	mbar l/s	Torr l/s	sccm
1 Pa m³/s = 1 W	1	10	7.5	586
1 mbar l/s	0.1	1	0.75	58.6
1 Torr l/s	0.133	1.33	1	78.0
1 sccm ¹⁾	$1.82 \cdot 10^{-3}$	0.018	0.013	1

Pressure

	Pa	mbar	bar	Torr	atm	at = kp/cm²	mWS	psf	psi
1 N/m² = 1 Pascal	1	0.01	10^{-5}	$7.5 \cdot 10^{-3}$	–	–	–	–	–
1 mbar	100	1	10^{-3}	0.75	–	–	0.0102	2.09	0.014
1 bar	10^5	1000	1	750.06	0.98	1.02	10.19	2089	14.50
1 Torr = 1 mm Hg	133.32	1.33	–	1	–	–	–	2.78	0.019
1 atm ²⁾	101325	1013	1.013	760	1	1.033	10.33	216.2	14.69
1 at = 1 kp/cm² ³⁾	98066.5	981	0.981	735.6	0.97	1	10	2048.2	14.22
1 m head of water	9806.65	98.1	0.098	73.56	0.097	0.1	1	204.82	1.42
1 lb/sqft = 1 psf	47.88	0.48	–	0.36	–	–	–	1	–
1 lb/sqin = 1 psi	6894.8	68.95	–	51.71	0.068	–	–	144	1

¹⁾ standard cubic centimeter per minute ²⁾ physical atmosphere ³⁾ technical atmosphere

Valve actuation

	Manual operation
	Variable leak valve
	Electromagnetic operation
	Fluid operation (hydraulic or pneumatic)
	Electric motor operation

Connections and tubes

	Flange connection, general
	Flange connection, bolted
	Small flange connection
	Clamped flange connection
	Threaded tube connection
	Ball-and-socket joint
	Spigot-and-socket joint
	Taper ground joint connection
	Intersection of two lines with connection
	Intersection of two lines without connection
	Branch off point
	Flexible line (bellows, flexible tubing, for example)

	Linear motion feedthrough, flange mounted
	Linear motion feedthrough without flange
	Feedthrough for transmission of rotary and linear motion
	Electric current feedthrough

Measurement and gauges

	Vacuum (for indicating a vacuum)
	Vacuum measurement, vacuum gauge head
	Vacuum gauge, operating and display unit for vacuum gauge head
	Vacuum gauge, recording
	Vacuum gauge with analog measured value display
	Vacuum gauge with digital measured value display
	Measurement of throughput

All vacuum symbols, with the exception of those marked by *) can be used in any orientation.

General Terms and Conditions of Sale and Supply

I. Tender

In the absence of any separate contractual agreements, Pfeiffer Vacuum will, as supplier only effect deliveries and provide services under the terms and conditions set forth hereunder. Any divergent purchasing conditions of the purchaser will under no circumstances, even if not expressly refuted – and neither by acceptance of an order –, become part of the contract. These General Standard Terms and Conditions shall apply both to the present business as well as to any future business.

II. Tender and Conclusion of a Contract

The information contained in price lists, catalogues and advertising media referring to Pfeiffer Vacuum's performances do not represent any tenders. Documents like figures, drawings, weight and measure information pertaining to a tender are subject to change without notice and only approximately relevant, unless they have not explicitly been declared as binding. Any verbal advice, collateral agreements and promises of whatever nature shall be ineffective, unless these are confirmed on Pfeiffer Vacuum's part as agreed upon in writing. Minor deviations from product specifications shall be accepted as approved of. In the absence of a special agreement, a contract will only be formed upon receipt of Pfeiffer Vacuum's written order confirmation or upon the supply of the merchandise. With regard to Pfeiffer Vacuum's samples, cost estimates, plans, drawings and similar information, either of material or immaterial nature – also in electronic form –, as well as all other documents Pfeiffer Vacuum will reserve all proprietary rights and copyrights; these may only be made accessible to third parties with Pfeiffer Vacuum's prior written consent.

III. Delivery Content

Pfeiffer Vacuum's signed order confirmation forms the basis for determining the contents and all other details concerning the merchandise, and in case of a tender limited in time from Pfeiffer Vacuum and the acceptance of the tender by the purchaser within the period stipulated, this will be the tender, unless an order confirmation is available from Pfeiffer Vacuum in time. Any collateral agreements and changes must be confirmed by Pfeiffer Vacuum in writing.

IV. Prices and Payments

- Prices are either ex works or, if applicable, the consigning sales office, including loading, but excluding packaging and official value-added tax. Pfeiffer Vacuum is entitled to invoice costs incurred in packaging and reserves the right to require return of transport packaging materials free of charge, providing such packaging has been provided free of charge. Returned packaging will not be credited.
- In the absence of any special agreements, payment is to be made in cash without deductions to Pfeiffer Vacuum at its place of business. As for systems and plants, the following payment terms will be applicable:
 - 30 % prepayment after receipt of the order confirmation,
 - 40 % once the purchaser has been advised that the main parts are ready for dispatch,
 - 20 % after delivery of the goods, and the remainder within the period of one month after transfer of risk.
- The purchaser shall only be entitled to withhold payments or set them off against any counterclaims, if these counterclaims are undoubted and legally effective.
- The minimum order value amounts to Euro 100,–.
- As for goods returned Pfeiffer Vacuum will invoice for the necessary function testing and other processing costs at the rate of 10 % of the net value of the merchandise, but at least Euro 100,–.
- With the cancellation of an order we will charge a 15 % cancellation fee of the cancelled order value. A cancellation has to take place in writing and is possible within 14 days after our order acknowledgement only.

V. Delivery Time/Delayed Delivery

- The delivery time is based on the agreements reached between the contracting parties. To be able to observe the delivery time from Pfeiffer Vacuum, it has to be ensured, that all commercial and technical questions between the contracting parties are clarified, and that the purchaser has fulfilled all of his obligations, for example the presentation of the documents, approvals, releases to be procured by the purchaser, or that the prepayment agreed upon has been made. If this is not the case, the delivery time shall be appropriately extended. Insofar as the delay falls under the responsibility of Pfeiffer Vacuum, this will not apply.
- The observance of the delivery period is subject to the proviso that the raw materials and supplies are supplied to Pfeiffer Vacuum correctly.
- The delivery period is deemed observed, when the goods have left Pfeiffer Vacuum's works at the time the delivery period would normally expire, or when it is at that time reported to be ready for dispatch. As far as an acceptance test has to be made prior to delivery, then the date of the acceptance test will – except for a justified refusal to take delivery – be decisive or alternatively the notification that the merchandise is ready for the acceptance test.
- If the dispatch or the acceptance of the goods to be delivered is delayed due to reasons falling under the responsibility of the purchaser, he will be charged for the costs incurred by the delay, beginning one month after the notification that the merchandise is ready for dispatch or for the acceptance test.
- If the nonobservance of the delivery period has been caused by force majeure, strikes, lock-outs or any other events beyond the control of Pfeiffer Vacuum, the delivery period will be appropriately extended. This also applies when a sub-contractor is subjected to such events. Nor are the circumstances described above the responsibility of Pfeiffer Vacuum when they arise during an existing delay. In important cases, Pfeiffer Vacuum will inform the purchaser as soon as possible with regard to when such hindrance begins and ends.
- The purchaser shall be entitled to withdraw from the contract without notice, if the entire performance has prior to the transfer of risk finally been made impossible for us. Furthermore the purchaser shall be entitled to withdraw from the contract, if in the case of an order the execution of same has in part become impossible, and if he has a legitimate interest in rejecting the partial delivery. If this does not prove to be true, then the purchaser shall have to pay the contractual price referring to the partial delivery. The same shall apply in case of Pfeiffer Vacuum's inability to perform. Apart from this paragraph IX.2 will apply. In the event the impossibility or the inability to perform occurs during the default in accepting the delivery of merchandise, or if these circumstances fall solely or predominantly under the responsibility of the purchaser, he shall be obliged to *quid pro quo*.
- If Pfeiffer Vacuum causes a delay in delivery and the purchaser suffers damage therefrom, he shall be subject to the exclusion of further claims and entitled to claim a flat-rate compensation for delayed performance. The compensation will amount to 0.5 % of the invoice amount per full week of the delay, up to a maximum of 5 % of the value of that part of the total delivery, which due to the delay, can not be delivered in time or not be used according to the contract. Any further claims resulting from default of delivery may only be derived from paragraph IX.2. If the purchaser concedes the supplier being in default – with due regard of legal exceptions – an adequate period of time for performance and this period of time is not observed, the purchaser shall within the framework of legal provisions be entitled to withdraw from the contract.
- If the dispatch of the merchandise is delayed upon the request of the purchaser, he will be charged the costs incurred by the storage, beginning one month after the notification of readiness for dispatch, in case of storage in Pfeiffer Vacuum's factory or sales office, however, at least 0.5 % of the invoice amount for each month. Pfeiffer Vacuum shall in addition to this have the right, to otherwise dispose of the merchandise to be delivered after a lapse of an appropriate period of time and to effect the delivery to the purchaser subject to a reasonably extended period of time.

VI. Transfer of Risk and Acceptance

- The risk is transferred to the purchaser at the latest at the time of dispatch of the merchandise. This also applies to partial deliveries or where Pfeiffer Vacuum has agreed to render other performances e.g. to meet the costs of freight or the delivery and installation. The purchaser can request at his own cost Pfeiffer Vacuum to arrange insurance to cover theft, breakage, transport/fire/water damage as well as other insurable risks. As far as an acceptance test has to be made, the date scheduled for this will determine the transfer of risk. The acceptance test must be performed without delay on the fixed date, or alternatively after Pfeiffer Vacuum's notification of readiness for the acceptance test. The purchaser may not refuse acceptance in the absence of any essential fault or deficiency.
- If the dispatch or the acceptance is delayed or not initiated due to circumstances not falling under the responsibility of Pfeiffer Vacuum, the risk will be transferred to the purchaser by the day on which the readiness for dispatch or for the acceptance test has been notified. Pfeiffer Vacuum commits itself to take out the insurances requested by the purchaser at his expense.
- The purchaser is obliged to accept merchandise supplied, even when negligible imperfections are involved and without prejudice to his rights under paragraph VIII.
- Partial deliveries will be permissible, as far as the purchaser can be reasonably expected to accept these.

VII. Retention of Property Rights

- Pfeiffer Vacuum retains ownership of the merchandise until full payment has been received and up to the settlement of any outstanding receivables due to Pfeiffer Vacuum or to other companies within the Pfeiffer Vacuum Group from the purchaser or from companies within the purchaser's Group. If the purchaser is a trader or a manufacturer, he is revocably empowered to associate the merchandise delivered within proper business transactions and/or to dispose of and/or re-work the merchandise supplied in a proper commercial manner. The purchaser hereby already assigns his title to the proceeds arising from the sale or manufacture to Pfeiffer Vacuum in the proportion that Pfeiffer Vacuum's goods bear to the manufacturing costs of the whole product. As far as the assignment exceeds 120 % of the secured claim, at the written request of the purchaser, Pfeiffer Vacuum will release the surety.
- Pfeiffer Vacuum is entitled to insure the merchandise, at the cost of the purchaser, against theft, breakage, transport/fire/water damage as well as other insurable risks where the purchaser has not himself taken out such insurance.

- The purchaser is not allowed to pledge nor use the merchandise as surety. If the merchandise becomes subject to an attachment or seizure order or other actions by third parties, the purchaser is required to inform the supplier immediately.
- If the purchaser breaks the terms of this contract, in particular in the case of non-payment, Pfeiffer Vacuum is entitled, after having issued a warning, to retrieve, and the purchaser required to surrender, the merchandise. The assertion of property rights and the impounding of the merchandise on the part of Pfeiffer Vacuum does not constitute a withdrawal from the contract.
- The application for the commencement of bankruptcy proceedings shall entitle Pfeiffer Vacuum to withdraw from the contract and to demand the immediate return of the merchandise delivered.

VIII. Warranty

Subject to the exclusion of further claims, Pfeiffer Vacuum gives warranty for material defects and deficiencies in title with regard to the delivery – and with the proviso of paragraph IX. – as follows:

Material defects

- As for all such parts that prove to be deficient due to circumstances prior to the time of the transfer of risk, Pfeiffer Vacuum undertakes at its own choice either to remedy defects free of charge or to effect a new delivery. Pfeiffer Vacuum has immediately upon detection of any such defects and deficiencies to be informed in writing thereof. Article 377 of the HGB (German Commercial Code) applies accordingly. Parts returned for replacement or modification become the property of Pfeiffer Vacuum. As for major bought-in products, Pfeiffer Vacuum's liability is restricted to the assignment of those claims Pfeiffer Vacuum is entitled to assert against the supplier of the bought-in product, provided these claims are not statute-barred and are not considerably lower than those claims being asserted against Pfeiffer Vacuum.
- The purchaser will be obliged to concede to Pfeiffer Vacuum after written notification sufficient time and opportunity to remedy defects or to effect replacement deliveries deemed necessary by Pfeiffer Vacuum; otherwise Pfeiffer Vacuum will be relieved from any liability with regard to the consequences resulting thereof. The purchaser shall only in urgent cases such as in the event of endangering of the operational safety or for the defense of unproportionately high damages, and under the condition that Pfeiffer Vacuum will immediately be informed thereof, have the right to remedy defects on his own or to have them repaired by third parties, and to put forward a claim for compensation of the expenses incurred.
- Pfeiffer Vacuum will bear the direct costs of retouches and replacements arising from legitimate claims, including despatch costs (excluding express deliveries and deliveries abroad) and also the reasonable costs associated with dismantling and assembly and the provision by the purchaser of personnel which the particular case may necessitate.
- The purchaser will within the framework of legal provisions have a right to withdraw from the contract, if Pfeiffer Vacuum – with due regard to legal exceptions – lets lapse an appropriate period of time, allotted in writing, to remedy defects or to effect a replacement delivery. In case of minor deficiencies the purchaser shall only be entitled to claim a reduction of the sales price. The right to demand a reduction of the sales price will otherwise be excluded.
- No warranty will in particular be given in the following cases:
 - Unsuitable or improper use, faulty or defective assembly or commissioning by the purchaser or by third parties, natural wear, faulty or neglectful treatment, improper maintenance, unsuitable pump fluid, poor construction work, unsuitable building ground, chemical, electrochemical, radio-active or electric influences, unless they fall under the responsibility of Pfeiffer Vacuum.
- If the purchaser or a third party remedies any defect improperly, Pfeiffer Vacuum shall not be liable for the consequences resulting thereof. The same shall apply for any alterations of the merchandise initiated by the purchaser or by third parties without prior written consent of Pfeiffer Vacuum.

Deficiencies in Title

- Should any use of the merchandise lead to a violation of any domestic industrial property rights or copyrights, Pfeiffer Vacuum will make sure at its own expense, that the purchaser will principally be given the right of further use or that the merchandise will be modified in such a way, as it might reasonably be expected of the purchaser to be acceptable to him, so that the violation of industrial property rights will no longer exist. Should this be impossible in terms of commercially adequate conditions or within a reasonable period of time, the purchaser shall have the right to withdraw from the contract. Under the conditions mentioned, Pfeiffer Vacuum shall in turn also be entitled to withdraw from the contract. Furthermore Pfeiffer Vacuum will indemnify the purchaser for undoubted and legally effective claims asserted by respective owners of industrial property rights.
- Pfeiffer Vacuum's obligations stated under paragraph VIII. 7 are with the proviso of paragraph IX. 2 as for the event of a violation of protected rights or copyrights all-inclusively settled.
 - They will only be applicable, if and when
 - the purchaser undertakes to inform Pfeiffer Vacuum immediately of any asserted claims with regard to the
 - violation of any protected rights or copyrights;
 - the purchaser undertakes to support Pfeiffer Vacuum to such an extent that will be appropriate for a defense of
 - the asserted claims or that will enable Pfeiffer Vacuum to proceed with the modification measures as outlined
 - in paragraph VIII. 7;
 - all defense measures, including out-of-court settlements, are reserved to Pfeiffer Vacuum;
 - the deficiency in title is not caused by an instruction on the part of the purchaser; and
 - the violation of law has not been caused by the fact, that the purchaser has independently modified the
 - merchandise or used it in a way not complying with the contract.

IX. Liability

- If the merchandise can not be used by the purchaser according to the intents of the contract, and this is due to Pfeiffer Vacuum's fault as a result of a neglected or faulty performance in connection with proposals and consultations prior to or after the conclusion of the contract or due to the violation of any other contractual collateral obligations – in particular with regard to instructions for the operation and maintenance of the merchandise –, the regulations under paragraphs VIII. and IX. 2 will apply accordingly to the exclusion of any further claims of the purchaser.
- As for damages not incurred at the merchandise itself as such Pfeiffer Vacuum will – for whatever legal reasons – only be liable
 - in case of intent;
 - in case of gross negligence on part of the owner or managerial employees;
 - in case of culpable personal injury to human life, body and health;
 - in case of deficiencies, where Pfeiffer Vacuum may be blamed of malicious silence, or where the absence of
 - deficiencies has been guaranteed;
 - in case of defects of the merchandise, as far as the manufacturer will in accordance with the product liability
 - law be liable for personal injury or for damages to property incurred in connection with privately used objects.In case of a culpable violation of major contractual obligations Pfeiffer Vacuum will also be liable in case of gross negligence on part of non-managerial employees as well as in case of minor negligence, in the latter case limited to the reasonably foreseeable, typical damage under the contract.
Any further claims for compensation shall be excluded.

X. Statutory limitation

Any claims of the purchaser – pertaining to whatever legal reasons – will be statute-barred within a period of 12 months. When it comes to intentional or fraudulent conduct as well as to claims resulting from the product liability law, the statutory time limits will be applicable. They will also be applicable in case of defects and deficiencies of a structure or of the merchandise, that has according to its customary manner of usage been employed and used for the construction of a structure, and has caused the structure's defectiveness.

XI. Use of Software

As far as the delivery comprises any software, the purchaser will be conceded the right to use the software delivered, including the documentation pertaining thereto. It is provided for utilisation with the respective designated merchandise. The usage of the software on more than one system is prohibited. The purchaser is only entitled to copy, re-work, translate or convert from the object code to the source code within the legally permissible scope (Articles 69a ff. of the Copyright Law (UrhG)). The purchaser commits himself not to eliminate or change the manufacturer's information or Pfeiffer Vacuum's information – especially copyright information – without Pfeiffer Vacuum's explicit prior approval. All other rights relating to the software and the documentation, including the copies thereof, shall remain with Pfeiffer Vacuum or with the software supplier. The issuance of sub-licenses is not permissible.

XII. Applicable Law/Place of Jurisdiction

- All legal relations between Pfeiffer Vacuum and the purchaser are subject to the substantive laws of the Federal Republic of Germany. This applies also for foreign business transactions. The application of the UN purchase right will be excluded.
- The place of jurisdiction is the court competent for Pfeiffer Vacuum's company seat. Pfeiffer Vacuum shall, however, be entitled to file a suit at the purchaser's head office.

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Note

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Pfeiffer Vacuum GmbH, January 2005

Address

Pfeiffer Vacuum GmbH
Headquarters/Germany
Berliner Straße 43
D-35614 Asslar
Tel. +49-(0) 6441-802-0
Fax +49-(0) 6441-802-202

info@pfeiffer-vacuum.de
www.pfeiffer-vacuum.net





