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œrlikon
leybold vacuum

Vacuum Fittings

ISO-KF
ISO-K
ISO-F
CF

Feedthroughs

177.01.02
Excerpt from the Oerlikon Leybold Vacuum Full Line Catalog
Product Section C13
Edition 2010

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General

Introduction

According to DIN 28 400, the term “Ultra-high Vacuum (UHV)” designates the pressure range below 10^{-7} mbar.

Several physical quantities, such as mean free path, monolayer time, flow density of the particles impinging on the walls, leak rate and the degassing rate are of significance in the characterization of this pressure range. For the definitions of these quantities refer to technical publications on this subject.

In order to attain or maintain pressures below 10^{-7} mbar, the following preconditions must be met:

- The vapor pressure of the pump fluid or lubricant should be in accordance with the desired ultimate pressure
- the leak and degassing rates of the entire apparatus including its installations must be extremely low.

Generally, both leak rate and backstreaming effects through the pump can be kept at sufficiently low levels by using suitable UHV sealing materials and pumps.

However, a sufficiently low outgassing rate can only be achieved by baking out the entire apparatus at temperatures of about 300 °C (572 °F) for a longer period of time. It is only under these conditions that the mono-layers of atoms or molecules, which attach quite firmly to the surfaces of the vacuum apparatus including its installations, are desorbed. Consequently, components for UHV systems are generally made of stainless steel. Metal gaskets, ceramic feedthroughs and bakeable observation windows are used exclusively.

For applications in the extreme UHV range (XHV) the outgassing rate of the CF flanges and the UHV components can be reduced by about two orders of magnitude by a special degassing process.

The high standard of development and manufacture combined with the use of high quality materials guarantee that UHV components from Oerlikon Leybold Vacuum are able to meet even the most demanding requirements.

Advantages to the User

- Stabilized Oerlikon Leybold Vacuum knife-edge
- High reliability
- Special knife edge profiles ensure the highest degree of leak tightness
- Flange connection can be baked out up to 450 °C (842 °F)
- Easy to assemble, helium-tight
- Symmetrical flange connection
- Equal sealing profiles
- Small outside diameter with respect to the nominal width
- Can be joined by welding or brazing using any desired process, also with other nickel chromium steel grades
- For use either with a flat gasket made of OFHC copper (oxygen-free) or FPM (FKM) O-ring
- Self-centering
- Fixed and rotary flanges in almost any size

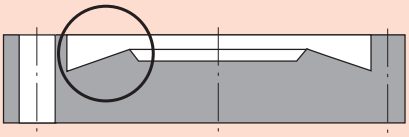
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These Arguments Prove Oerlikon Leybold Vacuum's QUALITY

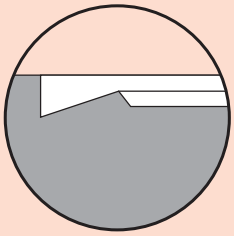
- Availability of all components at short notice
- World-wide advice at any time to answer your questions relating to vacuum systems
- Utilization of most advanced manufacturing methods
- Environment-friendly cleaning baths with complete waste disposal and recycling facilities
- Environment-friendly and secure packaging
- Total Quality Management methods during all processing stages
- Controlled material quality
- Compatible to your existing flanges of the same system
- Highly leak-tight down to leak rates of 1 x 10^{-9} mbar x l x s^{-1}; all components are subjected to a helium leak test
- Low outgassing rates of the materials through
  - choice of the right material quality, especially for vacuum apparatus
  - excellent cleaning methods
- Documentation available for all components

- The well-proven Oerlikon Leybold Vacuum geometry for the cutting edges

The stabilized Oerlikon Leybold Vacuum profile for the cutting edges



Diagrammatic view

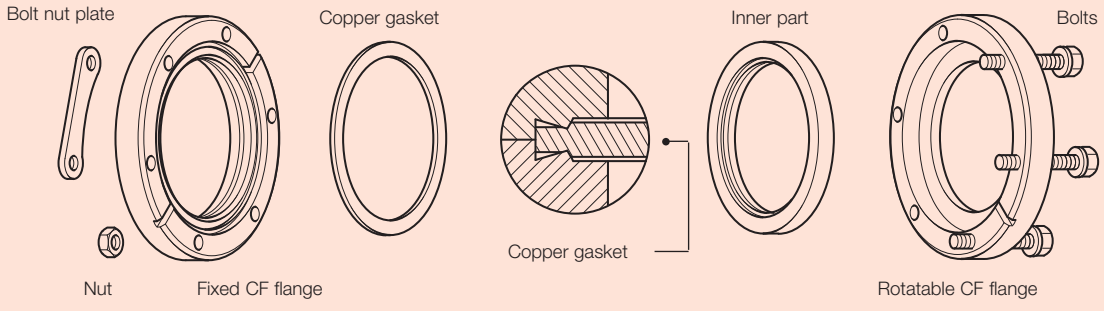


Partial view

- **Forged steel materials** of **high tensile strength and density**
- Material quality for standard applications DIN **1.4301 corresponds to AISI 304**
- Tightly checked, **close dimensional tolerances** for the entire sealing geometry
- **Low degassing rates** of the tube material used

Advantages

Reliable sealing of UHV connections over hundreds of heating cycles



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General

Vacuum systems (i.e. systems for pressures ranging from 2.5 bar to 10^{-9} mbar (1.9×10^{-3} Torr to 0.75×10^{-9} Torr)) are quickly and easily assembled owing to the modular construction principle which is based on interchangeable standard components by means of vacuum-tight, demountable flange connections. Individual components may be exchanged easily at any time. Depending on the intended use and size of the connection, flanges of different types have been developed. The KF flange connection was developed by Oerlikon Leybold Vacuum many years ago and has been widely accepted by all users of vacuum equipment. This product section lists all flange connections and fittings including adaptors for ultra-high vacuum components.

Components marked with [< 1000 mbar (< 750 Torr)] are not allowed for use at pressures exceeding 1000 mbar abs.

The components and flange connections are intended for use in connection with vacuum systems. They have not been designed to support mechanical loads. All loads must be supported separately at the connection components.

Flange Designations

The designations used by Oerlikon Leybold Vacuum for clamp flanges, fixed flanges (bolted) and collar flanges with retaining rings correspond both to the international standards [1)] and to the usual nomenclature in vacuum technology.

1) The nominal width DN corresponds only approximately to the inner diameter, i.e. is not necessarily identical to the inner diameter. Differences in the actual inner diameter are quite normal in practice and do not contravene standards.

Materials

Stainless Steel

German Material No.	AISI/ SAE	DIN Designation
1.4301	304	X5 CrNi 18 10
1.4305	303	X10 CrNi S 18 9
1.4306	304 L	X2 CrNi 19 11
1.4310	301	X12 CrNi 17 7
1.4401	316	X5 CrNiMo 17 12 2
1.4404	316 L	X2 CrNiMo 17 12 2
1.4435	316 L	X2 CrNiMo 18 14 3
1.4541	321	X10 CrNiTi 18 9
1.4571	316 Ti	X6 CrNiMoTi 17 12 2
1.4552	–	X5 CrNiNb 18 9

Aluminum

German Material No.	AISI	DIN Designation
3.0255.10	AA 1050 1-0	Al 99.5 w
3.0615.71	AA 6012-T6	AlMgSiPb
3.1655.53	AA 2011-T352	AlCuBiPb
3.2162.05	380.0 (AA)	GD-AlSi8Cu3
3.2315.08	6082-F (AA)	AlMgSi1
3.2315.71	6082-T6	AlMgSi1
3.2315.72	6063 (AA)	AlMgSi1
3.2381.02	520.0 (AA)	GK AlSi 10 Mg
3.2381.62	520.0 (AA)	GK AlSi 10 Mgwa
3.2582.05	160 X	GD-AlSi 12

Steel

German Material No.	AISI	DIN Designation
1.0037	–	St 37-2
1.0308.07	–	St 35
1.1141	–	CK 15
1.1181	–	CK 35

Gaskets

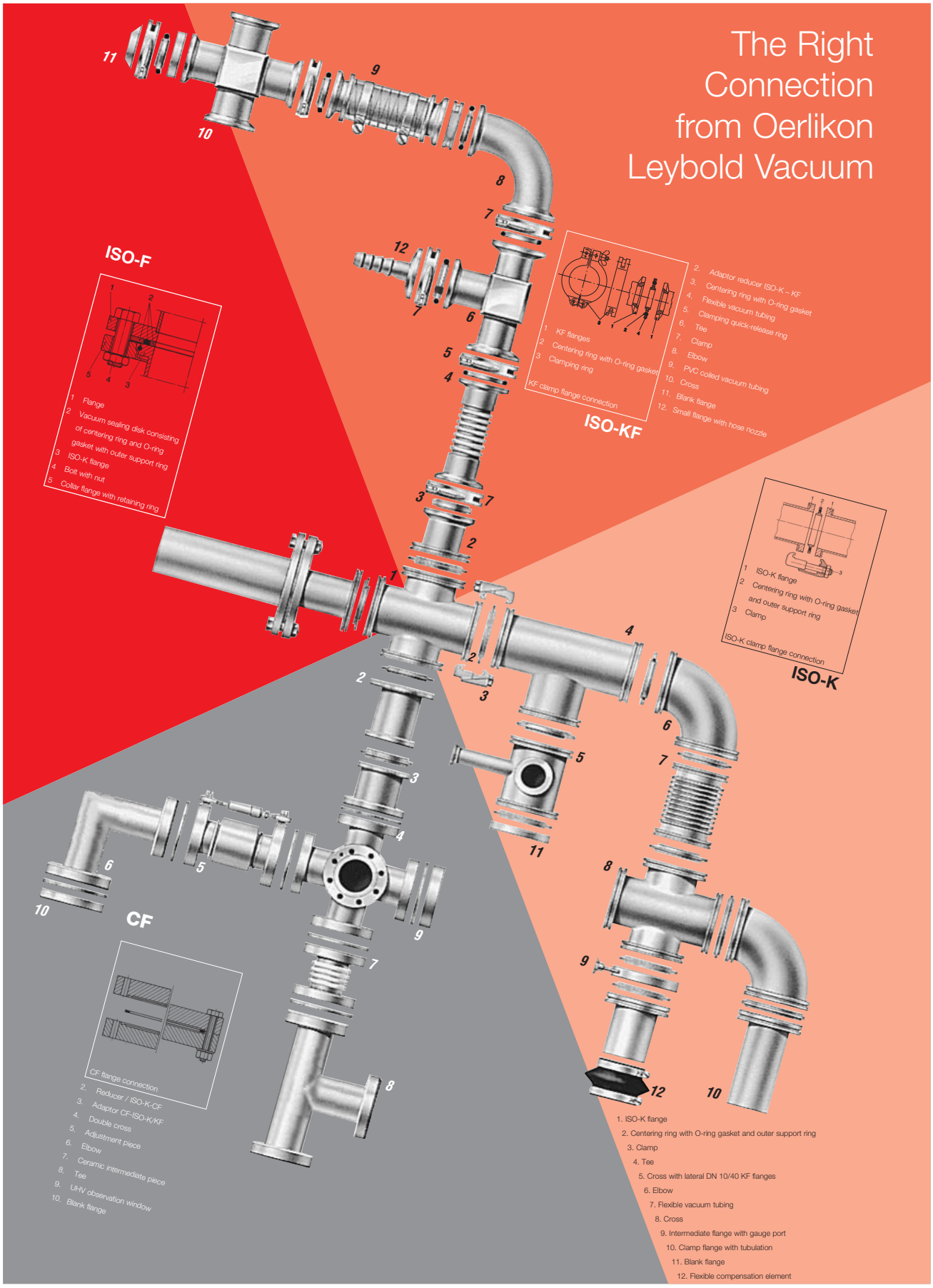
Code Designation	Chemical Designation	Typical Trade Name
CR	Chloroprene-caoutchouc	Neoprene
FPM (FKM)	Fluor-caoutchouc	Viton®
NBR	Acrylonitrile-butadienrubber	Perbunan®
PTFE	Polytetrafluor-ethylene	Teflon®
EPDM	Ethylene propy-lene dien rubber	–

Hoses and Tubes

Code Designation	Chemical Designation	Typical Trade Name
NR	Natural rubber	–
PVC	Polyvinylchloride	–

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The Right Connection from Oerlikon Leybold Vacuum

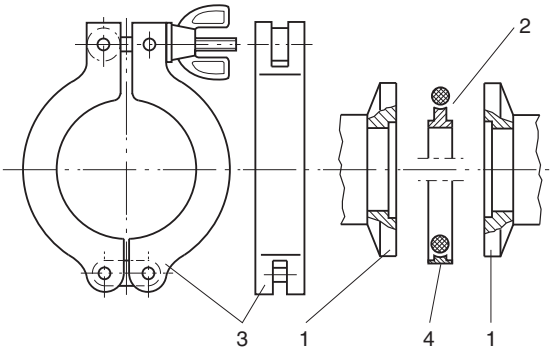


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Flange Connections

ISO-KF Connection

The ISO-KF connection (to DIN 28 403 and ISO 2861) permits rapid fitting and replacement of components in vacuum systems. It consists of two symmetrical KF flanges **(1)**, a centering ring with O-ring gasket **(2)** and a clamping ring **(3)**. High vacuum tight KF connections can be made without the use of tools simply by turning the wing nut of the clamping ring.



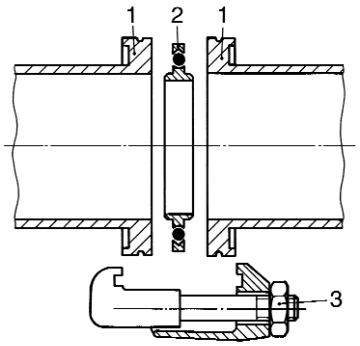
1 Small flange
2 Centering ring with O-ring
3 Clamping ring
4 Outer centering ring with O-ring

ISO-KF flange connection

ISO-K Clamp Flange Connection

The clamp flange connection (to DIN 28 404 and ISO 1609) allows components from DN 63 to DN 630 to be connected in any position regardless of the bolt hole arrangement on any fixed flanges.

It consists of two clamp flange components **(1)**, a centering ring **(2)** with an outer ring enclosing the O-ring gasket, and several clamps **(3)** which the connection is assembled and tightened with. Since the centering ring can be firmly inserted into the centering groove of the flange, even horizontal connections are quickly and easily fitted.

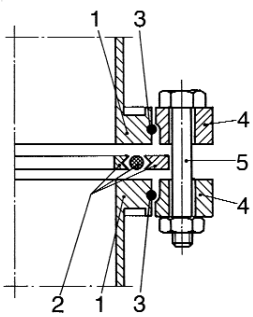


1 Clamp flange
2 Centering ring and O-ring with outer supporting ring
3 Clamp

ISO-K clamp flange connection

ISO-F / DIN Fixed Bolted Flange Fittings

With the appropriate collar flanges, the clamp flange can be connected to various fixed bolted flange systems (ISO-F, DN 2501, etc.) see figures in section “ISO-F and DIN 2501 Fixed Flange Fittings”.



1 ISO-K flanges
2 Vacuum sealing disk consisting of centering ring and O-ring with outer support ring
3 Retaining rings
4 ISO-F collar flanges
5 Bolt with nut

Clamped flange connection with collar flanges

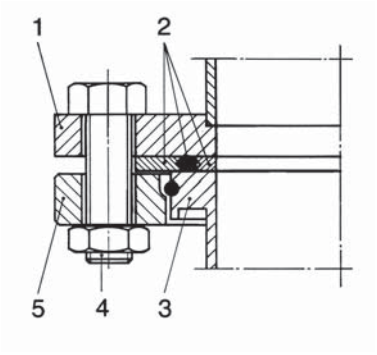
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Bake Out Temperatures for the Gaskets

CR and FPM (FKM) gaskets can be inserted in all listed flange types, while aluminum gaskets may be used for higher vacuum requirements.

CR gaskets can be used in the temperature range from -40 °C to +100 °C [-40 °F to +212 °F] (max. bakeout temperature), FPM (FKM) gaskets from -15 °C to +150 °C [+5 °F to +302 °F] (max. bakeout temperature). Aluminum gaskets from -196 °C to +200 °C [-321 °F to +392 °F] (max. bakeout temperature gradient; △T max. 2.5 °/min).

1 Flange to DIN 2501 ND6
2 Sealing disk consisting of centering ring and O-ring with outer support ring
3 ISO-K flange
4 Bolt with nut
5 Collar flange with retaining ring to DIN 2501 ND6



Connection between a DIN 2501 ND 6 flange and an ISO-K flange with DIN 2501 collar flange

Products

ISO-KF Flange Fittings and Components

DN 16 ISO-KF to DN ISO-50 KF Aluminum Design (to DIN 28 403) [Tubes similar DIN 28 403]

The small flange connection developed by Oerlikon Leybold Vacuum has become the basis of the international standard for vacuum technology.

Advantages to the User

- Quick, safe and reliable
- No tools are need to provide a vacuum-tight seal
- Suitable down to pressures of 10^{-7} mbar (0.75 x 10^{-7} Torr)
- Easy to disassemble and clean
- In the case of special requirements as to degassing for the purpose of reducing the outgassing rate and in case of special requirements as to corrosion resistance, we recommend the use of stainless steel components.

Quick Clamping Ring

Advantages to the User

- Quick and effective fitting and disassembly
- Can be fitted with one hand
- Closing action via lever with clamping spring
- Corrosion resistant

DN 16 ISO-KF to DN ISO-50 KF Stainless Steel Design (to DIN 28 403) [Tubes similar DIN 28 403]

Advantages to the User

- Quick, safe and reliable
- Can be baked out up to 200 °C (392 °F) when using metal seals
- Can be degassed up to 150 °C (302 °F) with FPM (FKM) gaskets
- With metal seals suitable for pressures down to 10^{-9} mbar (0.75 x 10^{-9} Torr)
- Corrosion resistant
- Low degassing rate
- For standard applications involving pressures up to 2.5 bar (1.9 x 10^{3} Torr) abs. even with outside ring resp. ultra sealing ring and 3-part clamping ring 5 bar
- Can be degassed up to 200 °C (392 °F) with UHV aluminum rings or disks

Flexible Compensation Elements

Vacuum systems and pump systems often require components which are capable of protecting sensitive instruments against impacts or excessive vibrations while linking tubes at the same time.

Advantages to the User

- Easy and quick to install
- Safe and reliable
- Tubes may be turned in any direction
- No centering and sealing ring required
- Capable of withstanding temperatures up to 80 °C (176 °F)
- Suitable for pressures down to 10^{-5} mbar (0.75 x 10^{-5} Torr)

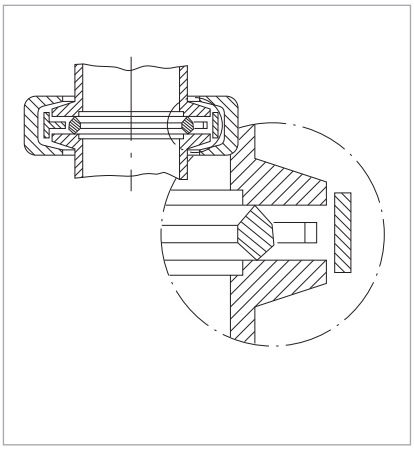
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Fitting a centering ring to a KF component



Quick clamping ring



Small flange connection with ultra sealing ring



Fitting an elbow



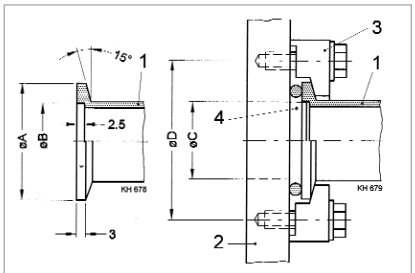
Clamping ring for ultra sealing disk



Small flange connection with clamping ring



Small flange components made of stainless steel



1 Small flange port
2 Housing wall with threaded tap
3 Claw
4 Centering ring

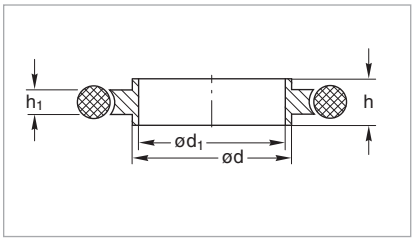
Small flange connection

Technical Data

Nominal diameter		A	B	C	D	Number of claws
DN 10 ISO-KF	mm	30.0	12.2	12.2	45.0	4
	in.	1.18	0.48	0.48	1.77	
DN 16 ISO-KF	mm	30.0	17.2	17.2	45.0	4
	in.	1.18	0.68	0.68	1.77	
DN 25 ISO-KF	mm	40.0	26.2	26.2	55.0	4
	in.	1.57	1.03	1.03	2.17	
DN 40 ISO-KF	mm	55.0	41.2	41.2	71.0	4
	in.	2.17	1.62	1.62	2.80	
DN 50 ISO-KF	mm	75.0	52.4	52.4	91.0	4
	in.	2.95	2.06	2.06	3.58	

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Centering Rings (Aluminum 3.1655.53/Stainless Steel 1.4305) with O-Ring (CR / FPM (FKM))



Dimensional drawing for the centering rings with O-ring

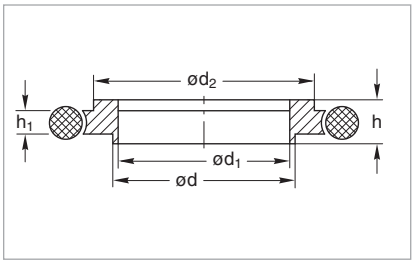
Technical Data

DN	ISO-KF	10	16	20	25	32	40	50
d	mm	12	17	22	26	34	41	52
	in.	0.47	0.67	0.87	1.02	1.34	1.61	2.05
d_1	mm	10	16	20	25	32	40	50
	in.	0.40	0.63	0.79	0.98	1.26	1.57	1.97
h	mm	8	8	8	8	8	8	8
	in.	0.31	0.31	0.31	0.31	0.31	0.31	0.31
h_1	mm	3.9	3.9	3.9	3.9	3.9	3.9	3.9
	in.	0.15	0.15	0.15	0.15	0.15	0.15	0.15

Ordering Information

Aluminum/CR	Part No.	**183 21**	**183 26**	**183 22**	**183 27**	**183 23**	**183 28**	**183 25**
Aluminum/FPM (FKM)	Part No.	**182 01**	**182 06**	**182 02**	**182 07**	**182 03**	**182 08**	**182 05**
Stainless steel/FPM (FKM)	Part No.	**883 21**	**883 46**	**883 22**	**883 47**	**883 23**	**883 48**	**883 25**

Centering Ring Adaptors (Aluminum 3.1655.53/Stainless Steel 1.4301) with O-ring (NBR / FPM (FKM))



Dimensional drawing for the centering ring adaptors with O-ring

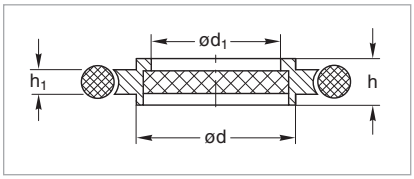
Technical Data

DN	ISO-KF	10/16	20/25	32/40
d	mm	12	22	34
	in.	0.47	0.87	1.34
d_1	mm	10	20	32
	in.	0.40	0.79	1.26
d_2	mm	17	26	41
	in.	0.67	1.02	1.61
h	mm	8	8	8
	in.	0.31	0.31	0.31
h_1	mm	3.9	3.9	3.9
	in.	0.15	0.15	0.15

Ordering information

Aluminum/FPM (FKM)	Part No.	**182 56**	**182 57**	**182 58**
Aluminum/NBR	Part No.	**183 56**	**183 57**	**183 58**
Stainless steel/ FPM (FKM)	Part No.	**883 56**	**883 57**	**883 58**

Centering Rings (Stainless Steel) with Sintered Metal Filter (Stainless Steel 1.4404 and O-Ring (FPM (FKM))



Dimensional drawing for the centering rings with sintered metal filter and O-ring

Technical Data

DN	ISO-KF	10	16	25	40	50
d	mm	12	17	26	41	52
	in.	0.47	0.67	1.02	1.61	2.05
d_1	mm	8	14	23	38	48
	in.	0.31	0.55	0.91	1.50	1.89
h	mm	8	8	8	8	8
	in.	0.31	0.31	0.31	0.31	0.31
h_1	mm	3.9	3.9	3.9	3.9	3.9
	in.	0.15	0.15	0.15	0.15	0.15

Ordering information

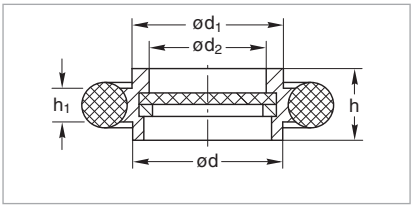
Stainless steel	Part No.	**883 50**	**883 51**	**883 52**	**883 53**	**883 54**

Air throughput at 20 °C (68 °F) and 200 mbar differential pressure approx. 1 $m^3 \times h^{-1} \times cm^2$; pore size: 20 µm

Important: In the table of Section "General" the German designation for the type of steel is also stated in accordance with AISI.

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Centering Rings with Fine Filter (Stainless Steel 1.4305), O-Ring (FPM (FKM))



Dimensional drawing for the centering rings with fine filter

Technical Data

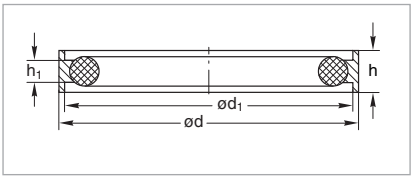
DN	ISO-KF	10	16	25	40	50
d	mm	12	17	26	41	52
	in.	0.47	0.67	1.02	1.61	2.05
d_1	mm	12	17	26	41	52
	in.	0.47	0.67	1.02	1.61	2.05
d_2	mm	9	13.5	22	35.5	46
	in.	0.35	0.53	0.87	1.4	1.81
h	mm	8	8	8	8	8
	in.	0.31	0.31	0.31	0.31	0.31
h_1	mm	3.9	3.9	3.9	3.9	3.9
	in.	0.15	0.15	0.15	0.15	0.15

Ordering information

Stainless steel	Part No.	**883 95**	**883 96**	**883 97**	**883 98**	**883 99**

Filter material: Stainless steel mesh 1.4404, size of pore: 4 µm, separation grade: 1 µm particles to 98% (Filter material not available seperately)

Outer Centering Rings (Aluminum 3.1655.53) with O-Ring (CR / FPM (FKM))



Dimensional drawing for the outer centering rings with O-ring

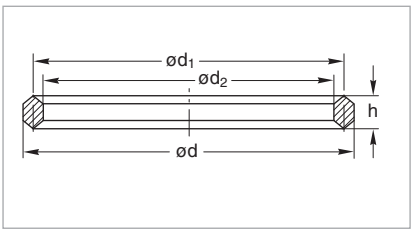
Technical Data

DN	ISO-KF	10/16	20/25	32/40	50
d	mm	32	42	57	77
	in.	1.26	1.65	2.24	3.03
d_1	mm	30.2	40.2	55.2	75.2
	in.	1.19	1.58	2.17	2.96
h	mm	7	7	7	7
	in.	0.28	0.28	0.28	0.28
h_1	mm	3.9	3.9	3.9	3.9
	in.	0.15	0.15	0.15	0.15

Ordering information

Aluminum/CR	Part No.	**183 50**	**183 51**	**183 52**	**183 59**
Aluminum/ FPM (FKM)	Part No.	**183 53**	**183 54**	**183 55**	**183 60**

Ultra Sealing Rings (Aluminum 3.2315.71)



Dimensional drawing for the ultra sealing rings

Technical Data

DN	ISO-KF	10/16	20/25	32/40	50
d	mm	25.6	35.6	50.6	65.6
	in.	1.01	1.40	1.99	2.58
d_1	mm	22.6	32.6	47.6	62.6
	in.	0.89	1.38	1.87	2.46
d_2	mm	19.6	29.6	44.6	59.6
	in.	0.77	1.17	1.76	2.35
h	mm	4.5	4.5	4.5	4.5
	in.	0.18	0.18	0.18	0.18

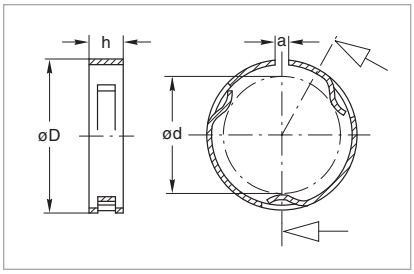
Ordering Information

Aluminum (set of 3 pieces)	Part No.	**883 73**	**883 75**	**883 77**	**883 79**

Important: In the table of Section “General” the German designation for the type of steel is also stated in accordance with AISI.

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Outer Support Rings (Stainless Steel 1.4310) for Ultra Sealing Rings



Dimensional drawing for the outer support rings

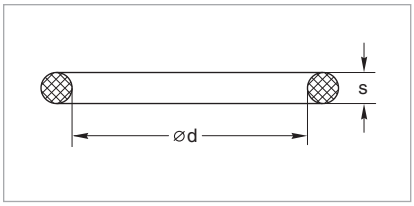
Technical Data

DN	ISO-KF	10/16	20/25	32/40	50
a	mm	32	42	57	77
	in.	0.12	0.12	0.12	0.12
D	mm	32	42	57	77
	in.	1.26	1.65	2.24	3.03
d	mm	25	35	50	65
	in.	0.98	1.38	1.97	2.56
h	mm	7	7	7	7
	in.	0.28	0.28	0.28	0.28

Ordering Information

Stainless steel	Part No.	**883 74**	**883 76**	**883 78**	**883 69**

Spare O-Ring Gaskets for KF Flange Connections



Dimensional drawing for the spare O-ring gaskets for KF flange connections

Technical Data

DN	ISO-KF	10	16 [1]	20	25 [1]	32	40 [1]	50
d	mm	15	18	25	28	40	42	55
	in.	0.59	0.71	0.98	1.10	1.57	1.65	2.17
s	mm	5	5	5	5	5	5	5
	in.	0.20	0.20	0.20	0.20	0.20	0.20	0.20

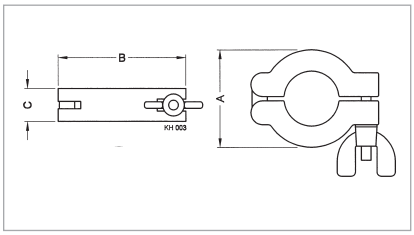
Ordering Information

FPM (FKM) (set of 10 pieces)

Part No.	**ES210600**	**ES210605**	**ES210610**	**ES210615**	**ES210620**	**ES210625**	**ES210630**

[1] Also for adaptor/centering rings

Clamping Rings (Aluminum 3.2582.05)



Dimensional drawing for the clamping rings

Technical Data

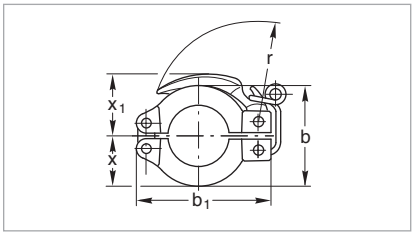
DN	ISO-KF	10/16	20/25	32/40	50
A	mm	45	55	70	95
	in.	1.77	2.17	2.76	3.74
B	mm	72	90	123	
	in.	2.40	2.83	3.54	4.84
C	mm	16	16	18	25
	in.	0.63	0.63	0.71	0.98

Ordering Information

Aluminum	Part No.	**183 41**	**183 42**	**183 43**	**183 45**
Individualy packed for USA	Part No.	**210 041**	**210 042**	**210 043**	**210 045**

Max. torque at the wing nut: 2 Nm

Quick Clamping Rings (Aluminum 3.2582.05)



Dimensional drawing for the quick clamping rings

Technical Data

DN	ISO-KF	10/16	20/25	32/40
b	mm	45	55	70
	in.	1.77	2.17	2.76
b_1	mm	61	72	90
	in.	2.40	2.83	3.54
r	mm	48	56	74
	in.	1.89	2.20	2.91
x	mm	22	27	35
	in.	0.87	1.06	1.38
x_1	mm	30	34	44
	in.	1.18	1.34	1.73

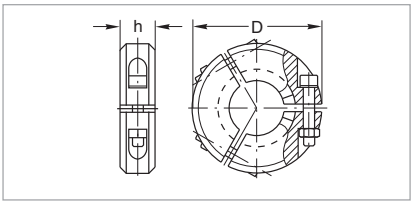
Ordering Information

Aluminum	Part No.	**183 46**	**183 47**	**183 48**

Important: In the table of Section "General" the German designation for the type of steel is also stated in accordance with AISI.

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Clamping Collars (Aluminum 3.2162.05) for Ultra Sealing Rings



Dimensional drawing for the clamping collars for ultra sealing rings

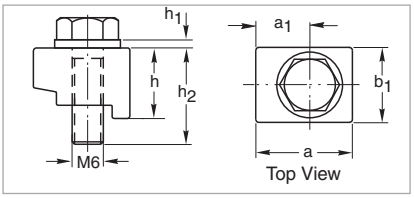
Technical Data

DN	ISO-KF	10/16	20/25	32/40	50
D	mm	52	75	90	115
	in.	2.05	2.95	3.54	4.52
h	mm	18	20	23	28
	in.	0.71	0.79	0.90	1.10
Hexagon socket screw to DIN 912	mm	M 4 x 30	M 6 x 30	M 8 x 35	M 8 x 50
	in.	M 4 x 1.18	M 6 x 1.18	M 8 x 1.38	M 8 x 1.97

Ordering Information

Aluminum	Part No.	**882 75**	**882 77**	**882 78**	**882 79**

Claw, complete (Aluminum 3.2315.08)



Dimensional drawing for the claw, complete

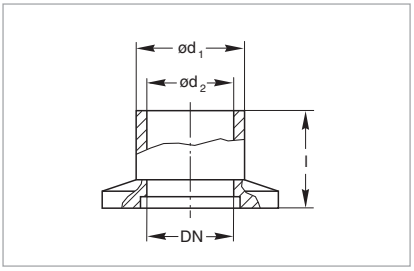
Technical Data

DN	ISO-KF	10 - 50
a	mm	19.5
	in.	0.77
a_1	mm	11.5
	in.	0.45
b_1	mm	14.0
	in.	0.55
h	mm	12.5
	in.	0.49
h_1	mm	1.6
	in.	0.06
h_2	mm	20.0
	in.	0.79

Ordering Information

Aluminum (Set of 4 pieces)	Part No.	**885 00**

KF Flanges with Short Tubulation (Steel 1.0037 / Stainless Steel 1.4301)



Dimensional drawing for the KF flanges with short tubulation

Technical Data

DN	ISO-KF	10	16	25	40	50
d_1	mm	16	20	30	45	55
	in.	0.63	0.79	1.18	1.77	2.17
d_2	mm	12	16	26	41	51
	in.	0.47	0.63	1.02	1.61	2.01
l	mm	20	20	20	20	20
	in.	0.79	0.79	0.79	0.79	0.79

Ordering Information

Steel	Part No.	**182 31**	**182 32**	**182 33**	**182 34**	**182 35**

Technical Data

DN	ISO-KF	10	16	25	40	50
d_1	mm	16	20	30	45	54
	in.	0.63	0.79	1.18	1.77	2.13
d_2	mm	12	16	26	41	50
	in.	0.47	0.63	1.02	1.61	1.97
l	mm	20	20	20	20	20
	in.	0.79	0.79	0.79	0.79	0.79

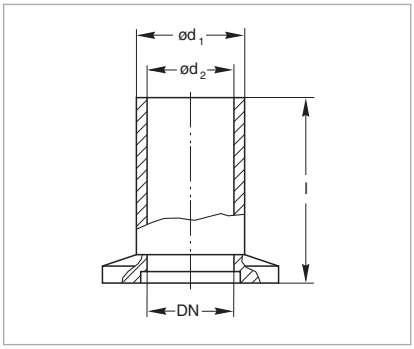
Ordering Information

Stainless steel	Part No.	**866 31**	**866 32**	**866 33**	**866 34**	**866 35**

Important: In the table of Section “General” the German designation for the type of steel is also stated in accordance with AISI.

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KF Flanges with Long Tubulation (Steel 1.0037 / Stainless Steel 1.4301)



Dimensional drawing for the KF flanges with long tubulation

Technical Data

DN	ISO-KF	10	16	25	40	50
d_1	mm	16	20	30	45	55
	in.	0.63	0.79	1.18	1.77	2.17
d_2	mm	12	16	26	41	51
	in.	0.47	0.63	1.02	1.61	2.01
l	mm	70	70	70	70	70
	in.	2.76	2.76	2.76	2.76	2.76

Ordering Information

Steel	Part No.	**182 81**	**182 82**	**182 83**	**182 84**	**182 85**

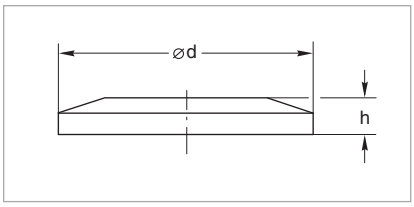
Technical Data

DN	ISO-KF	10	16	25	40	50
d_1	mm	16	20	30	45	54
	in.	0.63	0.79	1.18	1.77	2.13
d_2	mm	12	16	26	41	50
	in.	0.47	0.63	1.02	1.61	1.97
l	mm	70	70	70	70	70
	in.	2.76	2.76	2.76	2.76	2.76

Ordering Information

Stainless steel	Part No.	**866 81**	**866 82**	**866 83**	**866 84**	**866 85**

Blank Flanges (Aluminum 3.2315.71 / Stainless Steel 1.4301)



Dimensional drawing for the blank flanges

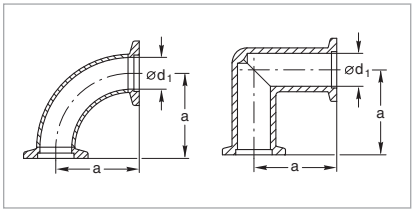
Technical Data

DN	ISO-KF	10	16	25	40	50
d	mm	30	30	40	55	75
	in.	1.18	1.18	1.57	2.17	2.95
h	mm	5	5	5	5	6
	in.	0.20	0.20	0.20	0.20	0.24

Ordering Information

Aluminum	Part No.	**184 41**	**184 46**	**184 47**	**184 48**	**184 45**
Stainless steel	Part No.	**884 41**	**884 36**	**884 37**	**884 38**	**884 45**

Pipe Bend 90° (Stainless Steel 1.4301) / Mitred Elbow 90° (Aluminum 3.2315.08)



Dimensional drawings for the elbows 90° (stainless steel, left) and the mitred elbows 90° (aluminum, right)

Technical Data

DN	ISO-KF	16		25		40		50
a	mm	40		50		65		70
	in.	1.57		1.97		2.56		2.76
d_1	mm	16	15	25		39	40.5	49
	in.	0.63	0.59	0.98		1.34	1.59	1.93
Conductance	l/s	6.5	–	18.9	–	56.5	–	–

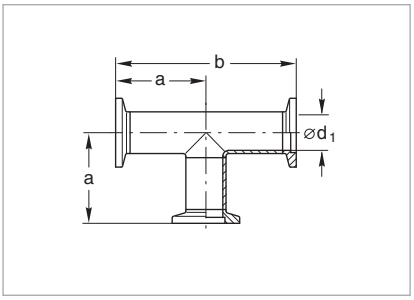
Ordering Information

Aluminum	Part No.	**184 36**	**–**	**184 37**	**–**	**184 38**	**–**	**–**
Stainless steel	Part No.	**–**	**884 61**	**–**	**884 62**	**–**	**884 64**	**884 65**

Important: In the table of Section “General” the German designation for the type of steel is also stated in accordance with AISI.

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Tees (Aluminum 3.2315.08 / Stainless steel 1.4301)



Dimensional drawing for the tees

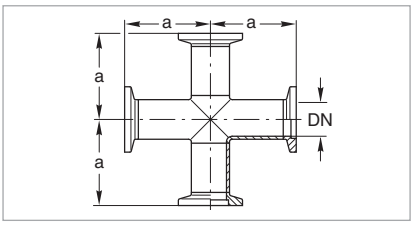
Technical Data

DN	ISO-KF	16	25	40	50
a	mm	40	50	65	70
	in.	1.57	1.97	2.56	2.76
b	mm	80	100	130	140
	in.	3.15	3.94	5.12	5.51
d_1 (Aluminum)	mm	16	25	39	–
	in.	0.63	0.98	1.54	–
d_1 (Stainless steel)	mm	16	25	40.5	53
	in.	0.63	0.98	1.59	2.09
Conductance	l/s	6.5 –	18.9 –	56.5 –	–

Ordering Information

Aluminum	Part No.	**184 06**	–	**184 07**	–	**184 08**	–	–
Stainless steel	Part No.	–	**884 71**	–	**884 72**	–	**884 74**	**884 75**

4-Way Crosses (Aluminum 3.2315.08 / Stainless 1.4301)



Dimensional drawing for the 4-way crosses

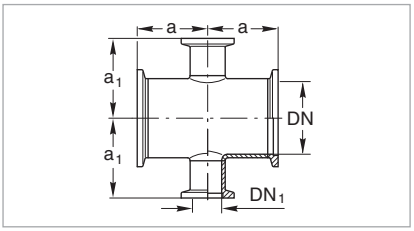
Technical Data

DN	ISO-KF	16	25	40	50
a	mm	40	50	65	70
	in.	1.57	1.97	2.56	2.67
Conductance	l/s	6.5 –	18.9 –	56.5 –	–

Ordering Information

Aluminum	Part No.	**184 71**	–	**184 74**	–	**184 75**	–	–
Stainless steel	Part No.	–	**884 85**	–	**884 86**	–	**884 87**	**884 88**

4-Way Reducer Crosses with DN 16 Flanges (Aluminum 3.2315.08 / Stainless steel 1.4301)



Dimensional drawing for the 4-way reducer crosses with lateral DN 16 flanges

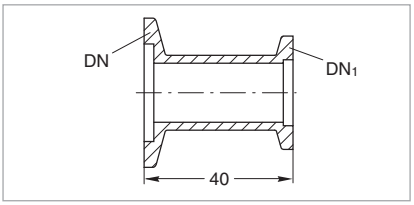
Technical Data

DN/DN_1	ISO-KF	25/16	40/16	50/16
a	mm	35	40	50
	in.	1.38	1.57	1.97
a_1	mm	35	45	50
	in.	1.38	1.77	1.97

Ordering Information

Aluminum	Part No.	**184 57**	**184 58**	–
Stainless steel	Part No.	**884 96**	**884 97**	**884 98**

Reducers (Aluminum 3.2315.72 / Stainless Steel 1.4305)



Dimensional drawing for the reducers

Technical Data

DN/DN_1	ISO-KF	25/16	40/16	40/25	50/40
l	mm	40	40	40	40
	in.	1.57	1.57	1.57	1.57

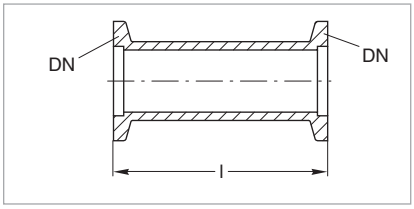
Ordering Information

Aluminum	Part No.	**183 86**	**183 89**	**183 87**	**183 88**
Stainless steel	Part No.	**885 04**	**885 07**	**885 05**	**885 06**

Important: In the table of Section “General” the German designation for the type of steel is also stated in accordance with AISI.

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Intermediate Pieces (Aluminum 3.2315.72 / Stainless Steel 1.4301)



Dimensional drawing for the intermediate pieces

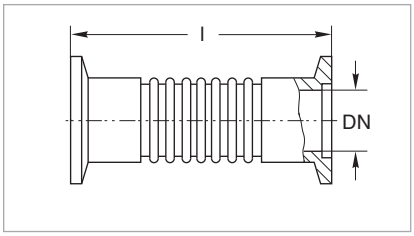
Technical Data

DN	ISO-KF	16	25	40
l	mm	80	100	130
	in.	3.15	3.94	5.12

Ordering Information

Aluminum	Part No.	**184 80**	**184 81**	**184 82**
Stainless steel	Part No.	**884 17**	**884 18**	**884 19**

Bellows (Stainless Steel 1.4571) with Flanges (Stainless Steel 1.4301)



Dimensional drawing for the bellows with flanges

Technical Data

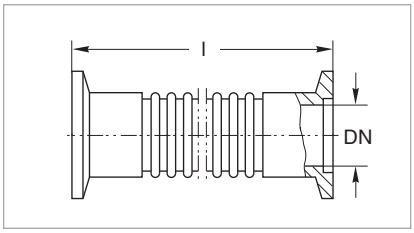
DN	ISO-KF	16	25	40	50
l	mm	70	80	100	100
	in.	2.76	3.15	3.94	3.94
Wall thickness	mm	0.13	0.13	0.15	0.2
	in.	0.005	0.005	0.006	0.008
max. extension, axial	mm	10.5	13	18	16
	in.	0.41	0.51	0.71	0.63
Compression	mm	6.5	8	11	10
	in.	0.26	0.31	0.43	0.39
Tension	mm	4	5	7	6
	in.	0.16	0.20	0.28	0.24
max. angle	degress [1]	±21	±17	±15	±15
Lateral motion	mm	±4	±3.5	±7	±8
	in.	±0.16	±0.14	0.28	±0.31

Ordering Information

Stainless steel	Part No.	**872 41**	**872 43**	**872 45**	**872 46**

[1] When utilizing the maximum bending angle, no extension along the axial axis will be possible!

Vacuum Hoses [1] with Flanges (Stainless Steel 1.4571)



Dimensional drawing for the vacuum hoses with flanges

Technical Data

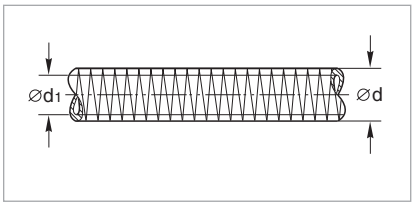
DN	ISO-KF	16	25	40	50
Max. bending radius (inside) with multiple bending	mm	68.5	103.0	129.0	198.0
	in.	2.70	4.06	5.08	7.80
with single bend	mm	50	63	100	130
	in.	1.97	2.48	3.94	5.12
Wall thickness	mm	0.2	0.2	0.2	0.3
	in.	0.008	0.008	0.008	0.01

Ordering Information

l = 250 mm (9.84 in.)	Part No.	**867 81**	**867 83**	**867 85**	**867 86**
l = 500 mm (19.69 in.)	Part No.	**867 91**	**867 93**	**867 95**	**867 96**
l = 750 mm (29.53 in.)	Part No.	**867 41**	**867 43**	**867 45**	**867 46**
l = 1000 mm (39.37 in.)	Part No.	**868 01**	**868 03**	**868 05**	**868 06**

[1] Flexible vacuum hoses must be linked to an external mechanical assembly

PVC Coiled Vacuum Hoses without Flanges



Dimensional drawing for the PVC vacuum hoses

Technical Data

DN	ISO-KF	16	25	40
d	mm	23	33	53
	in.	0.91	1.30	2.09
d_1	mm	16	25	40
	in.	0.63	0.98	1.57
Length	m	by the metre	by the metre	by the metre

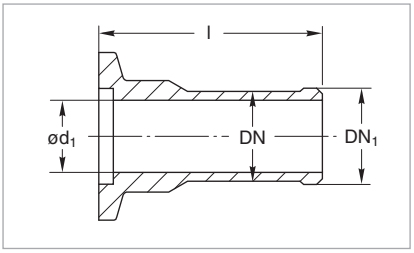
Ordering Information

PVC coiled vacuum hose	Part No.	**172 41**	**172 42**	**172 43**

Important: In the table of Section "General" the German designation for the type of steel is also stated in accordance with AISI.

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KF Flanges with Hose Nozzle (Aluminum 3.0615.71)



Dimensional drawing for the KF flanges with hose nozzle

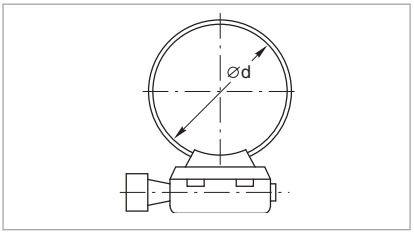
Technical Data

DN	ISO-KF	16	25	40
DN_1 (tube)	mm	17	26	41
	in.	0.67	1.02	1.61
l	mm	40	40	40
	in.	1.57	1.57	1.57
d_1	mm	13	22	37
	in.	0.51	0.87	1.46

Ordering Information

Aluminum	Part No.	**182 45**	**182 46**	**182 47**

Hose Clamps (Stainless Steel 1.4301)



Dimensional drawing for the hose clamps

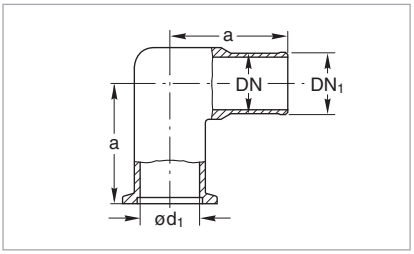
Technical Data

DN	ISO-KF	16	25	40
d (min. / max.)	mm	13 / 32	19 / 44	29 / 76
	in.	0.51 / 1.26	0.75 / 1.73	1.14 / 2.99

Ordering Information

Stainless steel	Part No.	**866 21**	**866 22**	**866 23**

Elbows 90° with Hose Nozzle (Aluminum 3.2381.02)



Dimensional drawing for the elbows 90° with hose nozzle

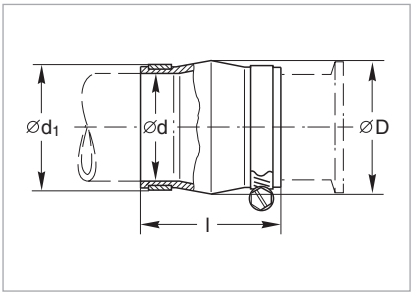
Technical Data

DN	ISO-KF	16	25	40
DN_1 (tube)	mm	17	26	41
	in.	0.67	1.02	1.61
a	mm	40	50	65
	in.	1.57	1.97	2.56
d1	mm	16	25	39
	in.	0.63	0.98	1.54

Ordering Information

Aluminum	Part No.	**182 15**	**182 16**	**182 17**

CR Compensation Elements with Integrated Support Ring



Dimensional drawing for the compensation elements with integrated support ring

Technical Data

DN	ISO-KF	16	25	40
D	mm	44	50	68
	in.	1.73	1.97	2.68
d (tube tolerance)	mm	16	25	40
	in.	0.63	0.98	1.57
d_1	mm	24	33	48
	in.	0.94	1.30	1.89
l	mm	58	60	64
	in.	2.28	2.36	2.52
Leak rate mbar x l x s^{-1}		≤ 1 x 10^{-5}	≤ 1 x 10^{-5}	≤ 1 x 10^{-5}

Ordering Information

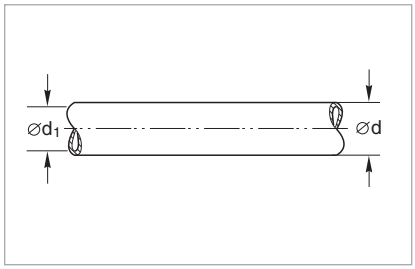
Stainless steel/CR	Part No.	**182 78** [1]	**182 79** [1]	**182 80** [1]

[1] Is supplied complete with stainless steel hose clamps

Important: In the table of Section "General" the German designation for the type of steel is also stated in accordance with AISI.

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Rubber Vacuum Hoses (NR) for Hose Nozzles



Dimensional drawing for rubber vacuum hoses

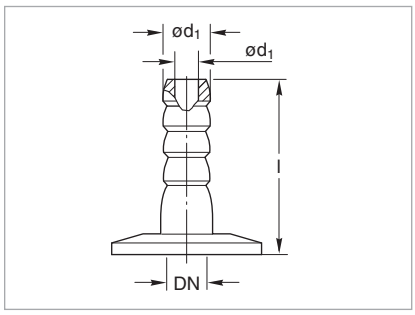
Technical Data

DN	ISO-KF	10	16	20
d	mm	17	25	32
	in.	0.66	0.98	1.26
d_1	mm	7	10	16
	in.	0.28	0.39	0.63
Length	m	by the metre	by the metre	by the metre
Hardness – Shore A –		55 ±5	55 ±5	55 ±5
Temperature range	°C	-30 to +85	-30 to +85	-30 to +85
	°F	-22 to +185	-22 to +185	-22 to +185

Ordering Information

Rubber vacuum hose	Part No.	**172 02**	**172 03**	**172 04**

KF Flanges with Hose Nozzles (Aluminum 3.0615.71 and Stainless Steel 1.4305)



Dimensional drawing for the KF flanges with hose nozzle

Technical Data

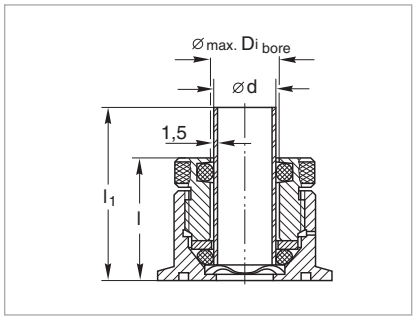
DN	ISO-KF	16	25	40
d	mm	12	12	12
	in.	0.47	0.47	0.47
d_1 [1)]	mm	7	7	7
	in.	0.26	0.26	0.26
l	mm	40	40	40
	in.	1.57	1.57	1.57

Ordering Information

Aluminum	Part No.	**182 90**	**182 91**	**182 92**
Stainless steel	Part No.	**885 14**	**885 08**	**885 09**

[1)] Also recommended inside diameter for the hose

KF Flanges with Compression Fitting for Glass/Metal/Plastic Tubes (Aluminum 3.0615/FPM (FKM))



Dimensional drawing for the KF flanges with compression fitting

Technical Data

DN	ISO-KF	10	40
b	mm	1.5	1.5
	in.	0.06	0.06
d (glass)	mm	10	26
	in.	0.39	1.02
l	mm	30	45
	in.	1.18	1.77
l_1	mm	50	65
	in.	1.97	2.56
Di_{bore}-max.	±0.2 mm	11	27
	±0.008 in.	0.43	1.06

Ordering Information

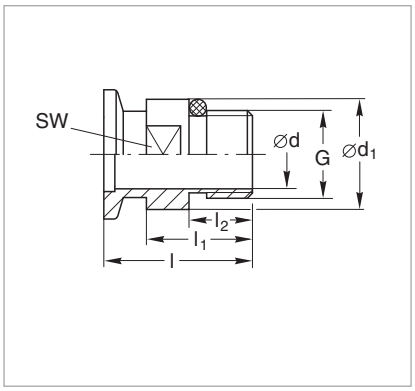
Compression Fitting	Part No.	**184 61**	**184 66**
Sealing set (FPM (FKM)) for high temperatures (150 °C (302 °F)) (set = 10 pieces)	Part No.	**105 94**	–

Only for pressure ≤ 1000 mbar (≤ 750 Torr)

Important: In the table of Section “General” the German designation for the type of steel is also stated in accordance with AISI.

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Screw-in Flanges (Stainless Steel 1.4305 / FPM (FKM))



Dimensional drawing for the screw-in flanges

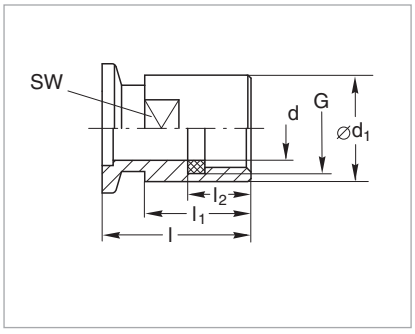
Technical Data

DN	ISO-KF	10	16	16	25	16	40
l	mm	35	35	42	45	26	50
	in.	1.34	1.34	1.65	1.77	1.02	1.97
l_1	mm	25	25	–	35	–	40
	in.	0.98	0.98	–	1.34	–	1.57
l_2	mm	15	15	11,5	25	8	30
	in.	0.59	0.59	0.45	0.98	0.31	1.18
d	mm	12	16	5	25	5	41
	in.	0.47	0.63	0.20	0.98	0.20	1.61
d_1	mm	22	26	–	39	–	54
	in.	0.87	1.02	–	1.54	–	2.13
G (according to DIN ISO 228-1)		3/8"	1/2"	M 16 x 1.5	1"	1/8"	1 1/2"
		3/8"	1/2"	M 16 x 0.06	1"	1/8"	1 1/2"
SW (width across flats)	mm	19	22	17	36	13	50
	in.	0.75	0.87	0.67	1.42	0.51	1.97

Ordering Information

Stainless steel	Part No.	**886 30**	**886 31**	**–**	**886 32**	**–**	**886 33**
Stainless steel 1.4571	Part No.	**–**	**–**	**–**	**–**	**160 26**	**–**
Nickel-plated steel	Part No.	**–**	**–**	**168 40**	**–**	**–**	**–**

Screw-on Flanges (Stainless Steel 1.4305 / FPM (FKM))



Dimensional drawing for the screw-on flanges

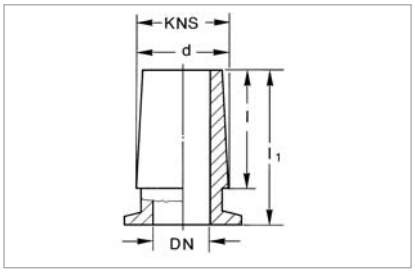
Technical Data

DN	ISO-KF	10	16	25	40
l	mm	35	35	45	50
	in.	1.34	1.34	1.77	1.97
l_1	mm	25	25	35	40
	in.	0.98	0.98	1.34	1.57
l_2	mm	15	15	25	30
	in.	0.59	0.59	0.98	1.18
d	mm	10	15	24	38
	in.	0.39	0.59	0.94	1.50
d_1	mm	20	25	39	54
	in.	0.79	0.98	1.54	2.13
G (according to DIN ISO 228-1)		3/8"	1/2"	1"	1 1/2"
SW (width across flats)	mm	17	21	36	50
	in.	0.67	0.83	1.42	1.97

Ordering Information

Stainless steel	Part No.	**884 25**	**884 26**	**884 27**	**884 28**

ISO-KF Flanges with Ground Cone (Stainless Steel 1.4301)



Dimensional drawing for the KF flanges with ground cone

Technical Data

DN	ISO-KF	16	25	40
KNS - d / l	mm	19 / 26	29 / 32	45 / 40
	in.	0.75 / 1.02	1.14 / 1.26	1.77 / 1.57
l_1	mm	40	45	55
	in.	1.57	1.77	2.17
Taper		1:10	1:10	1:10

Ordering Information

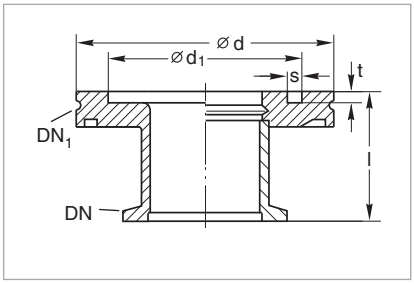
Stainless steel	Part No.	**184 87**	**184 85**	**184 86**

Important: In the table of Section “General” the German designation for the type of steel is also stated in accordance with AISI.

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Adaptors

Adaptors/Reducers ISO-KF – ISO-K



Dimensional drawing for the adaptor reducers ISO-KF – ISO-K;
left: aluminum; right: stainless steel

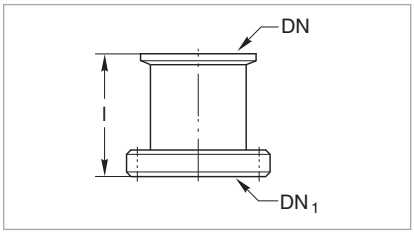
Technical Data

DN	ISO-KF	40	50	40
DN_1	ISO-K	63	63	100
d_1	mm	70	70	102
	in.	2.76	2.76	4.02
l	mm	40	45	40
	in.	1.57	1.77	1.57
s	mm	5	5	5
	in.	0.2	0.2	0.2
t	mm	4.5	4.5	4.5
	in.	0.18	0.18	0.18
Weight	kg	0.5	0.6	0.8
	lbs	1.10	1.32	1.77

Ordering Information

Stainless steel 1.4301	Part No.	**887 40**	**887 41**	**887 42**
Aluminum 3.2315.71	Part No.	**269 40**	**269 41**	**–**

Adaptors ISO-KF – CF (Stainless Steel 1.4301)



Dimensional drawing for the adaptors CF – ISO-KF

Technical Data

DN	ISO-KF	16	16	25	25	40
DN_1	CF	16	40	16	40	40
or	inch	1 5/16"	2 3/4"	1 5/16"	2 3/4"	2 3/4"
l	mm	35	30	35	30	50
	in.	1.38	1.18	1.38	1.18	2.17

Ordering Information

Stainless steel 1.4301	Part No.	**837 81**	**837 82**	**837 83**	**837 84**	**837 36**

Copper Gaskets for CF-Flanges (OFHC-Copper - Oxygen-Free)

Technical Data

DN	CF	16	40	63	100	160	200	250
Set of 10		x	x	x	x	x	x	–
Set of 5		–	–	–	–	–	–	x
Inside diameter	mm	16.2	39.0	63.6	101.8	152.6	203.4	254.0
	in.	0.64	1.54	2.5	4.0	6.0	8.0	10.0

Ordering Information

OFHC Copper	Part No.	**839 41**	**839 43**	**839 44**	**839 45**	**839 46**	**839 47**	**839 48**

FPM (FKM) Gaskets for CF-Flanges

Technical Data

DN	CF	16	40	63	100	160	200	250
Set of 5		x	x	–	–	–	–	1 FPM (FKM) O-ring with Support Ring
Profile seal, set of 2		–	–	x	x	x	x	–
Gasket with support ring		–	–	–	–	–	–	x
Degassing temperature	°C	160	160	160	160	160	160	160
	°F	320	320	320	320	320	320	320

Ordering Information

FPM (FKM)	Part No.	**839 21**	**839 23**	**839 34**	**839 35**	**839 36**	**839 37**	**839 03**

Important: In the table of Section "General" the German designation for the type of steel is also stated in accordance with AISI.

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Bolts, Nuts and Washers for CF-Flanges

Technical Data

DN	CF	16	40	63/100	160	200/250
Dimensions (d x l)	mm	M 4 x 20	M 6 x 35	M 8 x 50	M 8 x 55	M 8 x 60
	in.	M 4 x 0.79	M 6 x 1.38	M 8 x 1.97	M 8 x 2.17	M 8 x 2.36
Torque	Nm	4	10	20	20	20
Quantity per set						
Bolts		25	25	25	25	25
Nuts		25	25	25	25	25
Washers		25	25	25	25	25

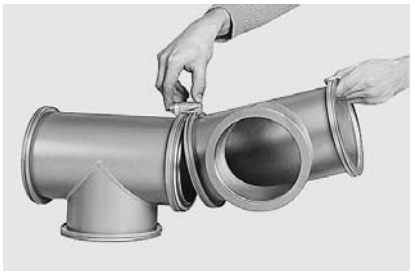
Ordering Information

Set	Part No.	**839 00**	**839 01**	**839 04**	**839 05**	**839 07**

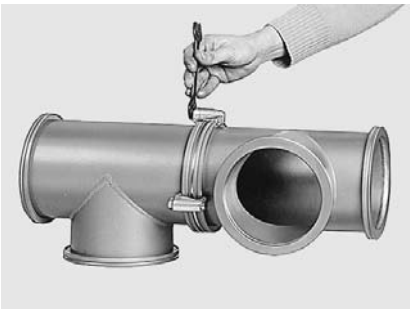
Important: In the table of Section “General” the German designation for the type of steel is also stated in accordance with AISI.

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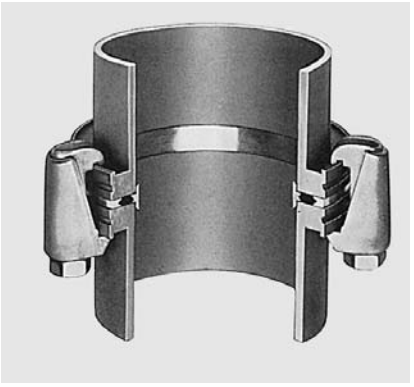
(ISO-K) Clamp Flange Fittings and Components



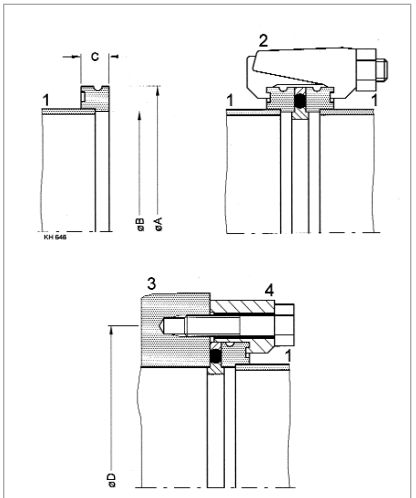
Attaching a clamp flange component and fitting of the clamp



Tightening the clamping bolt



ISO-K clamp flange connection



1 Clamp flange
2 Claw
3 Base plate
4 Claw

Flange Components DN 63 to DN 630 ISO-K (to DIN 28 404 in line with ISO 1609/3669)

The clamp flange connection was introduced to the vacuum industry by Oerlikon Leybold Vacuum. Since the fitting of clamp flanges does not depend on any bolt holes in the flange, these components may be installed in any orientation.

Advantages to the User

- Quick to fit
- Safe and reliable
- Can be turned in any direction
- Easy to disassemble, thus easy to clean
- Suitable for pressures down to 10^{-7} mbar (0.75 x 10^{-7} Torr) when using O-rings and down to 10^{-9} mbar (0.75 x 10^{-9} Torr) when using metal gaskets
- Easily adaptable to other flange systems
- Mounted by means of clamps (ISO-K) or collar flange with retaining ring (ISO-F, DIN 2501)
- Clamp flange components are used with CR or FPM (FKM) gaskets or with ultra sealing disks made of aluminum
- Degassing temperatures
  for CR, max. 100 °C (212 °F)
  for FPM (FKM), max. 150 °C (302 °F)
  for the ultra sealing disk, max. 200 °C (392 °F)

The pressure range for the application depends in each case on the sealing method which is used and is thus limited for ultra sealing disks to 10^{-9} mbar (0.75 x 10^{-9} Torr), for FPM (FKM) gaskets to 10^{-8} mbar (0.75 x 10^{-8} Torr) and for CR sealed components to 10^{-7} mbar (0.75 x 10^{-7} Torr).

Flexible Compensation Elements (CR)

Vacuum systems and pump systems often require components which are capable of protecting sensitive instruments against impacts or excessive vibrations while linking tubes at the same time.

Advantages to the User

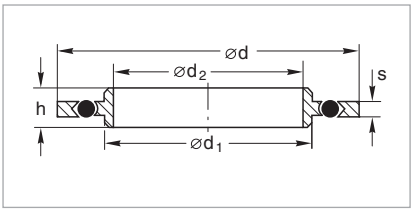
- Easy and quick to install
- Safe and reliable
- Tubes may be turned in any direction
- No centering ring and sealing ring is needed since the seal is provided by the smooth tube surface
- Capable of withstanding temperatures up to 100 °C (212 °F)
- Suitable for pressures down to 10^{-5} mbar (0.75 x 10^{-5} Torr)

Technical Data

Nominal diameter		A	B	C	Number of clamps	D	Screws for claws	Number of claws
DN 63 ISO-K	mm	95	70	12	4	110	M 8 x 35	4
	in.	3.74	2.76	0.47		4.33	M 8 x 1.38	
DN 100 ISO-K	mm	130	102	12	4	145	M 8 x 35	8
	in.	5.12	4.02	0.47		5.71	M 8 x 1.38	
DN 160 ISO-K	mm	180	153	12	4	200	M 10 x 35	8
	in.	7.09	6.02	0.47		7.87	M 10 x 1.38	
DN 200 ISO-K	mm	240	213	12	6	260	M 10 x 35	12
	in.	9.45	8.39	0.47		10.24	M 10 x 1.38	
DN 250 ISO-K	mm	290	261	12	6	310	M 10 x 35	12
	in.	11.42	10.28	0.47		12.20	M 10 x 1.38	
DN 320 ISO-K	mm	370	318	17	8	395	M 12 x 50	12
	in.	14.57	12.52	0.67		15.55	M 12 x 1.97	
DN 400 ISO-K	mm	450	400	17	8	480	M 12 x 50	16
	in.	17.72	15.75	0.67		18.90	M 12 x 1.97	
DN 500 ISO-K	mm	550	501	17	12	580	M 12 x 50	16
	in.	21.65	19.72	0.67		22.83	M 12 x 1.97	
DN 630 ISO-K	mm	690	651	22	12	720	M 12 x 55	20
	in.	17.17	25.63	0.87		28.35	M 12 x 2.17	

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Centering Rings (Aluminum / Stainless Steel) with O-Ring (NBR)



Dimensional drawing for the centering rings with O-ring

Technical Data

DN	ISO-K	63	100	160	200	250	320
d	mm	96	128	179	239	287	358
	in.	2.76	4.02	6.02	8.39	10.28	12.52
d_1	mm	70	102	153	213	261	318
	in.	2.64	3.9	5.91	8.27	10.16	12.32
d_2	mm	67	99	150	210	258	313
	in.	2.64	3.9	5.91	8.27	10.16	12.32
h	mm	8	8	8	8	8	14
	in.	0.31	0.31	0.31	0.31	0.31	0.55
s	mm	3.9	3.9	3.9	3.9	3.9	5.6
	in.	0.15	0.15	0.15	0.15	0.15	0.22

Ordering Information

Aluminum/FPM (FKM)	Part No.	**268 41**	**268 42**	**268 43**	**268 44**	**268 45**	**268 46**
Aluminum/CR	Part No.	**268 05**	**268 06**	**268 09**	**268 19**	**268 17**	**268 18**
Stainless steel/FPM (FKM)	Part No.	**887 03**	**887 04**	**887 07**	**887 02**	**887 08**	–

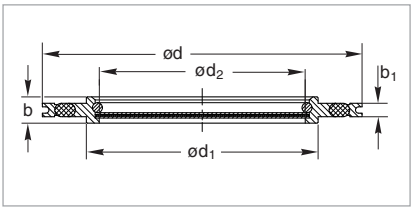
Technical Data

DN	ISO-K	400	500	630	800	1000
d	mm	440	541	691	840	1040
	in.	17.32	21.9	27.2	33.07	40.94
d_1	mm	400	501	651	800	1000
	in.	15.75	19.72	25.65	31.5	39.37
d_2	mm	395	496	646	795	995
	in.	15.55	19.53	25.43	31.18	39.17
h	mm	14	14	14	14	14
	in.	0.55	0.55	0.55	0.55	0.55
s	mm	5.6	5.6	5.6	5.6	5.6
	in.	0.22	0.22	0.22	0.22	0.22

Ordering Information

Aluminum/FPM (FKM)	Part No.	**268 47**	**268 48**	**268 49**	**268 50**	–
Aluminum/CR	Part No.	**268 14**	**268 15**	**268 16**	–	–

Centering Rings with Fine Filter (Stainless Steel 1.4301), O-Ring (FPM (FKM))



Dimensional drawing for the centering rings with fine filter

Technical Data

DN	ISO-K	63	100
b	mm	8	8
	in.	0.31	0.31
b_1	mm	4	4
	in.	0.16	0.16
d	mm	96	128
	in.	3.78	5.04
d_1	mm	70	102
	in.	2.76	4.02
d_2	mm	62	94
	in.	2.44	3.7

Ordering Information

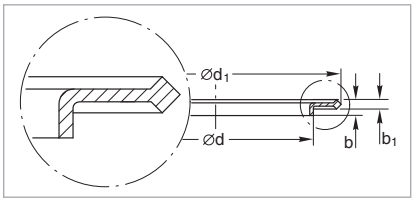
Stainless steel	Part No.	**887 20**	**887 21**

Filter material: Stainless steel 1.4404, size of pores: 4 µm, separation grade: 1 µm particles to 98%

Important: In the table of Section “General” the German designation for the type of steel is also stated in accordance with AISI.

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Ultra Sealing Disks (Aluminum 3.2315.70) [1)]



Dimensional drawing for the ultra sealing disks

Technical Data

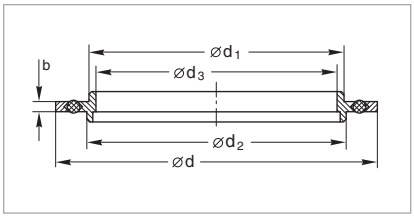
DN	ISO-K / ISO-F		63	100	160	250
b		mm	4.5	4.5	4.5	4.5
		in.	0.18	0.18	0.18	0.18
b_1		mm	2.6	2.6	2.6	2.6
		in.	0.10	0.10	0.10	0.10
d		mm	69.8	101.8	152.8	260.8
		in.	2.75	4.01	6.02	10.27
d_1		mm	85.6	116.6	166.6	276.6
		in.	3.37	4.59	6.56	10.89

Ordering Information

Aluminum	Part No.	**886 24**	**886 25**	**886 26**	**886 27**

[1)] Only for collar ring connections

Centering Ring Adaptors (Aluminum) with O-Ring (FPM (FKM)), ISO-K to LF Standard



Dimensional drawing for the centering ring adaptors with O-ring

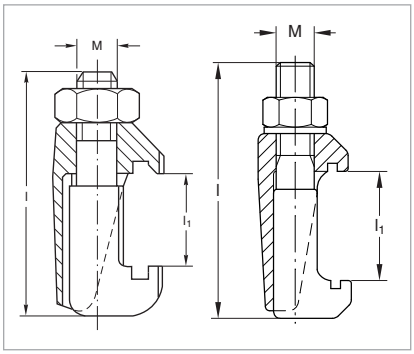
Technical Data

DN	ISO-K / LF		100 / 100	160 / 150	250 / 250
b		mm	4	4	4
		in.	0.16	0.16	0.16
d		mm	126	177	285
		in.	4.96	6.97	11.22
d_1		mm	100	150	250
		in.	3.94	5.91	9.84
d_2		mm	102	153	261
		in.	4.02	6.02	10.28
d_3		mm	95	145	244
		in.	3.74	5.71	9.61

Ordering Information

Aluminum/FPM (FKM) Part No.	**105 25**	**105 35**	**105 45**

Clamps for ISO-K



Dimensional drawing for the clamps, right: Part No. 210 061

Technical Data

DN	ISO-K		63 / 250	63 / 250	320 / 500	630	320 / 630
Number of required clamps per connection			4 / 6	4 / 6	8 / 12	12	8 / 12
M		thread	M 10	M 10	M 12	M 12	M 12
l		mm	60	68	78	88	82.5
		in.	2.36	2.68	3.07	3.46	3.25
l_1		mm	17 to 27	25 to 35	27 to 39	31 to 49	29 to 47
		in.	0.67 to 1.06	0.98 to 1.38	1.06 to 1.54	1.22 to 1.93	1.14 to 1.85

Ordering Information

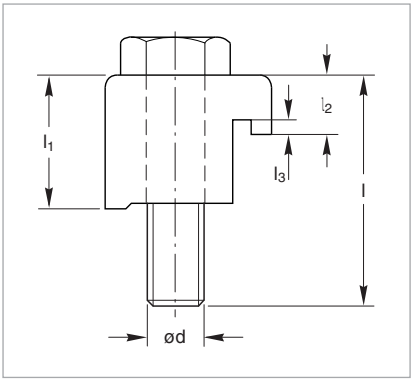
1 set = 4 clamps							
Galvanized steel 1.1181	Part No.	**267 01**	**267 02**	**267 10**	**267 11**	–
Stainless steel 1.4401	Part No.	**887 99**	–	–	–	**210 061**

Exact numbers of clamps see first page of the section "(ISO-K) Clamp Flange Fittings and Components"

Important: In the table of Section "General" the German designation for the type of steel is also stated in accordance with AISI.

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Claws (Galvanized Steel 1.1181) for ISO-K



Dimensional drawing for the claws for ISO-K

Technical Data

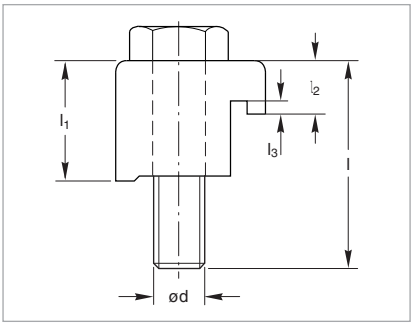
DN	ISO-K	63 / 100	160 / 250	320 / 500	630
Number of required claws per connection		4 / 8	8 / 12	12 / 16	20
d	thread	M 8	M 10	M 12	M 12
l	mm	35	35	50	55
	in.	1.38	1.38	1.97	2.17
l_1	mm	22.5	23	36.5	41.5
	in.	0.89	0.91	1.44	1.63
l_2	mm	8.6	9.1	15.9	16
	in.	0.34	0.36	0.63	0.63
l_3	mm	2.5	2.5	2.5	2.5
	in.	0.10	0.10	0.10	0.10

Ordering Information

1 set = 4 claws	Part No.	**268 25**	**268 26**	**268 27**	**268 28**

Exact numbers of clamps see first page of the section "(ISO-K) Clamp Flange Fittings and Components"

Claws for Sealing Groove in Base Plate (Galvanized Steel 1.1181) for ISO-K



Dimensional drawing for the claws for sealing groove

Technical Data

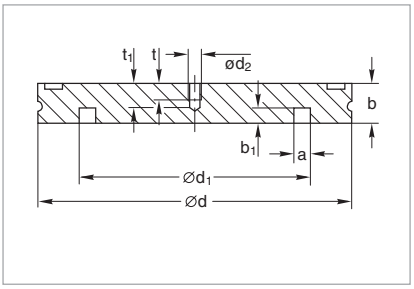
DN	ISO-K	63 / 100	160 / 250	320 / 500
d	thread	M 8	M 10	M 12
l	mm	30	35	45
	in.	1.18	1.38	1.77
l_1	mm	18.6	19	31
	in.	0.73	0.75	1.22
l_2	mm	8.6	9.0	16.0
	in.	0.34	0.35	0.63
l_3	mm	2.5	2.5	2.5
	in.	0.10	0.10	0.10

Ordering Information

1 set = 4 claws	Part No.	**268 76**	**268 77**	**268 78**

Exact numbers of clamps see first page of the section "(ISO-K) Clamp Flange Fittings and Components"

Blank Flanges (Nickel-Plated Steel 1.0037 / Stainless Steel 1.4301)



Dimensional drawing for the blank flanges

Technical Data

DN	ISO-K	63	100	160	200	250	320	400	500	630
a	mm	5	5	5	5	5	5	5	5	5
	in.	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
b	mm	12	12	12	12	12	17	17	17	22
	in.	0.47	0.47	0.47	0.47	0.47	0.67	0.67	0.67	0.87
b_1	mm	4.5	4.5	4.5	4.5	4.5	6.5	6.5	6.5	6.5
	in.	0.18	0.18	0.18	0.18	0.18	0.26	0.26	0.26	0.26
d	mm	95	130	180	240	290	370	450	550	690
	in.	3.74	5.12	7.09	9.45	11.42	14.57	17.72	21.65	27.17
d_1	mm	70	102	153	213	261	318	400	501	651
	in.	2.76	4.02	6.02	8.39	10.28	12.52	15.75	19.72	25.63
d_2	thread	M 8	M 8	M 8	M 8	M 8	M 8	M 8	M 8	M 8
t	mm	8	8	8	8	8	8	8	8	8
	in.	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31
t_1	mm	12	12	12	12	12	12	12	12	12
	in.	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47

Ordering Information

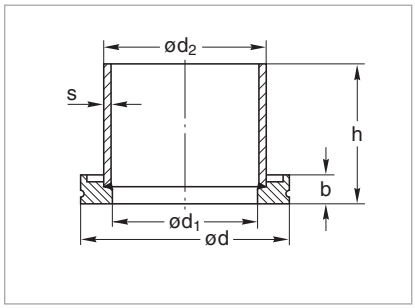
Nickel-plated steel	Part No.	**26947**	**26948**	**26949**	**–**	**26956**	**–**	**–**	**–**	**–**
Stainless steel	Part No.	**88755**	**88756**	**88757**	**88754**	**88758**	**88759**	**88760**	**88761**	**88762**

M 8 threaded bore from nominal size DN 500

Important: In the table of Section "General" the German designation for the type of steel is also stated in accordance with AISI.

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Clamp Flanges with Tubulation (Steel 1.0831, 1.0308 / Stainless Steel 1.4301)



Dimensional drawing for the clamp flanges with tubulation

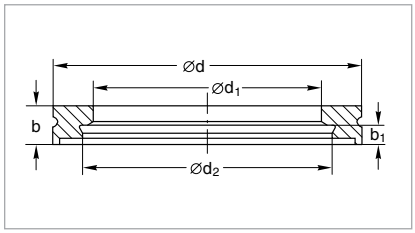
Technical Data

DN	ISO-K	63	100	160	200	250	320	400	500	630
d	mm	95	130	180	240	290	370	450	550	690
	in.	3.74	5.12	7.09	9.45	11.42	14.57	17.72	21.65	27.17
d_1	mm	70	102	153	213	261	318	400	501	651
	in.	2.76	4.02	6.02	8.39	10.28	12.52	15.75	19.72	25.63
d_2	mm	76.1	108	159	219.1	267	324	406	508	660
	in.	3.00	4.25	6.26	8.63	10.51	12.76	15.98	20.00	25.98
d	mm	100	100	100	100	100	100	100	100	100
	in.	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94
s (steel)	mm	2.9	2.9	2.9	–	3	3	3	4	5
	in.	0.11	0.11	0.11	–	0.12	0.12	0.12	0.16	0.20
s (stainless steel)										
	mm	2.3	2	2	3	3	3	3	4	5
	in.	0.09	0.08	0.08	0.12	0.12	0.12	0.12	0.16	0.20
b	mm	12	12	12	12	12	17	17	17	22
	in.	0.47	0.47	0.47	0.47	0.47	0.67	0.67	0.67	0.87

Ordering Information

Steel	Part No.	**26904**	**26905**	**26906**	**–**	**26917**	**–**	**–**	**–**	**–**
Stainless steel	Part No.	**88640**	**88641**	**88642**	**88643**	**88718**	**88719**	**88646**	**–**	**88648**

Welding Flanges



Dimensional drawing for the welding flanges

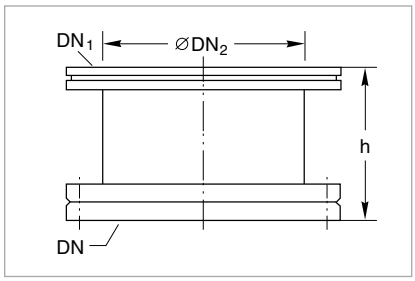
Technical Data

DN	ISO-K	63	100	160	200	250
b	mm	12	12	12	12	12
	in.	0.47	0.47	0.47	0.47	0.47
b_1	mm	6	6	6	6	6
	in.	0.24	0.24	0.24	0.24	0.24
d	mm	95	130	180	240	290
	in.	3.74	5.12	7.09	9.45	11.42
d_1	mm	70	102	153	213	261
	in.	2.76	4.02	6.02	8.39	10.28
d_2	mm	76.6	108.7	159.8	219.8	267.8
	in.	3.02	4.28	6.29	8.65	10.54

Ordering Information

Steel 1.0831	Part No.	**269 61**	**269 62**	**269 63**	**–**	**269 65**
Stainless steel 1.4301	Part No.	**886 61**	**886 62**	**886 63**	**886 64**	**886 65**

Adaptors ISO-K – CF



Dimensional drawing for the adaptors ISO-K – CF

Technical Data

DN	CF	63	100	160
o. D.	inch	4 1/2"	6"	8"
DN_1	ISO-K	63	100	160
DN_2	mm	66	104	153
	in.	2.60	4.09	6.02
h	mm	90	90	90
	in.	3.54	3.54	3.54

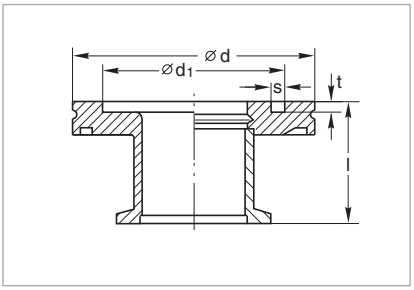
Ordering Information

DIN 1.4301	Part No.	**837 01**	**837 02**	**837 03**

Important: In the table of Section “General” the German designation for the type of steel is also stated in accordance with AISI.

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Adaptors-Reducers ISO-K – KF



Dimensional drawing for the adaptors-reducer ISO-K – KF;
left: aluminum; right: stainless steel

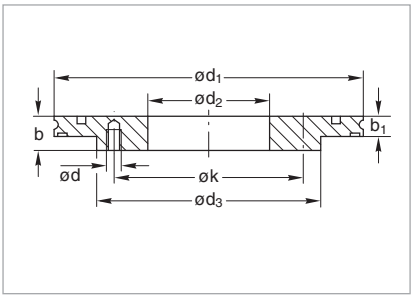
Technical Data

DN	ISO-K / KF		63 / 40	63 / 50	100 / 40
d		mm	95	95	130
		in.	3.74	3.74	5.12
d_1		mm	70	70	102
		in.	2.76	2.76	4.02
l		mm	40	45	40
		in.	1.57	1.77	1.57
s		mm	5	5	5
		in.	0.2	0.2	0.2
t		mm	4.5	4.5	4.5
		in.	0.16	0.16	0.16
Weight		kg	0.5	0.6	0.8
		lbs	1.1	1.32	1.77

Ordering Information

Stainless steel 1.4305	Part No.	**887 40**	**887 41**	**887 42**
Aluminum 3.2315.71	Part No.	**269 40**	**269 41**	–

Reducing Flanges (Stainless Steel 1.4301)



Dimensional drawing for the reducing flanges

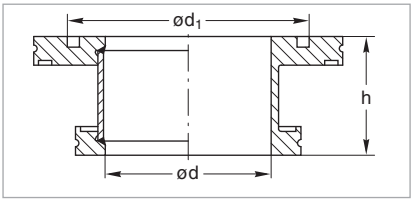
Technical Data

DN	ISO-K		160/63	160/100	200/100	200/160	250/160
b		mm	22	25	20	25	22
		in.	0.87	0.98	0.79	0.98	0.87
b_1		mm	12	12	12	12	12
		in.	0.47	0.47	0.47	0.47	0.47
d		thread	M 8	M 8	M 8	M 10	M 10
d_1		mm	180	180	240	240	290
		in.	7.09	7.09	9.49	9.49	11.42
d_2		mm	70	102	102	153	153
		in.	2.76	4.02	4.02	6.02	6.02
d_3		mm	130	165	165	225	225
		in.	5.12	6.50	6.50	8.86	8.86
k		mm	110	145	145	200	200
		in.	4.33	5.71	5.71	7.87	7.87

Ordering Information

Stainless steel	Part No.	**886 14**	**886 15**	**886 17**	**886 16**	**886 50**

Reducers (Stainless Steel 1.4305)



Dimensional drawing for the reducers

Technical Data

DN	ISO-K		100/63	250/200
d		mm	70	213
		in.	2.76	8.39
d_1		mm	102	261
		in.	4.02	10.28
h		mm	50	50
		in.	1.97	1.97

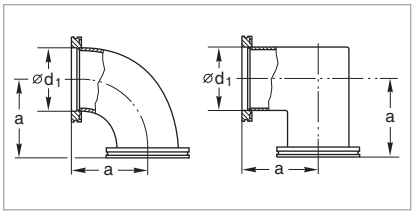
Ordering Information

Stainless steel	Part No.	**887 89**	**887 93**

Important: In the table of Section “General” the German designation for the type of steel is also stated in accordance with AISI.

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Pipe Bend (Stainless Steel 1.4301); from DN 160 ISO-K Mitred Elbow



Dimensional drawing for the pipe bends (left) and the mitred elbows (right)

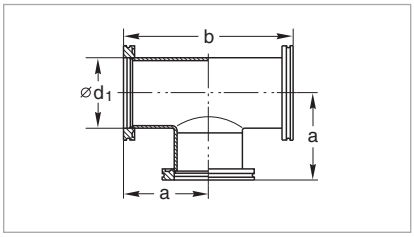
Technical Data

DN	ISO-K	63	100	160	250
a	mm	88	108	138	208
	in.	3.46	4.25	5.43	8.19
d_1	mm	70	102	153	261
	in.	2.76	4.02	6.02	10.28
Weight	kg	1.1	2.2	5.9	9.9
	lbs	2.43	4.8	13.02	21.85
Conductance	l/s	208	470	1200	3700

Ordering Information

Stainless steel	Part No.	**887 25**	**887 26**	**887 27**	**887 28**

Tees (Stainless Steel 1.4301)



Dimensional drawing for the tees

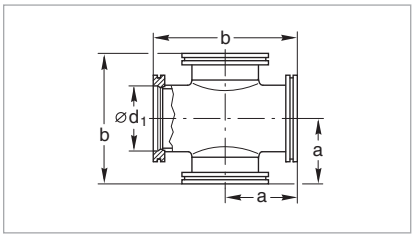
Technical Data

DN	ISO-K	63	100	160	250
a	mm	88	108	138	208
	in.	3.46	4.25	5.43	8.19
b	mm	176	216	276	416
	in.	6.93	8.50	10.87	16.38
d_1	mm	70	102	153	261
	in.	2.76	4.02	6.02	10.28
Weight	kg	1.6	3.2	7.6	8.1
	lbs	3.53	7.06	16.78	17.88

Ordering Information

Stainless steel	Part No.	**887 35**	**887 36**	**887 37**	**887 38**

4-Way Crosses (Stainless Steel 1.4301)



Dimensional drawing for the 4-way crosses

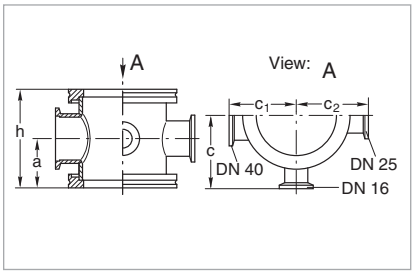
Technical Data

DN	ISO-K	63	100	160	250
a	mm	88	108	138	208
	in.	3.46	4.25	5.43	8.19
b	mm	176	216	276	416
	in.	6.93	8.50	10.87	16.38
d_1	mm	70	102	153	261
	in.	2.76	4.02	6.02	10.28

Ordering Information

Stainless steel	Part No.	**887 45**	**887 46**	**887 47**	**887 48**

Branching Pieces with Lateral DN 16/25/40 KF Flanges (Stainless Steel 1.4301)



Dimensional drawing for the branching pieces with lateral DN 16/25/40 flanges

Technical Data

DN	ISO-K	63	100	160
a	mm	44	50	50
	in.	1.73	1.97	1.97
h	mm	88	100	100
	in.	3.46	3.94	3.94
c	mm	66	82	107
	in.	2.60	3.23	4.21
c_1	mm	59	77	105
	in.	2.32	3.03	4.13
c_2	mm	64	80	107
	in.	2.52	3.15	4.21

Ordering Information

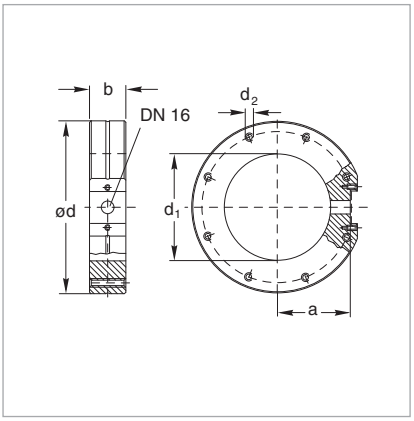
Stainless steel	Part No.	**886 71**	**886 72**	**886 73**

Can not be used with collar flanges ISO-F and DIN 2501

Important: In the table of Section “General” the German designation for the type of steel is also stated in accordance with AISI.

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Measurement Flanges



Dimensional drawing for the measurement flanges

Technical Data

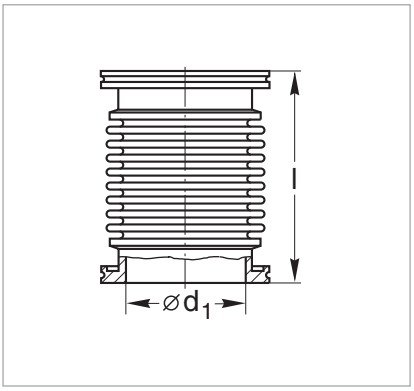
DN	ISO-K	63	100	160
a	mm	52.3	71.3	102.3
	in.	2.06	2.81	4.03
b	mm	30	30	30
	in.	1.18	1.18	1.18
d	mm	130	165	225
	in.	5.12	6.50	8.86
d_1	mm	70	102	153
	in.	2.76	4.02	6.02
d_2	thread	M 8	M 8	M 10
Number of threaded holes		4	8	8

Ordering Information

Stainless steel 1.4301	Part No.	**286 60** [1]	**286 61** [1]	**286 62** [1]
Recommended centering ring	Part No.	**2x 887 03**	**2x 887 04**	**2x 887 07**
Required claws kits	Part No. 268 25	**2 kits**	**4 kits**	**–**
Required claws kits	Part No. 268 26	**–**	**–**	**4 kits**

[1] Washers and nuts for DN 16 KF are included

Bellows (Stainless Steel 1.4571) with Flanges (Stainless Steel 1.4391)



Dimensional drawing for the bellows

Technical Data

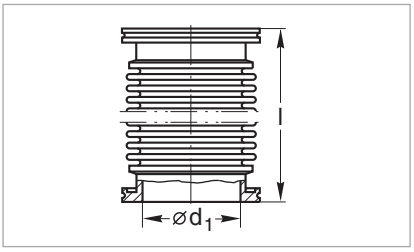
DN	ISO-K	63	100	160	250
d_1	mm	70	102	153	261
	in.	2.76	4.02	6.02	10.78
l	mm	132	132	150	200
	in.	5.20	5.20	5.91	7.87
Weight	kg	1.0	3.9	6.2	9.3
	lbs	2.21	8.61	13.69	20.53
Max. extension, axial	mm	40	56	44	60
	in.	1.57	2.20	1.73	2.36
Compression	mm	20	28	22	30
	in.	0.79	1.10	0.87	1.18
Tension	mm	20	28	22	30
	in.	0,79	1.10	0.87	1.18
Max. bending angle	degrees [1]	± 30°	± 30°	± 14°	± 13°
Lateral displacement	mm	7	9	3.5	4.5
	in.	0.28	0.35	0.14	0.18

Ordering Information

Stainless steel	Part No.	**887 70**	**887 71**	**887 72**	**887 68**

[1] When utilizing the maximum bend, no extension along the axial axis will be possible!

Flexible Vacuum Hoses (Stainless Steel 1.4571) with Flanges (Stainless Steel 1.4301)



Dimensional drawing for the flexible vacuum hoses

Technical Data

DN	ISO-K	63	63	63	63	100	100	100	100
d_1	mm	70	70	70	70	102	102	102	102
	in.	2.76	2.76	2.76	2.76	2.76	4.02	4.02	4.02
l	mm	250	500	750	1000	250	500	750	1000
	in.	9.84	19.69	29.53	39.37	9.84	19.69	29.53	39.37
Max. bending radius with multiple bending	mm	250	250	250	250	370	370	370	370
	in.	9.84	9.84	9.84	9.84	14.57	14.57	14.57	14.57
with single bend	mm	160	160	160	160	240	240	240	240
	in.	8.30	8.30	8.30	8.30	9.45	9.45	9.45	9.45

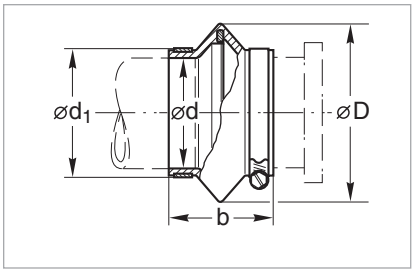
Ordering Information

Stainless steel	Part No.	**868 37**	**867 97**	**868 34**	**868 07**	**868 38**	**867 98**	**868 35**	**868 08**

Important: In the table of Section “General” the German designation for the type of steel is also stated in accordance with AISI.

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Flexible Compensation Elements (CR)



Dimensional drawing for the flexible compensation elements

Technical Data

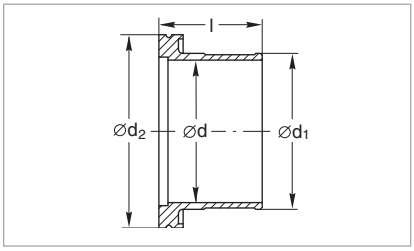
DN	ISO-K	63	100	160
D	mm	120	150	200
	in.	4.72	5.91	7.87
d	mm	75	106	155
	in.	2.95	4.17	6.10
d_1	mm	85	116	165
	in.	3.35	4.57	6.50
b	mm	70	72	72
	in.	2.76	2.83	2.83

Ordering Information

CR	Part No.	**272 23** [1]	**272 24** [1]	**272 25** [1]

[1] Is supplied complete with stainless steel hose clamps

Connections for Flexible Compensation Elements (Aluminum 3.2315.71)



Dimensional drawing for the connections for flexible compensation elements

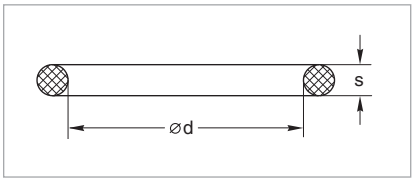
Technical Data

DN	ISO-K	63	100	160
d	mm	70	102	150
	in.	2.76	4.02	5.91
d_1	mm	76	107	156
	in.	2.99	4.21	6.14
d_2	mm	95	130	180
	in.	3.74	5.12	7.09
l	mm	51	56	56
	in.	2.01	2.20	2.20

Ordering Information

Aluminum	Part No.	**272 35**	**272 36**	**272 37**

Spare O-Ring Gaskets for Clamp Flange Fittings



Dimensional drawing for the spare O-ring for clamp flange fittings

Technical Data

DN	ISO-K	63	100	160	200	250	320
d	mm	75	107	158	208	253	329
	in.	2.95	4.21	6.22	8.19	9.96	12.95
s	mm	5	5	5	5	5	7
	in.	0.20	0.20	0.20	0.20	0.20	0.28
Quantity per set		5	5	5	5	5	1

Ordering Information

FPM (FKM)	Part No.	**210 635**	**210 645**	**210 650**	**210 655**	**210 660**	**210 665**

Technical Data

DN	ISO-K	400	500	630	800	1000
d	mm	405	506	658	808	1006
	in.	15.94	19.92	25.90	31.80	39.61
s	mm	7	7	7	7	7
	in.	0.28	0.28	0.28	0.28	0.28
Quantity per set		1	1	1	1	1

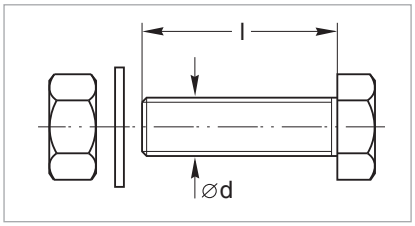
Ordering Information

FPM (FKM)	Part No.	**210 670**	**210 675**	**210 680**	**210 685**	**210 690**

Important: In the table of Section “General” the German designation for the type of steel is also stated in accordance with AISI.

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Bolts for Clamp Flange Fittings (Steel 8.8, zinc coated)



Dimensional drawing for the bolts
for clamp flange fittings

Technical Data

DN	ISO-K	63 - 100	160 - 250	320 - 500	630
Dimensions					
d	thread	M 8	M 10	M 12	M 12
l	mm	40	50	70	80
	in.	1.57	1.97	2.76	3.15
Quantity per set					
Bolts		8	12	16	20
Nuts		8	12	16	20
Washers		8	12	16	20

Ordering Information

Set	Part No.				
		887 81	**887 82**	**887 83**	**887 84**

Important: In the table of Section “General” the German designation for the type of steel is also stated in accordance with AISI.

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ISO-F and DIN 2501 Fixed Flange Fittings, ND 6

Note: ND 6 states a dimension and not refer to an operating pressure of 6 bar!

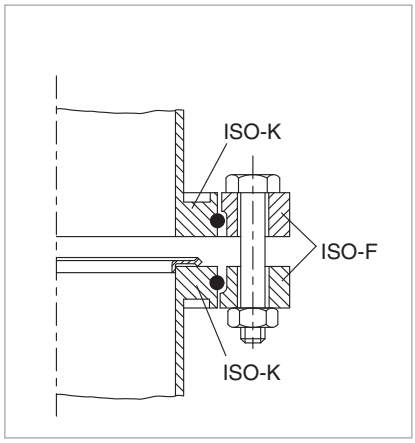


Mating clamp flanges with tubulation using collar rings and sealing disk

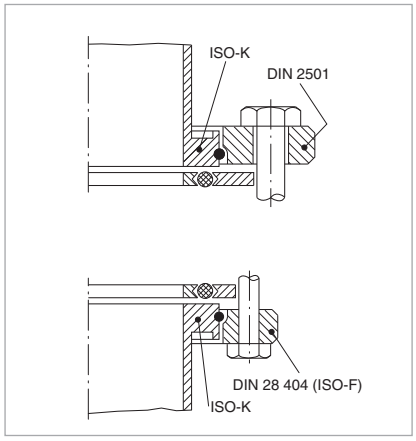
In addition to clamp flange connections, fixed welded flanges (ISO-F or to DIN 2501) are used in the area of vacuum engineering to interconnect valves, pumps and other components.

Advantages to the User

- A high vacuum seal is maintained also at large nominal width and high mechanical loads
- Evenly distributed sealing force through a large number of bolts
- Can be easily adapted to other flange systems
- Vacuum sealing disks consist of a CR O-ring seal with inner and outer aluminum ring
- Fixed flanges and collar flanges may also be constructed as all-metal seals by using ultra sealing disks



Mating clamp flanges using bolted collar rings and ultra sealing disk



Comparison:
Clamp flange with collar flange to DIN 2501 and clamp flange with collar flange to DIN 28 404; ISO-F

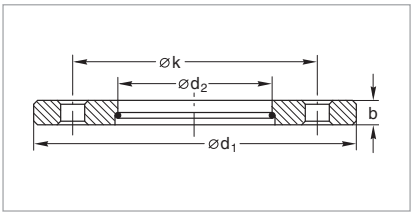
Collar Flange	Steel	Stainless Steel
Bolts and nuts	Galvanized 8.8 steel	1.4401
Retaining ring	Steel	1.4310

Important: In the table of Section “General” the German designation for the type of steel is also stated in accordance with AISI.

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ISO-F Fixed Flange Fittings

ISO-F Collar Flanges with Retaining Ring for use with Clamp Flange Fittings (Steel 1.0037)



Dimensional drawing for collar flanges with retaining ring

Technical Data

DN	ISO-F	63	100	160	200	250
d_1	mm	130	165	225	285	335
	in.	5.12	6.50	8.86	11.22	13.19
d_2	mm	95.6	130.6	180.9	240.9	290.9
	in.	3.76	5.14	7.12	9.48	11.45
k	mm	110	145	200	260	310
	in.	4.93	5.71	7.87	10.24	12.20
b	mm	12	12	16	16	16
	in.	0.47	0.47	0.63	0.63	0.63
Number of holes		4	8	8	12	12

Ordering Information

Nickel-plated steel	Part No.	**267 67**	**267 70**	**267 71**	**267 68**	**267 72**

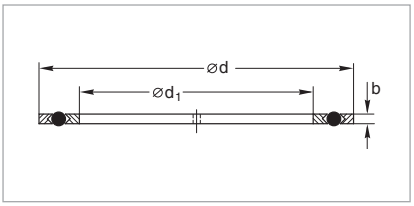
Technical Data

DN	ISO-F	320	400	500	630
d_1	mm	425	510	610	750
	in.	16.73	20.08	24.02	29.53
d_2	mm	370.8	451.0	551.0	691.0
	in.	14.60	17.76	21.69	27.2
k	mm	395	480	580	720
	in.	15.51	18.90	22.83	28.35
b	mm	20	20	20	24
	in.	0.79	0.79	0.79	0.79
Number of holes		12	16	16	20

Ordering Information

Nickel-plated steel	Part No.	**267 76**	**267 74**	**267 75**	**267 77**

Vacuum Sealing Disks for ISO-F Flanges (Aluminum/CR)



Dimensional drawing for vacuum sealing disks

Technical Data

DN	ISO-F	63	100	160	250	320
d	mm	98	132	185	295	375
	in.	3.86	5.20	7.28	11.61	14.76
d_1	mm	73	107	160	270	330
	in.	2.87	4.21	6.3	10.63	12.99
b	mm	4	4	4	4	6
	in.	0.16	0.16	0.16	0.16	0.24

Ordering Information

Aluminum/CR	Part No.	**171 09**	**171 10**	**171 11**	**171 12**	**171 19**

Technical Data

DN	ISO-F	400	500	630	800	1000
d	mm	460	560	701	870	1070
	in.	18.11	22.05	27.60	34.25	42.13
d_1	mm	415	515	656	825	1025
	in.	16.34	20.28	25.83	32.48	40.35
b	mm	6	6	6	6	6
	in.	0.24	0.24	0.24	0.24	0.24

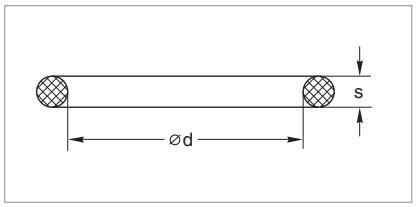
Ordering Information

Al/CR	Part No.	**171 14**	**171 15**	**171 16**	**171 17**	**171 18**

Important: In the table of Section "General" the German designation for the type of steel is also stated in accordance with AISI.

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Spare O-Ring Gaskets ISO-F Flange Connection



Dimensional drawing for O-rings

Technical Data

DN	ISO-F	63	100	160	250	320
d	mm	80	110	165	265	325
	in.	3.15	4.33	6.50	10.43	12.75
s	mm	5	5	5	5	8
	in.	0.20	0.20	0.20	0.20	0.31
Quantity per set		5	5	5	5	1

Ordering Information

CR	Part No.	ES210701	ES210711	ES210716	ES210721	ES210726

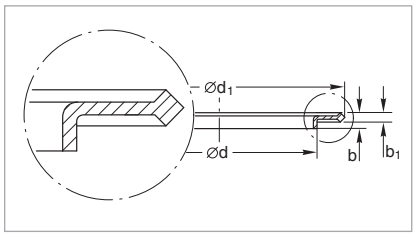
Technical Data

DN	ISO-F	400	500	630	800	1000
d	mm	412	510	640	820	1023
	in.	16.22	20.08	25.20	32.28	40.28
s	mm	8	8	8	8	8
	in.	0.31	0.31	0.31	0.31	0.31
Quantity per set		1	1	1	1	1

Ordering Information

CR	Part No.	ES210731	upon request	ES210741	ES210746	ES210751

Ultra Sealing Disks (Aluminum 3.2315.71) for ISO-F Flanges



Dimensional drawing for O-rings

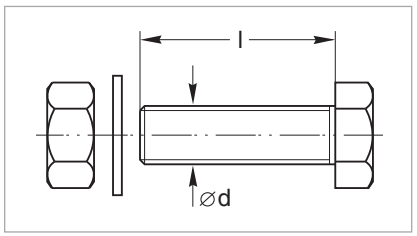
Technical Data

DN	ISO-K / ISO-F	63	100	160	250
b	mm	4.5	4.5	4.5	4.5
	in.	0.18	0.18	0.18	0.18
b_1	mm	2.6	2.6	2.6	2.6
	in.	0.10	0.10	0.10	0.10
d	mm	69.8	101.8	152.8	260.8
	in.	2.75	4.01	6.02	10.27
d_1	mm	85.6	116.6	166.6	276.6
	in.	3.37	4.59	6.56	10.89

Ordering Information

Aluminum	Part No.	886 24	886 25	886 26	886 27

Bolts for ISO-F Flange Connection (Steel 8.8, zinc coated)



Dimensional drawing for the bolts
for ISO-F flange fconnections

Technical Data

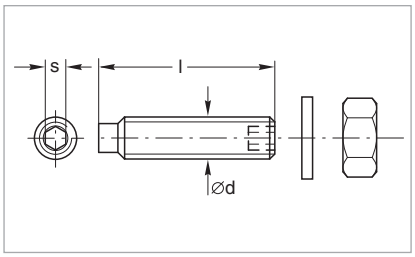
DN	ISO-F	63 - 100	160 - 250	320 - 500	630
Dimensions					
d	thread	M 8	M 10	M 12	M 12
l	mm	40	50	70	80
	in.	1.57	1.97	2.76	3.15
Quantity per set					
Bolts		8	12	16	20
Nuts		8	12	16	20
Washers		8	12	16	20

Ordering Information

Set	Part No.	887 81	887 82	887 83	887 84

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Bolts, Nuts and Washers for Joints with VAT Gate Valves



Dimensional drawing for the set screws, nuts and washers

Technical Data

DN	ISO-F	40 CF	63-100 ISO-F/63-200 CF	160-250 ISO-F
Dimensions				
d	**thread**	M 6	M 8	M 10
l	**mm**	35	45	55
	in.	1.38	1.77	2.17
s	**mm**	3	4	6
	in.	0.12	0.16	0.24
Quantity per set				
Bolts		6	16	12
Nuts		6	16	12
Washers		6	16	12

Ordering Information

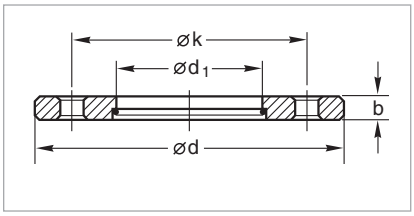
Set	Part No.	**839 11**	**839 13**	**210 071**

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DIN 2501 Fixed Flange Fittings; Dimensions to DIN 2501, ND 6

Note: ND 6 states a dimension and does not refer to an operating pressure of 6 bar!

Collar Flanges with Retaining Ring (Steel 1.0037)



Dimensional drawing for collar flanges with retaining ring

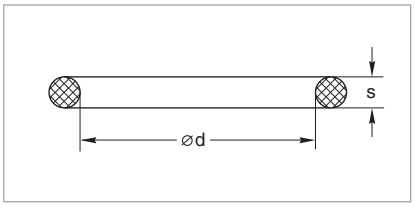
Technical Data

DN	DIN	63	100	160	250
d	mm	160	210	265	375
	in.	6.30	8.27	10.43	14.76
d_1	mm	95.6	130.6	180.9	290.9
	in.	3.76	5.14	7.12	11.45
k	mm	130	170	225	335
	in.	5.12	6.69	8.86	13.19
b	mm	12	15	15	15
	in.	0.47	0.59	0.59	0.59

Ordering Information

Steel	Part No.	**267 47**	**267 50**	**267 51**	**267 52**

Spare O-Ring Gaskets for Vacuum Sealing Disks DIN 2501



Dimensional drawing for O-ring gaskets

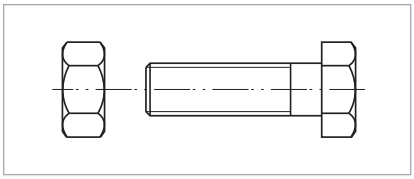
Technical Data

DN	ISO-F	63	100	160
d	mm	80	110	165
	in.	3.15	4.23	6.50
s	mm	5	5	5
	in.	0.20	0.20	0.20
Quantity per set		5	5	5

Ordering Information

CR	Part No.	**ES 210 701**	**ES 210 711**	**ES 210 716**

Bolts and Nuts for DIN Collar Flange



Dimensional drawing for bolts and nuts

Technical Data

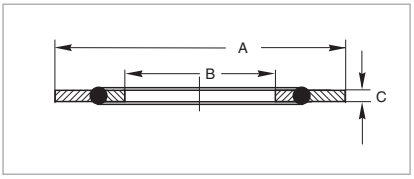
DN	DIN	63	100	160	250
Dimensions d	thread	M 12	M 16	M 16	M 15
l	mm	40	50	50	50
	in.	1.57	1.97	1.97	3.15
Number of bolts/nuts required		4	8	8	12

Ordering Information

1 bolt (galvanized 8.8 steel)	Part No.	**201 02 381**	**201 02 434**	**201 02 434**	**201 02 434**
1 nut (galvanized 8.8 steel)	Part No.	**211 01 115**	**211 01 117**	**211 01 117**	**211 01 117**

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Sealing Disc Assembly



Dimensional drawing for the sealing disc assembly

Technical Data

DN	DIN	63	100	160	250
⌀ A	mm	117	154	208	318
	in.	4.06	6.06	8.19	12.52
⌀ B	mm	71	105	158	264
	in.	2.80	4.13	6.22	10.39
C	mm	4	4	4	5
	in.	0.16	0.16	0.16	0.20
Material		Aluminum	Aluminum	Aluminum	Aluminum

Ordering Information

Replaceable O-Ring					
Buna-N	Part No.	**170 44**	**170 45**	**170 46**	**170 47**
Viton	Part No.	**882 56**	**882 57**	**882 58**	**882 59**

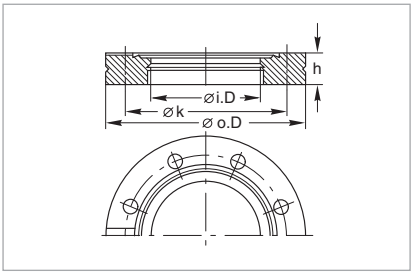
For sealing ISO-K flanges see the centering rings described in the section “(ISO-K) Clamp Flange Fittings and Components”.

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CF Flanges



The CF flange connection consists of two identical flanges with a flat gasket made of **OFHC copper**, bolts, nuts and washers.



Dimensional drawing for CF flanges

Sealing Principle

When assembling the CF flange connection, the flat copper gasket fits with a slight clearance into the outer recess of the flanges and thus assures good centering of the flange connection. If the flange bolts are properly tightened according to the instructions, the knife edge of the flanges penetrates into the flat copper gasket, whereby the shear action of the outer face of the cutting edge - as seen from the flange axis - produces a yield pressure on the copper gasket, while the inner face of the edge produces a cutting action.

During this process the copper gasket adapts it-self optimally to the microstructure of the outer knife edge. This explains the high sealing effect and the especially low leak rates of CF flange connections. A radial grove extending right up to the sealing ring is provided for leak testing of the flange connection. In order to ensure that the sealing knife edge is not damaged during frequent use of the flanges, the conventional geometry of such knife edges for CF flanges has been developed further. By using the Oerlikon Leybold Vacuum developed obtuse angled knife edge profile the strength of the sealing knife edges has been significantly stabilized. In addition to the actual knife edge, the flanges are provided with a concentric sealing surface for placement of a FPM (FKM) gasket or a supporting ring with FPM O-ring, which may be baked up to 150 °C (302 °F) (does not apply to observation windows).

This design has the advantage, that it is possible to equip the apparatus with elastomer gaskets prior to final assembly, so that the system can be tested under normal high vacuum conditions.

Technical Data

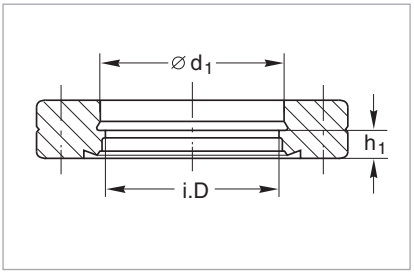
DN	CF	16	40	63	100	160	200	250
Outside diameter o. D.	inch	1.33"	2.75"	4.50"	6.00"	8.00"	10.00"	12.00"
Outside diameter o. D.	mm	34.0	69.5	113.5	152.0	202.5	253.0	305.0
Inside diameter i. D.	inch	0.33"	1.375"	2.50"	4.00"	6.00"	8.00"	10.00"
Inside diameter i. D.	mm	16.0	36.8	66.0	104.0	155.0	200.0	250.0
Bolt circle diameter k	mm	27.0	58.7	92.2	130.3	181.0	231.8	284.0
High h	mm	7.5	13.0	17.5	20.0	22.0	24.5	24.5
Number of holes		6	6	8	16	20	24	32
Hole diameter	mm	4.3	6.6	8.4	8.4	8.4	8.4	8.4

Conversion Factors

1. Magnetizing field H, unit:	A x m^{-1}
Previously used unit: Oerstedt (Oe)	1 Oe = 79.577 (A x m^{-1})
2. Strength of the magnetic field B, unit:	Vs x m^2 = Tesla (T)
Previously used unit: Gauß (G)	1 G = 10^{-4} Vs x m^2 = 10^{-4} T

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CF Bore Flanges, Fixed



Dimensional drawing for the CF bore flanges, fixed

Technical Data

DN	CF	16	40	63	100	160	200	250
Outside diameter	inch	1.33"	2.75"	4.50"	6.00"	8.00"	10.00"	12.00"
Inside diameter	mm	16.0	36.8	66.0	104.0	155.0	200.0	250.0
d_1	mm	18.3	40.3	70.3	108.5	159.5	205.5	256.5
h_1	mm	4.2	5.5	9.5	11.0	12.0	12.5	12.5

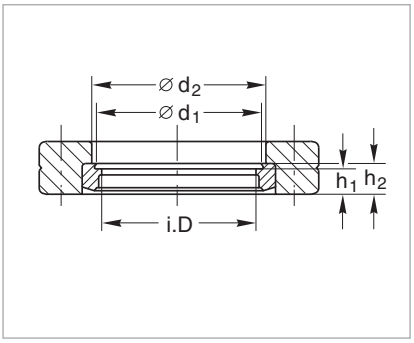
For missing dimensions see “Technical Data” at the beginning of the Section “CF Flanges”

Ordering Information

Material: DIN 1.4301

Part No.	**835 41**	**835 37**	**835 38**	**835 39**	**835 40**	**835 47**	**835 49**

CF Bore Flanges, Rotatable



Dimensional drawing for the CF bore flanges, rotatable

Technical Data

DN	CF	16	40	63	100	160	200	250
Outside diameter	inch	1.33"	2.75"	4.50"	6.00"	8.00"	10.00"	12.00"
Inside diameter	mm	16.0	36.8	66.0	104.0	155.0	200.0	250.0
d_1	mm	18.3	40.3	70.3	108.5	159.5	205.5	256.5
d_2	mm	18.6	41.0	71.0	109.0	160.0	206.0	257.0
h_1	mm	4.2	5.5	9.5	11.0	12.0	12.5	12.5
h_2	mm	5.8	7.6	12.6	14.3	15.8	17.1	18.0

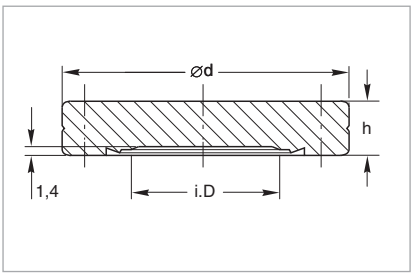
For missing dimensions see “Technical Data” at the beginning of the Section “CF Flanges”

Ordering Information

Material: DIN 1.4301

Part No.	**835 61**	**835 58**	**835 59**	**835 60**	**835 69**	**835 67**	**835 78**

CF Blank Flanges, Fixed



Dimensional drawing for the CF blank flanges, fixed

Technical Data

DN	CF	16	40	63	100	160	200	250
Outside diameter	inch	1.33"	2.75"	4.50"	6.00"	8.00"	10.00"	12.00"
Inside diameter	mm	14	38	66	104	155	205	256
d	mm	34.0	69.5	113.5	152.0	202.5	253.0	305.0
h	mm	7.5	13.0	17.5	20.0	22.0	24.5	24.5

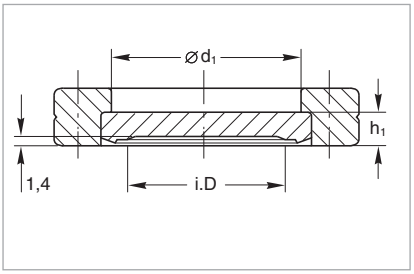
For missing dimensions see “Technical Data” at the beginning of the Section “CF Flanges”

Ordering Information

Material: DIN 1.4301

Part No.	**835 01**	**835 03**	**835 04**	**835 05**	**835 06**	**835 07**	**835 09**

CF Blank Flanges, Rotatable



Dimensional drawing for the CF blank flanges, rotatable

Technical Data

DN	CF	16	40	63	100	160	200	250
Outside diameter	inch	1.33"	2.75"	4.50"	6.00"	8.00"	10.00"	12.00"
Inside diameter	mm	14	38	66	104	155	205	256
d_1	mm	18.6	41.0	71.0	109.0	160.0	206.0	257.0
h_1	mm	5.8	7.6	12.6	14.3	15.8	17.1	18.0

For missing dimensions see “Technical Data” at the beginning of the Section “CF Flanges”

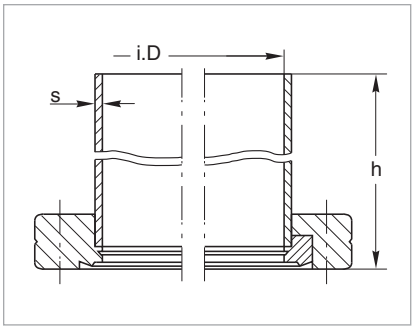
Ordering Information

Material: DIN 1.4301

Part No.	**835 21**	**835 23**	**835 24**	**835 25**	**835 26**	**835 27**	**835 29**

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CF Flanges with Tube End



Dimensional drawing for the CF flanges with tube end; left fixed, right rotatable

Technical Data

DN	CF	16	40	63	100	160
Outside diameter	inch	1.33"	2.75"	4.50"	6.00"	8.00"
Inside diameter	mm	16.0	36.8	66.0	104.0	155.0
s	mm	1.0	1.6	2.0	2.0	2.0
h	mm	38	63	105	135	167

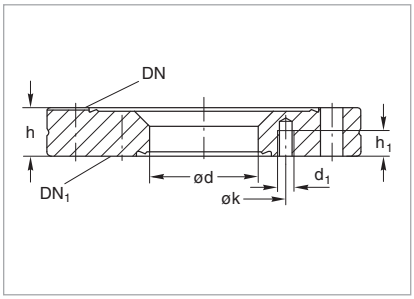
For missing dimensions see “Technical Data” at the beginning of the Section “CF Flanges”

Ordering Information

Material: DIN 1.4301

Tube end						
fixed	Part No.	**835 51**	**835 31**	**835 32**	**835 33**	**835 34**
rotatable	Part No.	**835 71**	**835 82**	**835 74**	**835 75**	**835 76**

CF Reducing Flanges



Dimensional drawing for the CF reducing flanges, fixed

Technical Data

DN	CF	40	63	100	100	160	160
Outside diameter	inch	2.75"	4.50"	6.00"	6.00"	8.00"	8.00"
DN_1	CF	16	40	40	63	40	100
k	mm	27.0	58.7	58.7	92.2	58.7	130.0
h	mm	13.0	17.5	20.0	20.0	22.0	22.0
h_1	mm	5.5	9.0	9.0	11.0	9.0	11.0
d	mm	16	39	39	66	39	104
d_1	mm	M 4	M 6	M 6	M 8	M 6	M 8

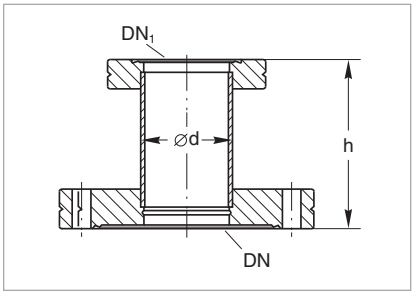
For missing dimensions see “Technical Data” at the beginning of the Section “CF Flanges”

Ordering Information

Material: DIN 1.4301

	Part No.	**836 85**	**836 86**	**836 87**	**836 89**	**836 90**	**836 91**
Matching stud bolts							
	Part No.	**839 10**	**839 11**	**839 11**	**839 13**	**839 11**	**839 13**

CF Reducing Pieces



Dimensional drawing for the CF reducing pieces

Technical Data

DN	CF	40	63	100	100	160
Outside diameter	inch	2.75"	4.50"	6.00"	6.00"	8.00"
DN_1	CF	16	40	40	63	100
h	mm	45	75	75	95	105
d (tube)	mm	18	40	40	70	108

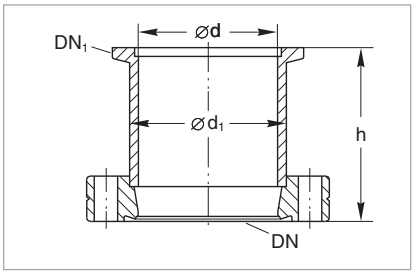
For missing dimensions see “Technical Data” at the beginning of the Section “CF Flanges”

Ordering Information

Material: DIN 1.4301

	Part No.	**837 10**	**837 15**	**837 16**	**837 19**	**837 22**

UHV CF/KF Adaptors



Dimensional drawing for the CF/KF adaptors

Technical Data

DN	CF	16	16	40	40	40	63
Outside diameter	inch	1.33"	1.33"	2.75"	2.75"	2.75"	4.50"
DN_1	KF	16	25	16	25	40	40
d	mm	16	16	16	26	37	41
h	mm	35	35	30	30	50	35
d_1 (tube)	mm	20	20	20	30	41	45

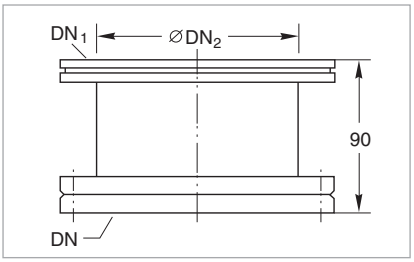
Ordering Information

Material: DIN 1.4301

	Part No.	**837 81**	**837 83**	**837 82**	**837 84**	**837 36**	**837 86**

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UHV CF/ISO-K Adaptors



Dimensional drawing for the CF/ISO-K adaptors

Technical Data

DN	CF	63	100	160
Outside diameter	inch	4.50"	6.00"	8.00"
DN_1	ISO-K	63	100	160
DN_2	mm	66	104	153

Ordering Information

Material: DIN 1.4301

Part No.	**837 01**	**837 02**	**837 03**

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Observation Windows for Vacuum Systems

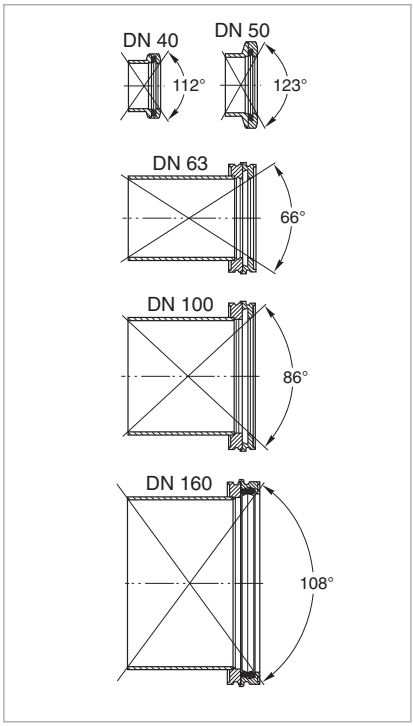


Observation of the phenomena in the vacuum chamber is very important for many vacuum processes. Measurements and monitoring can often be accomplished only by means of external instruments used under normal atmospheric pressure conditions.

This calls for highly transparent, rugged observation windows featuring a wide angle view.

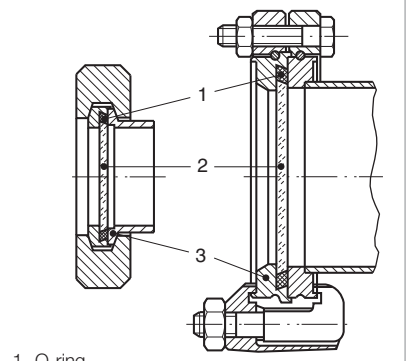
Advantages to the User

- Flat design
- Easy to fit and remove
- Easy to clean
- Wide viewing angle
- Can be baked out up to 150 °C (302 °F)
- May be combined with KF and ISO-K components
- No special mounting components are required
- The FPM (FKM) O-ring seals against the atmosphere (integrated centering ring)
- Each observation window is subjected to a leak test (thereby ensuring safe operation!)



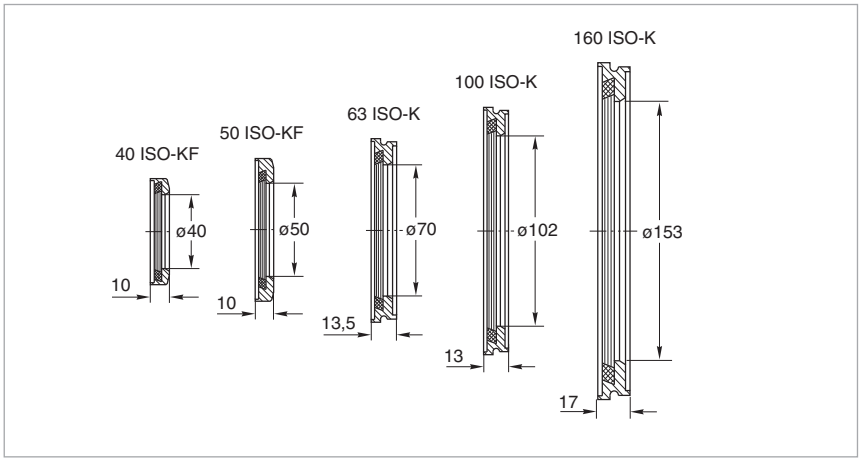
Viewing angle into vacuum chamber through observation window DN 40 ISO-KF - DN 160 ISO-K (mounting on matching flanges with tubulation)

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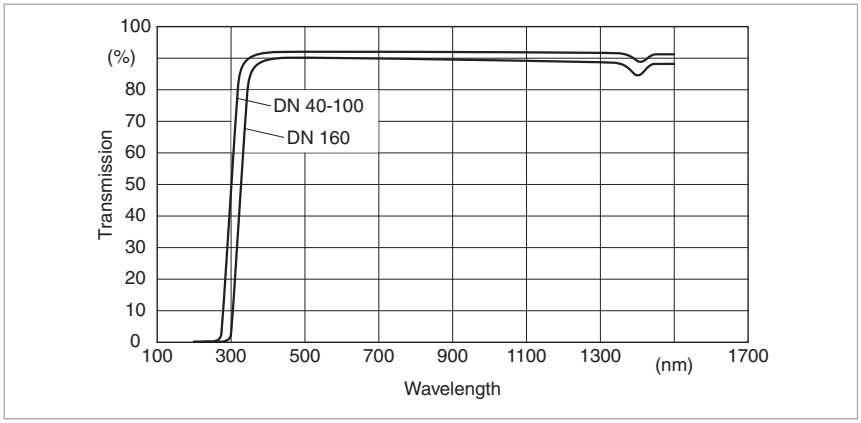


1 O-ring
2 Glass
3 Flange

ISO-KF and ISO-K observation windows, fully installed



Window dimensions for the observation windows



Transmittance as a function of the wavelength for Oerlikon Leybold Vacuum viewports DN 40 ISO-KF to DN 160 ISO-K for different window thicknesses

Technical Data — Observation Windows

DN		40 ISO-KF	50 ISO-KF	63 ISO-K	100 ISO-K	160 ISO-K
Thickness of glass window	**mm**	4	4	4	5	9
	in.	0.16	0.16	0.16	0.20	0.35
Diameter of glass window	**mm**	44	54	75	109	160
	in.	1.73	2.13	2.95	4.29	6.30
	mm	10.0	10.0	13.5	13.0	17.0
	in.	0.39	0.39	0.53	0.51	0.67
	mm	40	50	70	102	153
	in.	1.57	1.97	2.76	4.02	6.02
Viewing angle	°	112	123	66	86	108

The glass used is a borosilicate glass (BOROFLOAT® 33) with a refractive index of n = 1.472

Dielectric number (at 25 °C (77 °F))	4.8 at 1 MHz
Flange material	Stainless steel 1.4301
Glass material	Borosilicate
O-ring material	FPM (FKM)
Leak rate	$< 10^{-8}$ mbar x l/s

Ordering Information — Observation Windows

	DN	40 ISO-KF	50 ISO-KF	63 ISO-K	100 ISO-K	160 ISO-K
Observation Windows	**Part No.**	**210 131**	**210 132**	**210 133**	**210 134**	**210 135**

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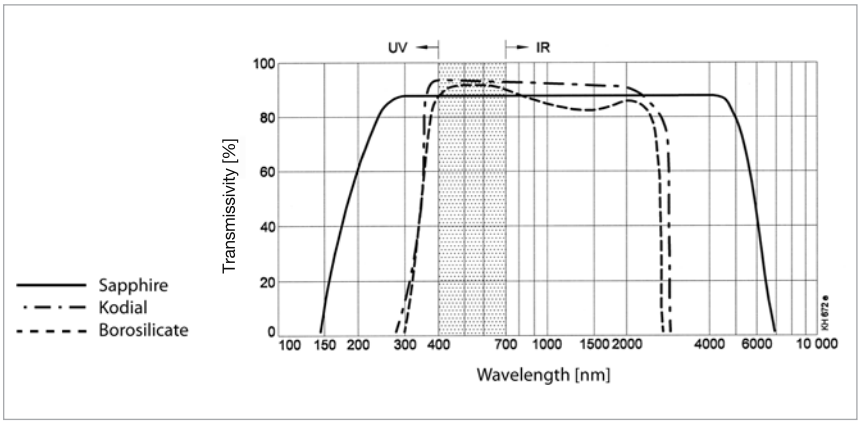
CF Observation Windows



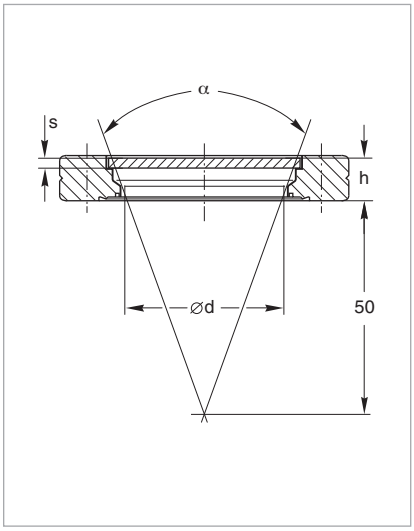
Standard glass is normally only used for visual observations, for photography of experiment details and, among other things, for pyrometer measurements.

Advantages to the User

- Optically plane-parallel glass surface up to just before the edge
- Flange with a wide viewing angle



Optical transmissivity for the CF observation windows



Dimensional drawing for CF observation windows

Technical Data

DN	CF	40	63	100	160
Thickness of the glass (s)	mm	3.0	3.5	6.0	8.0
Diameter of viewing area (d)	mm	38	65	90	135
Viewing angle (α)	°	38	57	71	92
Spacing of the glass (h), approx.	mm	11.0	16.4	8.0	10.0
Viewing distance	mm	50	50	50	50
Wavelength range	nm	400 to 3000	400 to 3000	400 to 3000	400 to 3000
Material		Vacon (compensation ring)	Vacon (compensation ring)	Vacon (compensation ring)	Vacon (compensation ring)
Mean transmission ratio	%	93 in the visible range	93 in the visible range	93 in the visible range	93 in the visible range
Type of glass		Kodial	Kodial	Kodial	Kodial
Max. heating rate	min	5	5	5	5
Max. bakeout temperature	°C (°F)	400 (752)	400 (752)	400 (752)	400 (752)

Ordering information

CF observation window					
	Part No.	**210 112**	**210 114**	**210 115**	**210 116**

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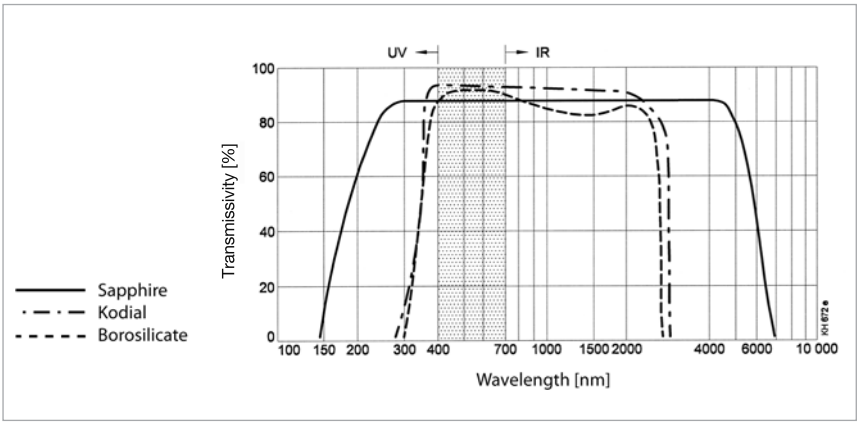
CF Sapphire Observation Windows



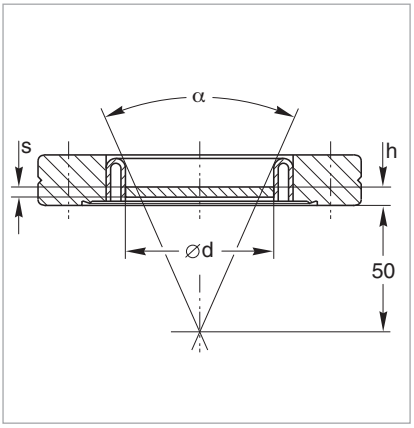
Sapphire exhibits a transmissivity range of 250 nm to 5500 nm. The infrared limit is shifted far in to the infrared range. For this reason, glass of this type is used in connection with sun simulation tests, Laser experiments, high-temperature plasma measurements and spectroscopic measurements, for example.

Advantages to the User

- Optically plane-parallel glass surface up to just before the edge



Optical transmissivity for the CF Sapphire observation windows



Dimensional drawing for the CF sapphire observation windows

Technical Data

DN	CF	40
Thickness of the glass (s)	mm	3.0
Diameter of viewing area (d)	mm	23
Viewing angle (α)	°	23
Spacing of the glass (h), approx.	mm	10
Viewing distance	mm	50
Wavelength range	nm	250 to 5500
Mean transmission ratio	%	> 80
Type of glas		Sapphire
Max. heating rate	min	5
Max. bakeout temperature	°C (°F)	400 (752)

Ordering information

CF sapphire observation windows	Part No.	**210 122**

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CF Components



CF components are manufactured according to the requirements outlined in the introductory chapter. They are made from selected and corrosion resistant types of stainless steel. Both design and production methods are such, that the components meet the requirements of UHV applications. All components are fusion welded from the inside to prevent fissures and pocket holes (virtual leaks which cannot be located by leak detection methods from the outside). If welding from the outside cannot be avoided due to design constraints, the welding seam penetrates to the inner side, the side of the vacuum.

A carefully implemented cleaning process and suitable packaging for the components are essential pre-requisites for obtaining pressures in the UHV range within reasonably short pump down times after assembly (providing the remainder of the apparatus is clean too).

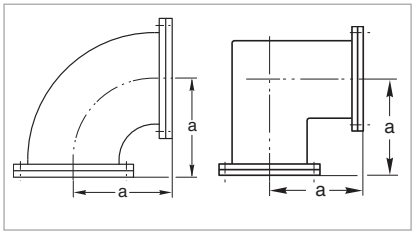
For applications in the extreme UHV range (XHV) the outgassing rate of the CF flanges and the UHV components can be reduced by about two orders of magnitude by a special degassing process.

Advantages to the User

- Low degassing rates
- High degassing temperature
- Leak rates below 1×10^{-11} mbar x l x s^{-1}
- Basic dimensions correspond to those of the components from other international manufacturers
- Bolts may be inserted from the side of the body

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Pipe Bend 90°; from DN 160 CF Mitred Elbow



Dimensional drawing for the pipe bends 90° (left) and the mitred elbows (right)

Technical Data

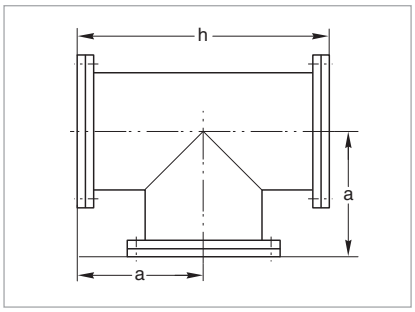
DN	CF	16	40	63	100	160
Outside diameter	inch	1.33"	2.75"	4.50"	6.00"	8.00"
a	mm	38	63	105	135	167

For missing dimensions see “Technical Data” at the beginning of the Section “CF Flanges”

Ordering Information

Elbow 90° with a rotatable flange	Part No.	**836 04**	**836 05**	**836 06**	**836 07**	**836 08**

Tees



Dimensional drawing for the tees

Technical Data

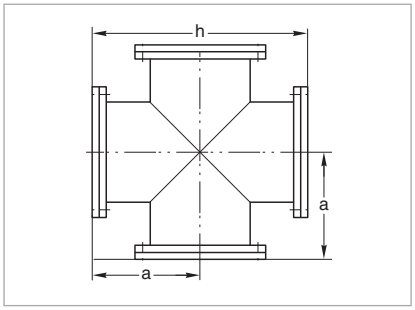
DN	CF	16	40	63	100	160
Outside diameter	inch	1.33"	2.75"	4.50"	6.00"	8.00"
a	mm	38	63	105	135	167
h	mm	76	126	210	270	334

For missing dimensions see “Technical Data” at the beginning of the Section “CF Flanges”

Ordering Information

Tee with a rotatable flange on each axis	Part No.	**836 14**	**836 15**	**836 16**	**836 17**	**836 18**

Crosses



Dimensional drawing for the crosses

Technical Data

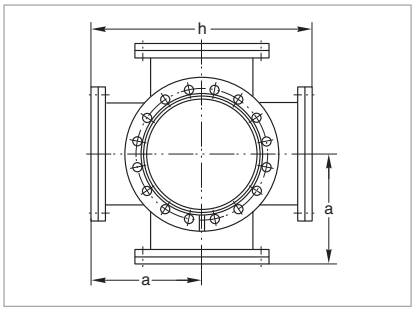
DN	CF	16	40	63	100	160
Outside diameter	inch	1.33"	2.75"	4.50"	6.00"	8.00"
a	mm	38	63	105	135	167
h	mm	76	126	210	270	334

For missing dimensions see “Technical Data” at the beginning of the Section “CF Flanges”

Ordering Information

Cross with a rotatable flange on each axis	Part No.	**836 34**	**836 35**	**836 36**	**836 37**	**836 38**

Double Crosses



Dimensional drawing for the double crosses

Technical Data

DN	CF	40	63	100	160
Outside diameter	inch	2.75"	4.50"	6.00"	8.00"
a	mm	63	105	135	167
h	mm	126	210	270	334

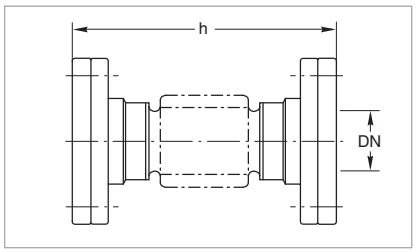
For missing dimensions see “Technical Data” at the beginning of the Section “CF Flanges”

Ordering Information

Double cross with a rotatable flange on each axis	Part No.	**836 45**	**836 46**	**836 47**	**836 48**

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Flexible Connecting Components (CF Bellows)



Dimensional drawing for the CF bellows

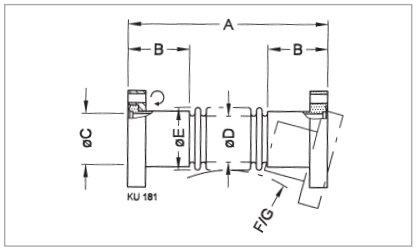
Technical Data

DN	CF	16	40	63	100	160
Outside diameter	inch	1.33"	2.75"	4.50"	6.00"	8.00"
h	mm	76 ±1.5	126 ±2.0	139 ±2.0	142 ±2.0	250 ±3.0

Ordering Information

CF bellows with one rotatable flange						
	Part No.	**880 01**	**880 02**	**880 03**	**880 04**	**–**

Flexible Connecting Components (CF Corrugated Hoses)



Dimensional drawing for the CF corrugated hoses

Technical Data

DN	CF	16	16	16	16
Outside diameter	inch	1.33"	1.33"	1.33"	1.33"
A = Length	mm	250	500	750	1000

Ordering Information

CF corrugated hose with one rotatable flange					
	Part No.	**885 56**	**885 68**	**885 65**	**885 73**

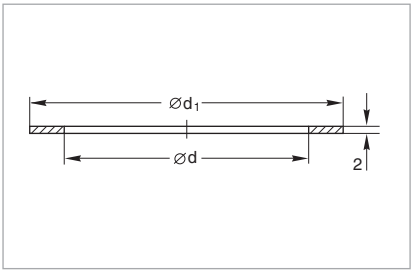
Dimensions

DN	CF	16
B	mm	23.0
C	mm	16.0
D	mm	15.0
E	mm	22.5
F	mm	70.0
G	mm	50.0

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Accessories for CF Components

Copper Gaskets for CF Flanges (OFHC Copper – Oxygen-Free)



Dimensional drawing for the copper gaskets for CF flanges

Technical Data

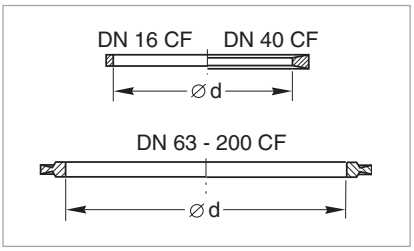
DN	CF	16	40	63	100	160	200	250
Outside diameter	inch	1.33"	2.75"	4.50"	6.00"	8.00"	10.00"	12.00"
d	mm	16.2	39.0	63.6	101.8	152.6	203.4	254.0
d_1	mm	21.3	48.1	82.4	120.5	171.3	222.1	272.7
Set of 5		–	–	–	–	–	–	x
Set of 10		x	x	x	x	x	x	–

Ordering Information

Qualität: Standard

Part No.	839 41	839 43	839 44	839 45	839 46	839 47	839 48

FPM (FKM) Profiled Gasket without Support Ring



Dimensional drawing for the profiled gaskets without support ring

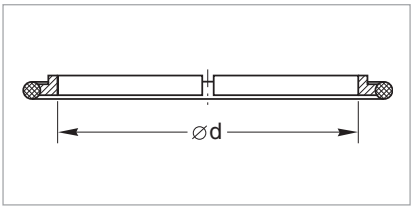
Technical Data

DN	CF	16	40	63	100	160	200
Outside diameter	inch	1.33"	2.75"	4.50"	6.00"	8.00"	10.00"
d	mm	16.0	42.0	69.7	107.8	156.0	206.0
Bakeout temperature	°C (°F)	160 (320)	160 (320)	160 (320)	160 (320)	160 (320)	160 (320)
Set of 2		–	–	x	x	x	x
Set of 5		x	x	–	–	–	–

Ordering Information

Part No.	839 21	839 23	839 34	839 35	839 36	839 37

FPM (FKM) O-ring with Support Ring



Dimensional drawing for the FPM (FKM) O-rings with support ring

Technical Data

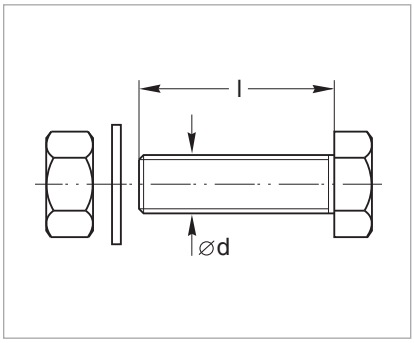
DN	CF	250
Outside diameter	inch	12.00"
d	mm	248.3
Bakeout temperature	°C (°F)	160 (320)

Ordering Information

Part No.	839 03

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Hexagon Bolts, Set for CF Flanges



Dimensional drawing for the hexagon bolts for CF flanges

Technical Data

DN	CF	16	40	63	100	160	200	250
Outside diameter	inch	1.33"	2.75"	4.50"	6.00"	8.00"	10.00"	12.00"
Dimensions (d x l)	mm	M 4 x 20	M 6 x 35	M 8 x 45	M 8 x 50	M 8 x 55	M 8 x 60	M 8 x 60
Sealing torque [1]	Nm	4	10	20	20	20	20	20
	(lbf-in)	35.40	88.51	177.02	177.02	177.02	177.02	177.02
Quantity per set								
Bolts		25	25	25	25	25	25	25
Nuts		25	25	25	25	25	25	25
Washers		25	25	25	25	25	25	25

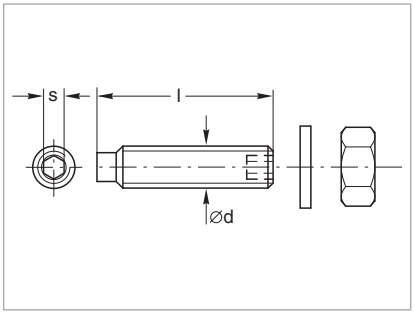
Ordering information

Set	Part No.							
		839 00	**839 01**	**838 81**	**839 04**	**839 05**	**839 07**	**839 07** [2]

[1] With separating agent

[2] 2 sets are required

Set Screws, Nuts and Washers for CF Flanges



Dimensional drawing for the set screws, nuts and washers for CF flanges

Technical Data

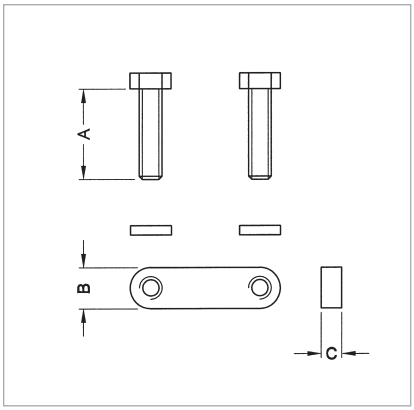
DN	CF	16	40	63 - 100
Dimensions (d x l)	mm	M 4 x 20	M 6 x 35	M 8 x 45
s	mm	2	3	4
Sealing torque [1]	Nm	4	10	20
	(lbf-in)	35.40	88.51	177.02
Quantity per set				
Bolts		6	6	16
Nuts		6	6	16
Washers		6	6	16

Ordering information

Set	Part No.			
		839 10	**839 11**	**839 13**

[1] With separating agent

Bolts with Bolt Nut Plate and Washers



Dimensional drawing for the bolts with bolt nut plate and washers

Technical Data

DN	CF	16	40	63	100/160
Outside diameter	inch	1.33"	2.75"	4.50"	6.00"/8.00"
Dimensions (d x l)	mm	M 4 x 20	M 6 x 35	M 8 x 45	M 8 x 55
A	mm	20	35	45	55
B	mm	7	10	12	12
C	mm	4	5	8	8
Sealing torque [1]	Nm	4	10	20	20
	(lbf-in)	35.40	88.51	177.02	177.02
Quantity per set					
Bolts		6	6	8	20
Bolt nut plate		3	3	4	10
Washers		6	6	8	20

Ordering information

Set	Part No.				
		838 87	**838 88**	**838 89**	**838 91**

[1] With separating agent

Lubricant for Threads

This thread lubricant is preferably applied to stainless steel joints and is used to prevent bolts from seizing due to high temperatures or high mechanical stresses.

Technical Data

Temperature	up to 1000 °C (1832 °F)

Ordering information

Lubricant for threads, 28 g tube	Part No.	
		E 839 99

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Notes

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Feedthroughs

Current Feedthroughs

General

Electrical feedthroughs for vacuum applications, as well as their corresponding connectors, comply with the German VDE Regulations 0100, 0660 and 0110 Section 1. The latter refers to air gaps and leakage paths.

- All current feedthroughs are tested according to VDE Regulations

Important

The special regional safety regulations must be observed! These may differ from the regulations which apply in Germany! The voltages stated on the following pages apply to atmospheric pressure and the right connector from Oerlikon Leybold Vacuum. The voltage specifications apply also to that part of the feedthrough which is exposed to the vacuum, provided the pressure in these areas is less than 10^{-1} mbar (0.75×10^{-1} Torr).

At pressures over 10^{-1} mbar (0.75×10^{-1} Torr) voltage breakdowns may occur depending on the distance between the electrodes, the type of rarefied gas, the type of contamination, the distribution of the electric field, etc.

Operators are advised to check each application individually or to get in touch with Oerlikon Leybold Vacuum for advice.

In applications where VDE regulations need not be applied, higher operating voltages are permissible. Please contact us for further information regarding your particular application.

The test and operating voltages refer to a vacuum pressure of $< 1 \times 10^{-4}$ mbar ($< 0.75 \times 10^{-4}$ mbar) and when using the connectors recommended by Oerlikon Leybold Vacuum. Electrical power may only be applied via the external plugs.

Abbreviations used in connection with feedthroughs:

F Feedthrough

- **E** Electric
- **L** Liquid
- **N** Normal
- **P** Precision
- **F** Frequency
  - **HC** Current
  - **HV** Voltage
  - **L** Linear
  - **R** Rotary

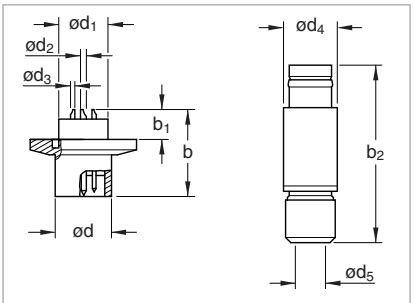
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Electrical Feedthroughs

Technical Data		FE 16 / 9S	FE 16 / 9
Vacuum connection		DN 16 ISO-KF	DN 16 ISO-KF
Number of feedthroughs		9	9
Voltage per pole [1]	V	50	50
Current per pole [1]	A	2	2
Connection Vacuum side Air side		 solder connection connector	 connector connector
Diameter of connecting wire	mm (in.)	0.8 (0.03) / 1.2 (0.05)	–
Test voltage	V / Hz	1 x 10^{-9}	1 x 10^{-9}
Pressure (absolute)		1 x 10^{-8} mbar to 2.5 bar (0.75 x 10^{-8} Torr to 2.5 bar)	1 x 10^{-8} mbar to 2.5 bar (0.75 x 10^{-8} Torr to 2.5 bar)
Bakeout temperature (feedthrough, connector)	°C (°F)	130 (266)	130 (266)
Housing		stainless steel	stainless steel
Insulator		PEEK / Araldit	PEEK / Araldit
Seal		FPM (FKM)	FPM (FKM)
Contact (feedthrough, connector)		gold-plated brass	gold-plated brass

Ordering Information	FE 16 / 9S	FE 16 / 9
Electrical Feedthroughs	**Part No. 210 302**	**Part No. 210 304**
Connector: vacuum side	**–**	**Part No. 210 305**
Connector: air side	**Part No. 210 303**	**Part No. 210 303**

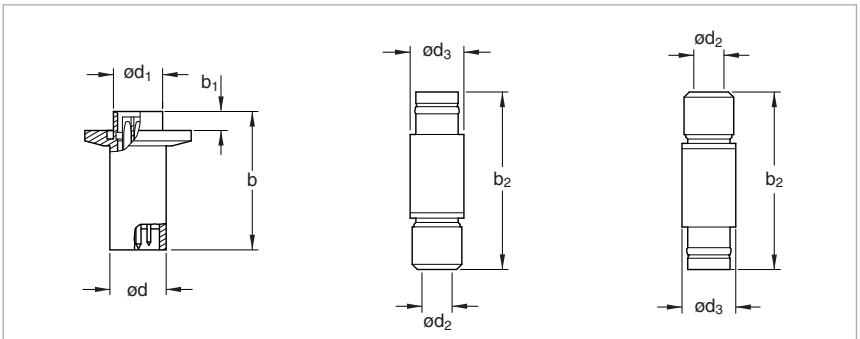
[1] Local regulations concerning use must be followed



	d	d_1	d_2	d_3	d_4	d_5
mm	16	14	1.2	0.8	15	8.7
in.	0.63	0.55	0.05	0.03	0.59	0.34

	b	b_1	b_2
mm	23.2	6.8	50
in.	0.91	0.27	1.97

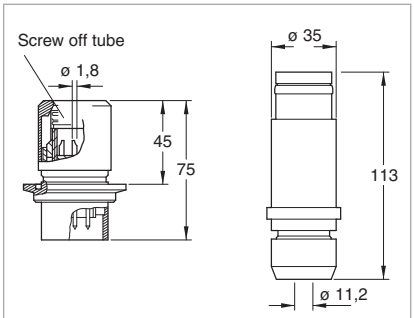
Dimensional drawing for the feedthrough FE 16/9S (left) and the connector for air side (right)



	d	d_1	d_2	d_3	b	b_1	b_2
mm	16	14	8.7	15	40	5.5	50
in.	0.63	0.55	0.34	0.59	1.57	0.22	1.97

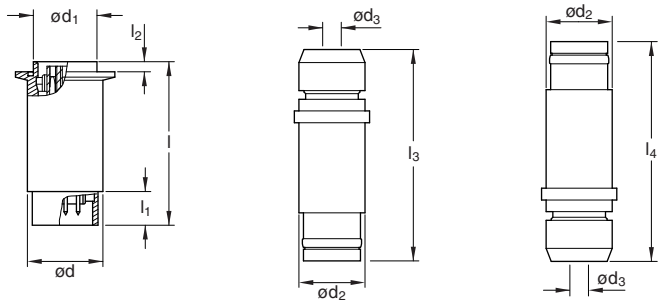
Dimensional drawing for the feedthrough FE 16/9 (left), the connector for vacuum side (middle) and the connector for air side (right)

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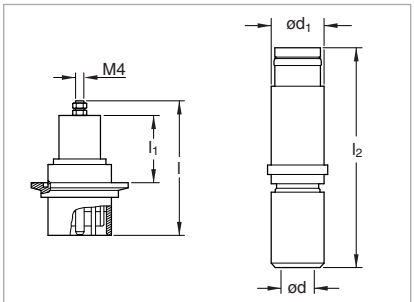
	d	d_1	d_2	l	l_1	l_2
mm	1.6	11.2	35	75	45	113
in.	0.06	0.44	1.38	2.92	1.77	4.45

Dimensional drawing for the feedthrough FE 40/7S (left) and the connector for air side (right)



	d	d_1	d_2	d_5	l	l_1	l_2	l_3	l_4
mm	40	39	35	11.2	92	19	5.5	110	113
in.	1.57	1.54	1.38	0.44	3.62	0.75	0.22	4.33	4.45

Dimensional drawing for the feedthrough FE 40/7 (left), the connector for vacuum side (middle) and the connector for air side (right)



	d	d_1	l	l_1	l_2
mm	22.7	34	76.1	38.1	135
in.	0.89	1.34	3.00	1.50	5.31

Dimensional drawing for the feedthrough FEHV 40/1 (left) and the connector for air side (right)



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Technical Data		FE 40 / 7S	FE 40 / 7	FEHV 40 / 1
Vacuum connection		DN 40 ISO-KF	DN 40 ISO-KF	DN 40 ISO-KF
Number of feedthroughs		7	7	1
Voltage per pole [1]	V	380	380	6000
Current per pole [1]	A	16	16	25
Connection Vacuum side Air side		 solder connection connector	 connector connector	 screw coupling connector
Diameter of connecting wire	mm (in.)	dia. 1.8 (0.07)	–	–
Test voltage	kV / Hz	–	–	15 / 50
Tigthness	mbar x l x s^{-1}	1 x 10^{-9}	1 x 10^{-9}	1 x 10^{-9}
Pressure (absolute)		1 x 10^{-8} mbar x l x s^{-1} to 2.5 bar (1.9 Torr)	1 x 10^{-8} mbar x l x s^{-1} to 2.5 bar (1.9 Torr)	1 x 10^{-8} mbar x l x s^{-1} to 2.5 bar (1.9 Torr)
Bakeout temperature (feedthrough, connector)	°C (°F)	130 (266)	130 (266)	130 (266)
Housing		chrom-plated steel	chrom-plated steel	chrom-plated steel
Insulator		PTFE / Araldit	PTFE / Araldit	PTFE
Seal		FPM (FKM)	FPM (FKM)	FPM (FKM)
Contact (feedthrough, connector)		gold-plated stainless steel	gold-plated stainless steel	nickel-plated brass

Ordering Information	FE 40 / 7S	FE 40 / 7	FEHV 40 / 1
Electrical Feedthroughs	**Part No. 210 325**	**Part No. 210 326**	**Part No. 210 350**
Connector: vacuum side	**–**	**Part No. 210 328**	**–**
Connector: air side	**Part No. 210 327**	**Part No. 210 327**	**Part No. 210 351**

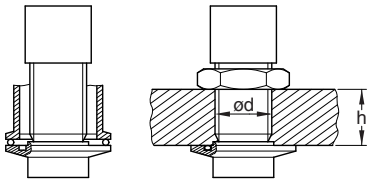
[1] Local regulations concerning use must be followed

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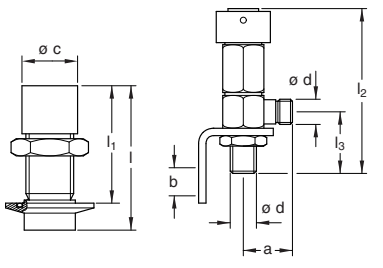
High Current Feedthroughs



	d	h
mm	32.5	3 - 30
in.	1.28	0.12 - 1.18

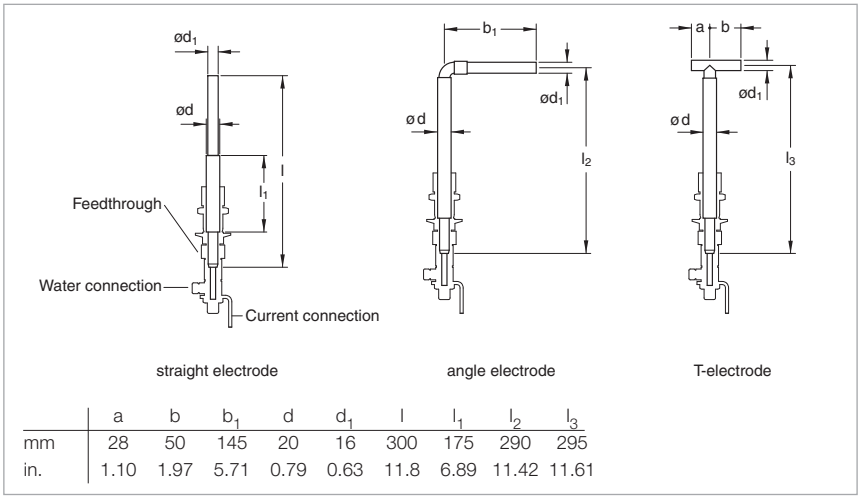


- Selection of electrodes
- Slide into mounted feedthrough
- Current connection with water cooling



	a	øb	c	d	l	l_1	l_2	l_3
mm	32.5	18	35	G 3/8"	90	73	110	41
in.	1.28	0.71	1.38	G 3/8"	3.54	2.87	4.33	1.61

Dimensional drawing for the feedthrough FEHC 40/1 (left) and current connection with water cooling (right)



	a	b	b_1	d	d_1	l	l_1	l_2	l_3
mm	28	50	145	20	16	300	175	290	295
in.	1.10	1.97	5.71	0.79	0.63	11.8	6.89	11.42	11.61

Dimensional drawings for the copper electrodes for the feedthrough FEHC 40/1

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Technical Data

		FEHC 40/1
Vacuum connection		DN 40 ISO-KF
Number of feedthroughs		1
Voltage	V	50
Current	A	250
with water cooling	A	1500
Tigthness	mbar x l x s^{-1}	1 x 10^{-9}
Pressure (absolute)		1 x 10^{-8} mbar to 2.5 bar (max. 10 bar with external centering ring)
Bakeout temperature	°C (°F)	110 (230)
Housing		aluminum
Insulator		thermoplast and thermoset
Seal		FPM (FKM)

Ordering Information

	FEHC 40/1
High Current Feedthroughs	**Part No. 210 352**
Current connection with water cooling [1)]	**Part No. 210 356**
Straight electrode	**Part No. 210 353**
Angle electrode	**Part No. 210 354**
T-electrode	**Part No. 210 355**

1) not insulated

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Rotary Feedthroughs

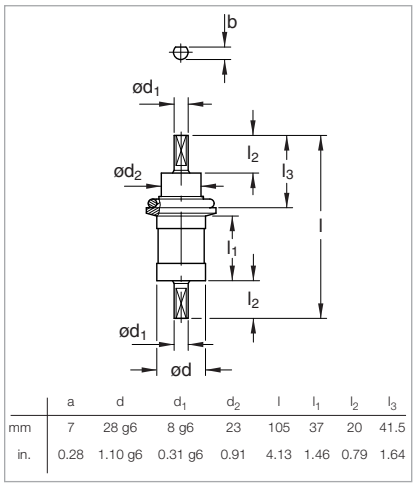
- ISO-KF / ISO-K
- For transmitting high torque
- With FPM (FKM) shaft seal and ball bearings

Technical Data		FR 25/50 N	FR 63/100 N
Vacuum connection		DN 25 ISO-KF	DN 63 ISO-K
Feedthrough / seal		FPM (FKM)	FPM (FKM)
Shaft connection	mm (in.)	dia. 8 (0.31)	dia. 20 (0.79)
Transferable torque	Nm	6	100
Rotational speed [1]	1/min	1000	500
Shaft load Radial Axial	 N N	 150 50	 500 100
Service life (revolutions)		20 000 000	10 000 000
Tightness, static	mbar x l x s^{-1}	1 x 10^{-9}	1 x 10^{-9}
Pressure (absolute)		1 x 10^{-9} mbar to 1 bar	1 x 10^{-9} mbar to 1 bar
Operating temperature, max.	°C (°F)	50 (122)	50 (122)
Bakeout temperature	°C (°F)	110 (230)	110 (230)
Materials exposed to process media		stainless steel, aluminum, FPM (FKM)	stainless steel, aluminum, FPM (FKM)
Weight	kg (lbs)	0.2 (0.44)	2 (4.42)

Ordering Information	FR 25/50 N	FR 63/100 N
Rotary Feedthrough	**Part No. 210 151**	**Part No. 210 153** [2]

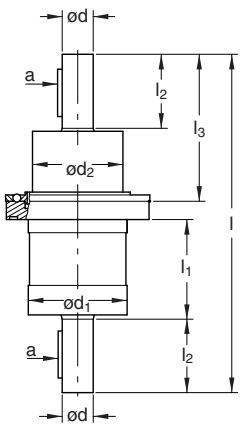
[1] When a reduced service life is acceptable, the rotational speed can be increased by up to a factor of two

[2] Centering ring, CR/aluminum Part No. 268 05, FPM (FKM)/stainless steel Part No. 887 03



	a	d	d_1	d_2	l	l_1	l_2	l_3
mm	7	28 g6	8 g6	23	105	37	20	41.5
in.	0.28	1.10 g6	0.31 g6	0.91	4.13	1.46	0.79	1.64

Dimensional drawing
for the feedthrough FR 25/50 N



	a	d	d_1	d_2	l	l_1	l_2	l_3
mm	6 h9 x 32	20 g6	66 g6	60	230	68	50	100
in.	0.24 h9 x 1.26	0.79 g6	2.60 g6	2.36	9.06	2.68	1.97	3.94

Dimensional drawing for the feedthrough FR 63/100 N

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Liquid Feedthroughs

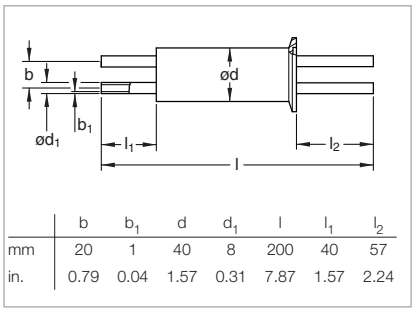
- For H_2O and LN_2
- Thermically insulated
- Especially suited for very hot and very cold applications

Technical Data

		FL 40K/2
Vacuum connection		DN 40 ISO-KF
Feedthrough / seal		welded
Connection	**mm (in.)**	dia. 8 x 1 (0.31 x 0.04)
Number of tubes		2
Tightness	**mbar x l x s^{-1}**	1 x 10^{-9}
Pressure (absolute)		1 x 10^{-9} mbar to 2.5 bar (max. 10 bar with external centering ring)
Temperature range	**°C (°F)**	-200 to +150 (-328 to +302)
Material		stainless steel
Weight	**kg (lbs)**	0.3 (0.66)

Ordering Information

	FL 40K/2
Liquid Feedthrough	**Part No. 210 275**

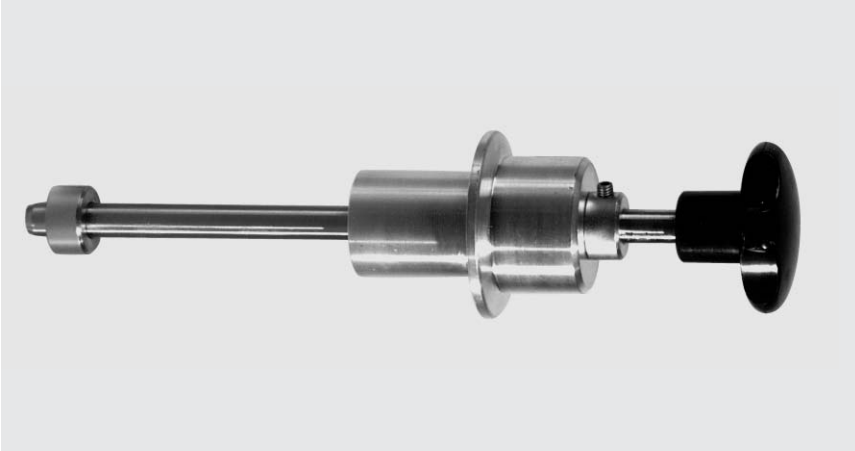


	b	b_1	d	d_1	l	l_1	l_2
mm	20	1	40	8	200	40	57
in.	0.79	0.04	1.57	0.31	7.87	1.57	2.24

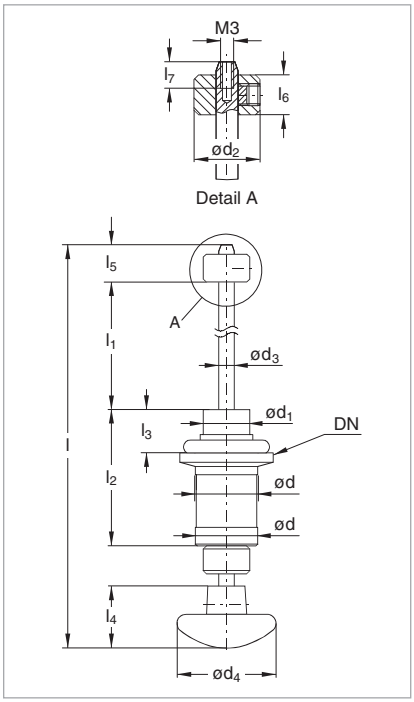
Dimensional drawing for the liquid feedthrough FL 40K/2

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Rotary / Linear Motion Feedthroughs



- Two FPM (FKM) shaft seals
- Direct push/pull and rotary actuation
- With locking ring and optional anti-rotation device



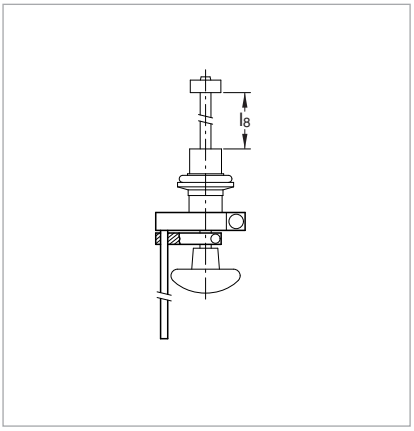
Dimensional drawing for the feedthroughs FNRL

Dimension Table

Anti-rotation device		$l_8 = l_1$ from FNRL 16/50	FNRL 25/100
Part No. 210 225			
	mm	50	–
	in.	1.97	–
Part No. 210 226			
	mm	–	100
	in.	–	3.94

Dimension Table

Feedthroughs		DN	d	d_1	d_2	d_3
FNRL 16/50		16				
	mm		20g6	15	15	$5^{-0.03}_{-0.05}$
	in.		0.79g6	0.59	0.59	0.20
FNRL 25/100		25				
	mm		25g6	23	22	$8^{-0.06}_{-0.08}$
	in.		0.98g6	0.91	0.87	0.31
		d_4	l	l_1 max.	l_2	l_3
FNRL 16/50	mm	32	134	50	44	14
	in.	1.26	5.28	1.97	1.73	0.55
FNRL 25/100	mm	50	210	100	58	24
	in.	1.97	8.27	3.94	2.28	0.94
		l_4	l_5	l_6	l_7	
FNRL 16/50	mm	20	10.5	8	6	
	in.	0.79	0.41	0.31	0.24	
FNRL 25/100	mm	32	11	9	8	
	in.	1.26	0.43	0.35	0.31	



Dimensional drawing for the anti-rotation device

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Technical Data		FNRL 16/50	FNRL 25/100
Vacuum connection		DN 16 ISO-KF	DN 25 ISO-KF
Feedthrough / seal		FPM (FKM)	FPM (FKM)
Shaft connection	mm (in.)	M 3 x 6 / dia. 5 (M 3 x 0.24 / dia. 0.20)	M 4 x 8 / dia. 8 (M 4 x 0.31 / dia. 0.31)
Stroke	mm (in.)	50 (1.97)	100 (3.94)
Shaft load			
Radial, at. max. displacement	N	10	15
Torsion	Nm	2	8
Tightness, static	mbar x l x s^{-1}	1 x 10^{-9}	1 x 10^{-9}
Operating pressure range (absolute)		1 x 10^{-8} mbar to 1 bar	1 x 10^{-8} mbar to 1 bar
Operating temperature, max.	°C (°F)	50 (122)	50 (122)
Bakeout temperature	°C (°F)	110 (230)	110 (230)
Materials exposed to process media		stainless steel, aluminum, FPM (FKM)	stainless steel, aluminum, FPM (FKM)
Weight	kg (lbs)	0.1 (0.22)	0.2 (0.44)

Ordering Information	FNRL 16/50	FNRL 25/100
Rotary / linear feedthrough	**Part No. 210 200**	**Part No. 210 201**
Anti-rotation device	**Part No. 210 225**	**Part No. 210 226**

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CF Feedthroughs

CF feedthroughs are available in a variety of field-proven designs, specifically:

- Linear motion mechanical feedthroughs,
- Rotary motion mechanical feedthroughs,

A stainless steel bellows is used to seal off the CF linear and rotary feedthroughs against the atmosphere.

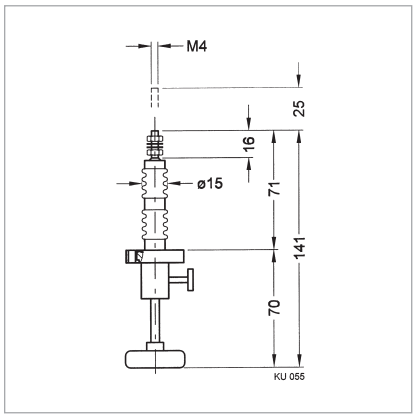
All feedthroughs can be installed in the vacuum systems in any orientation.

Abbreviations used in connection with feedthroughs:

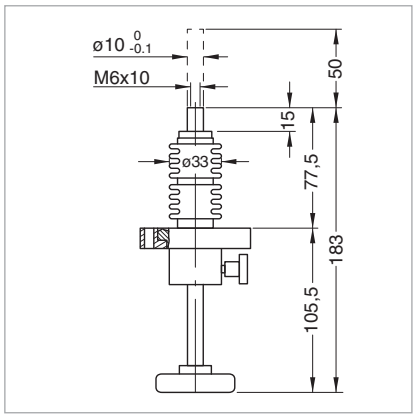
F Feedthrough

- **E** Electric
- **L** Liquid
- **N** Normal
- **P** Precision
  - **F** Frequency
  - **HC** Current
  - **HV** Voltage
  - **L** Linear
  - **R** Rotary

Linear Motion Mechanical Feedthroughs



Dimensional drawing for the FNL 16/25 linear motion feedthrough



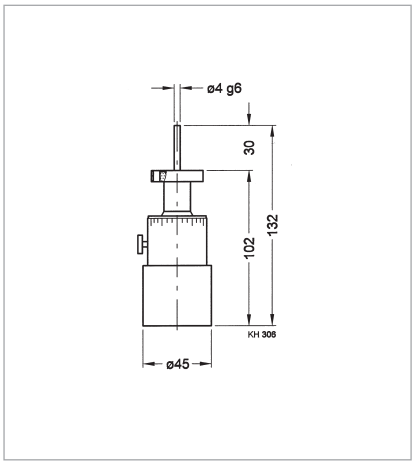
Dimensional drawing for the FNL 40/50 linear motion feedthrough

Technical Data		FNL 16/25	FNL 40/50
Nominal width	DN	16 CF-R	40 CF-R
Shaft connection	mm	M 4 x 16	M 6 x 10, ø 10
Feedthrough/seal		bellow	bellow
Actuator		manually	manually
Travel	mm	25	50
Scale division	mm	5	10
Shaft load			
Radial at max. displacement	N	20	100
Axial, against vacuum	N	85	140
Axial, against vatmoshere	N	100	200
Torsion	Nm (lbf-in)	0.2 (1.77)	0.5 (4.43)
Tightness	mbar x l x s^{-1}	5 x 10^{-11}	5 x 10^{-11}
Pressure absolute		1 x 10^{-10} mbar to 2 bar	1 x 10^{-10} mbar to 2 bar
Bakeout temperatureFeedthrough	°C (°F)	300 (572)	300 (572)
Weight	kg (lbs)	0.15 (0.33)	0.75 (1.66)
Materials exposed to process media		Stainless steel	Stainless steel

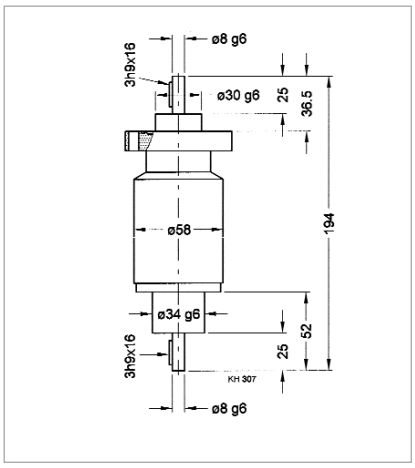
Ordering information	FNL 16/25	FNL 40/50
Linear motion feedthrough	**Part No. 210 250**	**Part No. 210 251**

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Linear Motion Mechanical Feedthroughs



Dimensional drawing for the FPR 16/5 N rotary feedthrough



Dimensional drawing for the FNR 40/20 N rotary feedthrough

The rotation of the drive knob is translated via a gearless drive system to the shaft on the vacuum side. This shaft runs on ball bearings which do not require any maintenance during the entire service life.

Technical Data

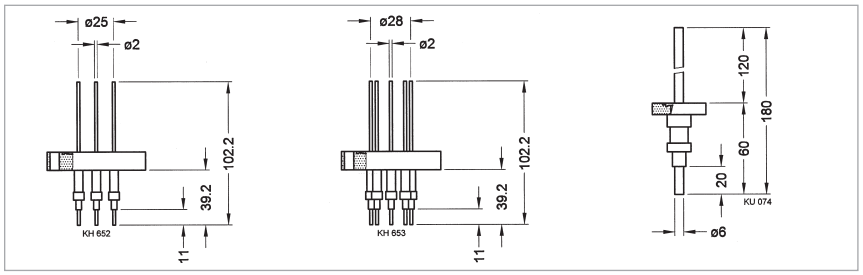
		FPR 16/5 N	FNR 40/20 N
Nominal width	DN	16 CF-F	40 CF-F
Shaft connection	mm	dia. 4	dia. 8
Feedthrough/seal		bellow	bellow
Transferable torque			
Dynamic	Nm (lbf-in)	0.4 (3.54)	4.0 (35.40)
Dynamic, at 300 °C (572 °F)	Nm (lbf-in)	0.2 (1.77)	2.0 (17.70)
Static	Nm (lbf-in)	0.2 (1.77)	3.0 (26.55)
Rotational speed	rpm	200	1000
at max. torque	rpm	–	500
Scale division	mm	10°	–
Shaft load			
Radial	N	10	60
Axial	N	5	20
Tightness	mbar x l x s^{-1}	5 x 10^{-11}	5 x 10^{-11}
Pressure absolute		1 x 10^{-10} mbar to 2 bar	1 x 10^{-10} mbar to 2 bar
Operating temperature	°C (°F)	300 (572)	300 (572)
Bakeout temperature	°C (°F)	300 (572)	300 (572)
Weight	kg (lbs)	0.3 (0.66)	1.5 (3.31)
Materials exposed to process media		Stainless steel	Stainless steel

Ordering information

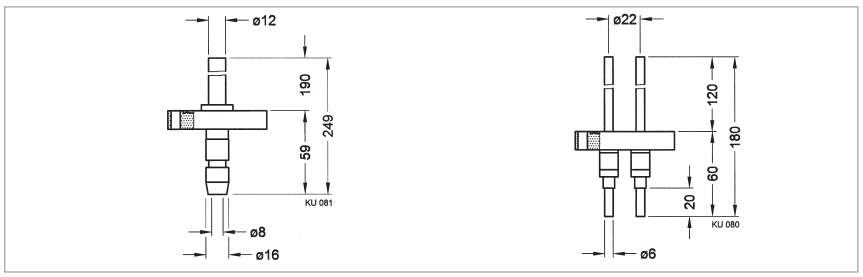
	FPR 16/5 N	FNR 40/20 N
Rotary feedthrough	**Part No. 210 154**	**Part No. 210 155**

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Electrical Feedthroughs



Dimensional drawing for the electrical feeedthrough FE 40/4 (left), FE 40/9 (middle) and FEHC 16/1(right)



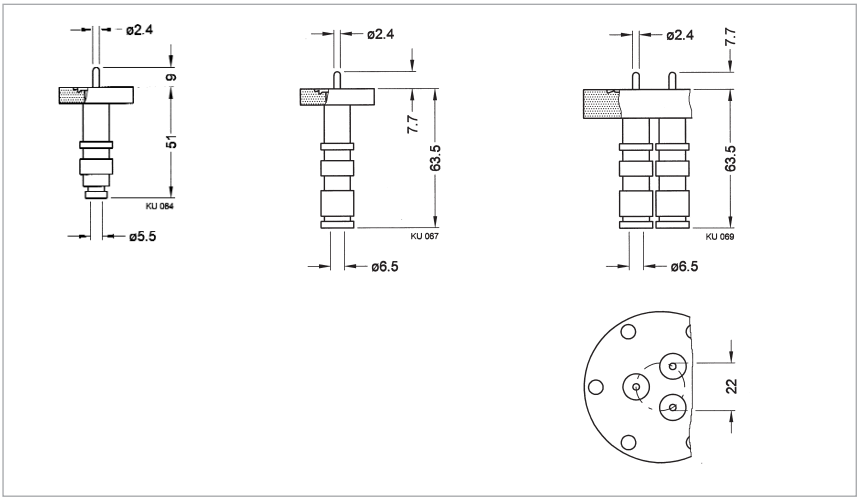
Dimensional drawing for the electrical feeedthrough FEHC 40/1 (left) and FEHC 40/2 (right)

Technical Data		**FE 40/4**	**FE 40/9**	**FEHC 16/1**	**FEHC 40/1**	**FEHC 40/2**
Nominal width	DN	CF 40-F	CF 40-F	CF 16-F	CF 40-F	CF 40-F
Number of feedthroughs		4	9	1	1	2
Number of connection pieces vacuum side (set) atmospheric side (set)		 5 5	 2 x 5 2 x 5	 2 2	 1 1	 2 2
Voltage per pole [1]	kV	1	1	4	1	4
Current per pole [1]	A	8	1	150	250/1000 [2]	150
Bakeout temperature	°C (°F)	400 (752)	400 (752)	400 (752)	400 (752)	400 (752)
Temperature rise at max. current △T	°C/min	5	5	5	4	4
Tightness	mbar x l x s^{-1}	1 x 10^{-10}	1 x 10^{-10}	1 x 10^{-10}	1 x 10^{-10}	1 x 10^{-10}
Pressure absolute		1 x 10^{-10} mbar to 2 bar	1 x 10^{-10} mbar to 2 bar	1 x 10^{-10} mbar to 2 bar	1 x 10^{-10} mbar to 2 bar	1 x 10^{-10} mbar to 2 bar
Flange		Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel
Conductor		Stainless steel	Stainless steel	Copper	Copper	Copper
Insulator		Al_2O_3	Al_2O_3	Al_2O_3	Al_2O_3	Al_2O_3
Weight	kg (lbs)	0.3 (0.66)	0.4 (0.88)	0.15 (0.33)	0.5 (1.10)	0.45 (0.91)

Ordering information	**FE 40/4**	**FE 40/9**	**FEHC 16/1**	**FEHC 40/1**	**FEHC 40/2**
Current feedthrough	**Part No. 210 310**	**Part No. 210 313**	**Part No. 210 335**	**Part No. 210 338**	**Part No. 210 342**
Connection piece, vacuum side (set)	**Part No. 210 312**	**Part No. 2x 210 312**	**Part No. 210 337**	**Part No. 210 340**	**Part No. 210 337**
Connector, atmospheric side (set)	**Part No. 210 311**	**Part No. 2x 210 311**	**Part No. 210 336**	**Part No. 210 339**	**Part No. 210 336**
Connector, atmospheric side, H_2O cooled	–	–	–	**Part No. 210 341**	–

[1] Local safety regulations must be met
[2] with water-cooling

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Dimensional drawing for the electrical feeedthrough FEF 16/1 (left), FEHV 16/1 (middle) und FEHV 40/3 (right)

Technical Data

		FEF 16/1	FEHV 16/1	FEHV 40/3
Nominal width	DN	CF 16-F	CF 16-F	CF 40-F
Number of feedthroughs		1	1	3
Voltage				
AC, 50 Hz	kV	0.35	3.5	3.5
DC	kV	0.5	5.0	5.0
Current	A	3	3	3
Frequency	MHz	150	–	–
Impedance	Ω	50 - 60	–	–
Insulation resistance at 20 °C (68 °F)	Ω	10^{+10}	10^{+10}	10^{+10}
Bakeout temperature				
with connector	°C (°F)	50 (122)	50 (122)	50 (122)
without connector	°C (°F)	400 (572)	400 (572)	400 (572)
Tightness	mbar x l x s^{-1}	1 x 10^{-10}	1 x 10^{-10}	1 x 10^{-10}
Pressure absolute [2]		1 x 10^{-10} mbar – 10 bar	1 x 10^{-10} mbar – 10 bar	1 x 10^{-10} mbar – 10 bar
Housing, flange, conductor		Stainless steel	Stainless steel	Stainless steel
Feedthrough, seal		Al_2O_3	Al_2O_3	Al_2O_3
Weight	kg (lbs)	0.14 (0.31)	0.14 (0.31)	0.5 (1.10)

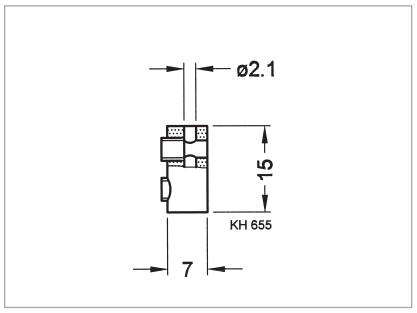
Ordering information

	FEF 16/1	FEHV 16/1	FEHV 40/3
Current feedthrough	**Part No. 210 404**	**Part No. 210 402**	**Part No. 210 403**
Inside plug	**–**	**–**	**–**
Outside plug (included in delivery)	**BNC UG 88/U**	**MHV UG 932/U**	**MHV UG 932/U**
Cable	**RG 58/U**	**RG 59/U**	**RG 59/U**

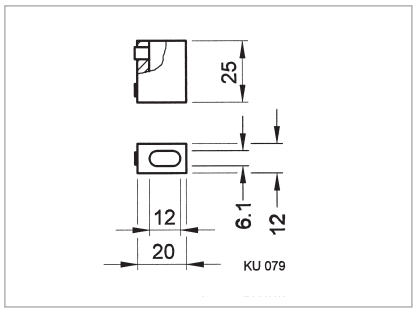
[1] with elastomer seal up to 150 °C (302 °F)
[2] Pressure ati 400 °C (572 °F) reduced to 2 bar

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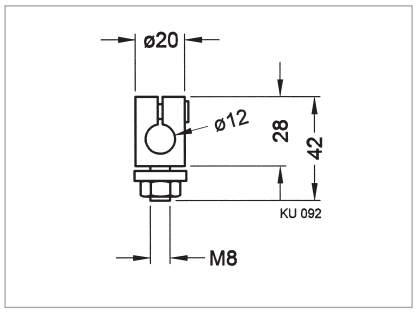
Accessories for Feedthroughs
Connectors, vacuum side



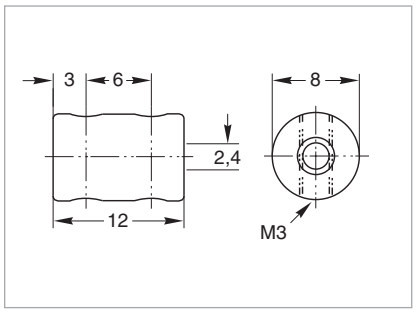
Dimensional drawing for the connector used on FE 40/4 / FE 40/9



Dimensional drawing for the connector used on FE 16/1, FEHC 40/2 and FEHC 16/1



Dimensional drawing for the connector used on FEHC 40/1



Dimensional drawing for the connector used on FEHV 16/1, FEHV 40/3 and FEF 16/1

Technical Data

Connectors Vacuum Side

Connector for feedthrough		FE 40/4 / FE 40/9	FEHC 40/2 / FEHC 16/1	FEHC 40/1	FEHV 16/1 / FEHV 40/3 FEF 16/1
Current max.	A	12	90	1000	3
Bakeout temperature	°C (°F)	400 (752)	400 (752)	400 (752)	350 (662)
Material		Stainless steel	Stainless steel	Copper	Copper

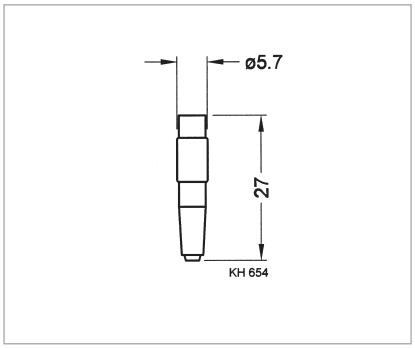
Ordering information

Connectors Vacuum Side

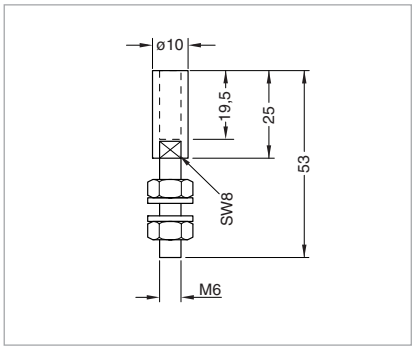
Connector, vacuum side	–	–	**Part No. 210 340**	**Part No. 846 47**
Connector, vacuum side (Set of 5)	**Part No. 210 312**	–	–	–
Connector, vacuum side (Set of 2)	–	**Part No. 210 337**	–	–

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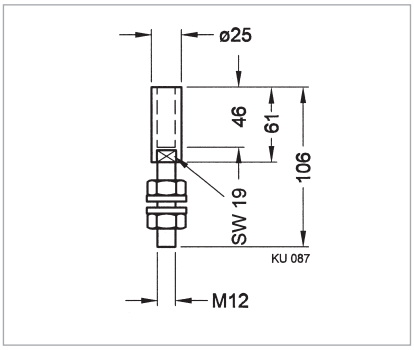
Connectors, atmospheric side



Dimensional drawing for the outside plug used on FE 40 /4 and FE 40/9



Dimensional drawing for the outside plug used on FE 16/1, FEHC 40/2 and FEHC 16/1



Dimensional drawing for the outside plug used on FEHC 40/1

Technical Data

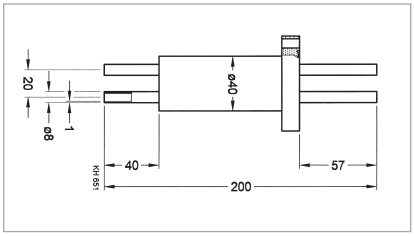
		Connectors Atmospheric Side		
Connector for feedthrough		FE 40/4 / FE 40/9	FE 16/1 / FEHC 40/2 / FEHC 16/1	FEHC 40/1
Current max.	**A**	12	90	250
Not insulated, for use up to	**V**	50	50	50
Bakeout temperature	**C (°F)**	50 (122)	150 (302)	150 (302)
Material		gold-plated brass	silver-plated brass	silver-plated brass

Ordering information

	Connectors Atmospheric Side		
Connector, atmospheric side	–	–	**Part No. 210 339**
Connector, atmospheric side (Set of 5)	**Part No. 210 311**	–	–
Connector, atmospheric side (Set of 2)	–	**Part No. 210 336**	–

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CF Liquid Feedthrough



Dimensional drawing for the FL 40C/2 CF liquid feedthrough

The thermally insulated CF liquid feedthrough is used to convey cold or hot gases, liquids or liquid nitrogen.

Technical Note

The ends of the tubes are long enough that they may be bent apart so that an UHV compatible connection can be provided.

Technical Data		FL 40C/2
Nominal width	DN	40 CF-F
Feedthrough		welded
Connection	mm	dia. 8 x 1
Number of tubes		2
Tightness	mbar x l x s^{-1}	1 x 10^{-10}
Pressure absolute		10^{-9} mbar to 10 bar (at 400 °C (752 °F) max. 2 bar)
Temperature range	C (°F)	-200 to +400 (-328 to +752)
Material		Stainless steel
Weight	kg (lbs)	0.4 (0.88)

Ordering information	FL 40C/2
CF liquid feedthrough	**Part No. 210 276**

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Miscellaneous

Vacuum Greases

RAMSAY greases
for lubricating ground joints and drain valve in fore-vacuum lines consist of special grades of paraffin jelly to which caoutchouc is added for attaining the specific consistence.

RAMSAY grease thick
is used to lubricate ground joints. Usable down to 10^{-2} mbar/Torr.

RAMSAY grease soft
is used to lubricate drain valves. Usable down to 10^{-2} mbar/Torr.

GLEITLEN
is a special grease used to lubricate stirrer shafts (KPG stirrers, among others) of all sizes in the laboratory. Usable down to 10^{-2} mbar/Torr.

LITHELEN
contains lithium compounds, and all components contributing to higher vapor pressures have been removed through high-vacuum pre-processing. It may be used within a wide temperature range (from 0 °C to 150 °C (32 °F to 302 °F)) and in all applications from atmospheric pressure down to 10^{-8} mbar (0.75×10^{-8} Torr).

Silicone high-vacuum grease Dow Corning
contains compounds of a high molecular weight together with chain elements containing silicon and oxygen. At temperatures over 220 °C (428 °F) the silicone grease will polymerise giving off gas. It may be used within a wide temperature range (from -40 °C to 200 °C (-40 °F to 392 °F)) and in all applications from atmospheric pressure down to 10^{-6} mbar/Torr.

DYNAFAT
is used to lubricate gaskets.

Material safety data sheets are available upon request for professional users from:
Email „documentation.vacuum@oerlikon.com“ or from the Internet „www.oerlikon.com“.

Overview Sealing Greases

Application Data	RAMSAY grease, thick	RAMSAY grease, soft	GLEITLEN	LITHELEN	Silicone high-vacuum grease	DYNAFAT
Purpose	Greasing of ground joints and drain valves, usable down to pressures of 10^{-2} mbar/Torr	Greasing of ground joints and drain valves, usable down to pressures of 10^{-2} mbar/Torr	Lubrication of stirrer shafts (KPG stirrerr)	Greasing of ground joints and drain valves at low pressures and high working temperatures	Greasing of ground joints and drain valves at low pressures and high working temperatures	Lubrication of gaskets

Technical Data	RAMSAY grease, thick	RAMSAY grease, soft	GLEITLEN	LITHELEN	Silicone high-vacuum grease	DYNAFAT
Vapor pressure at 20 °C (68 °F) mbar/Torr	10^{-4}	10^{-4}	10^{-4}	10^{-10}	10^{-7}	10^{-3}
Dripping point °C (°F)	> 56 (> 133)	> 56 (> 133)	> 50 (> 122)	> 210 (> 410)	[1]	148 (298)
Max. working temperature °C (°F)	30 (86)	30 (86)	30 (86)	150 (302)	200 (392)	110 (230)

Ordering Information	RAMSAY grease, thick	RAMSAY grease, soft	GLEITLEN	LITHELEN	Silicone high-vacuum grease	DYNAFAT
Tin 50 g (0.11 lbs)	**Part No. 177 32**	**Part No. 177 42**	**Part No. 176 38**	–	–	–
Tube 50 g (0.11 lbs)	–	–	–	**Part No. 176 44**	**Part No. 210 502**	– –
Tube 100 g (0.22 lbs)	–	–	–	–	–	**Part No. 210 500**

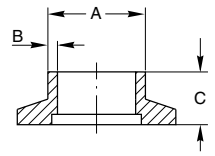
[1] over 220 °C (428 °F) polymerisation

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ISO-KF Flange Fittings and Components

KF Flanges with Short Weld Stub, Standard-Inch Diameters



Dimensional drawing for the KF flanges with short weld stub

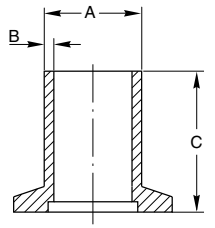
Technical Data

DN	KF	16	25	40	50
⌀ A	mm	19	25.4	38.1	50.8
	in.	0.75	1.00	1.50	2.00
B	mm	1.7	1.7	2.1	2.1
	in.	0.065	0.065	0.083	0.083
C	mm	12.7	12.7	19.0	19.0
	in.	0.50	0.50	0.75	0.75
Tube fitting O.D. size		3/4"	1"	1 1/2"	2"

Ordering Information

Stainless steel	Part No.	**899 611**	**899 612**	**899 614**	**899 615**

KF Flanges with Long Weld Stub, Standard-Inch Diameters



Dimensional drawing for the KF flanges with long weld stub

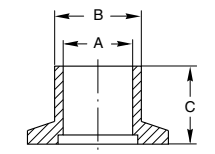
Technical Data

DN	KF	16	25	40	50
⌀ A	mm	19	25.4	38.1	50.8
	in.	0.75	1.00	1.50	2.00
B	mm	1.7	1.7	2.1	2.1
	in.	0.065	0.065	0.083	0.083
C	mm	40.0	40.0	40.0	40.0
	in.	1.575	1.575	1.575	1.575
Tube fitting O.D. size		3/4"	1"	1 1/2"	2"

Ordering Information

Stainless steel	Part No.	**899 621**	**899 622**	**899 624**	**899 625**

KF Flanges with Weld Stub, Metric Diameters



Dimensional drawing for the KF flanges with weld stub

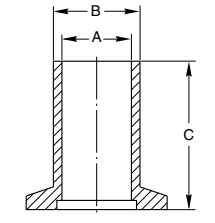
Technical Data

DN	KF	16	25	40	50
⌀ A	mm	16	25	40	50
	in.	0.630	0.984	1.575	1.968
B	mm	20	28	45	55
	in.	0.787	1.102	1.772	1.165
C	mm	16	19	25	25
	in.	0.630	0.750	0.984	0.984

Ordering Information

Stainless steel	Part No.	**884 21**	**884 22**	**884 23**	**883 85**

KF Flanges with Weld Neck, Metric Diameters



Dimensional drawing for the KF flanges with weld neck

Technical Data

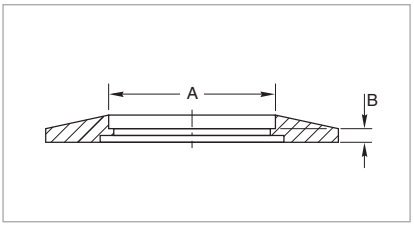
DN	KF	16	25	40
⌀ A	mm	16	25	40
	in.	0.630	0.984	1.575
B	mm	20	28	45
	in.	0.787	1.102	1.772
C	mm	57	57	57
	in.	2.250	2.250	2.250

Ordering Information

Stainless steel	Part No.	**884 31**	**884 32**	**884 33**

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Flanges with Welded Socket



Dimensional drawing for the flanges with welded sockets

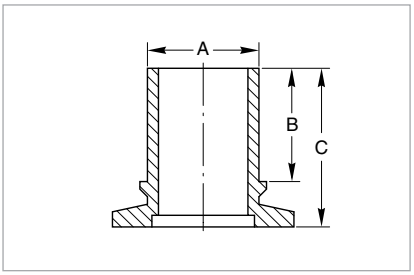
Technical Data

DN	KF	16	25	40	50
⌀A	mm	17.3	26.2	41.1	52.1
	in.	0.68	1.03	1.62	2.05
B	mm	3.0	3.0	3.0	3.0
	in.	0.12	0.12	0.12	0.12
Tube fitting O.D. size		3/4"	1"	1 1/2"	2"

Ordering Information

Stainless steel	Part No.	**899 631**	**899 632**	**899 634**	**899 635**

KF Flanges for Tube Fittings, Male



Dimensional drawing for the KF flanges for tube fittings, male

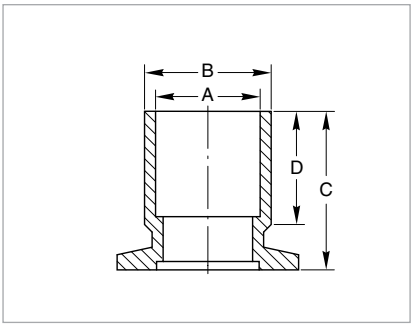
Technical Data

DN	KF	16	25	40	40
⌀A	mm	19	29.0	44.5	41.0
	in.	0.750	1.125	1.750	1.625
B	mm	17.5	29.0	29.0	29.0
	in.	0.688	1.125	1.125	1.125
C	mm	29.0	35.0	46.0	46.0
	in.	1.125	1.375	1.812	1.812
Tube fitting I.D. size		3/4"	1 1/8"	1 3/4"	1 5/8"

Ordering Information

Brass	Part No.	**910280119**	**910280120**	**910280126**	**910280121**

KF Flanges for Tube Fittings, Female



Dimensional drawing for the KF flanges for tube fittings, female

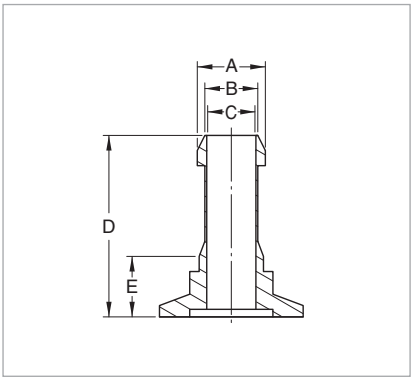
Technical Data

DN	KF	16	25	40	40
⌀A	mm	19	29.0	54.0	41.0
	in.	0.754	1.130	2.130	1.630
⌀B	mm	22.0	32.0	57.0	44.5
	in.	0.875	1.250	2.240	1.750
C	mm	25.4	35.0	35.0	35.0
	in.	1.000	1.375	1.375	1.375
D	mm	13.0	17.0	16.0	19.0
	in.	0.500	0.672	0.625	0.750
Tube fitting O.D. size		3/4"	1 1/8"	2 1/8"	1 5/8"

Ordering Information

Brass	Part No.	**910280122**	**910280123**	**910280124**	**910280125**

KF Nipples, American Standard



Dimensional drawing for the KF nipples american standard

Technical Data

DN	KF	16	16	25
⌀A	mm	9.5	16.1	16.1
	in.	0.375	0.635	0.635
⌀B	mm	7.6	14.3	14.3
	in.	0.300	0.563	0.563
C	mm	5.6	11.9	11.9
	in.	0.219	0.469	0.469
D	mm	40	40	40
	in.	1.575	1.575	1.575
E	mm	12.7	12.7	12.7
	in.	0.500	0.500	0.500
Tube fitting O.D. size		1/4"	1/2"	1/2"

Ordering Information

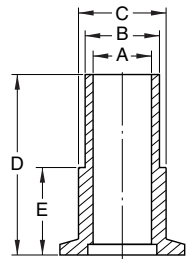
Stainless steel	Part No.	**899 674**	**899 675**	**899 676**

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Adaptors

Hose Adapter



Dimensional drawing for the hose adaptors

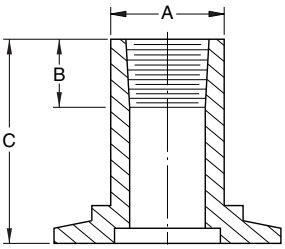
Technical Data

DN	KF	16	25	40
⌀A	mm	16	21	32
	in.	0.625	0.813	1.250
⌀B	mm	19.5	26	39
	in.	0.770	1.020	1.540
⌀C	mm	20	28	45
	in.	0.787	1.102	1.772
D	mm	29	29	29
	in.	1.125	1.125	1.125
E	mm	13	13	13
	in.	0.500	0.500	0.500
Nominal I.D. hose		3/4"	1"	1 1/2"

Ordering Information

Stainless steel	Part No.	**992780668**	**992780670**	**992780672**

KF/NPT Female Adapter



Dimensional drawing
for the KF/NPT female adaptors

Technical Data

DN	KF	16	25	40
⌀A	mm	16	25	38
	in.	0.620	0.995	1.500
B	mm	10	10	10
	in.	0.394	0.394	0.394
C	mm	25.4	25.4	25.4
	in.	1.000	1.000	1.000
Pipe size NPT		1/8"	1/8"	1/8"

Ordering Information

Stainless steel	Part No.	**899 604**	**899 605**	**899 606**

Technical Data

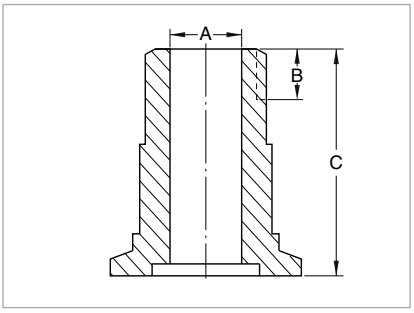
DN	KF	16	25	40
⌀A	mm	16	25	38
	in.	0.620	0.995	1.500
B	mm	10	10	10
	in.	0.394	0.394	0.394
C	mm	25.4	25.4	25.4
	in.	1.000	1.000	1.000
Pipe size NPT		1/4"	1/4"	1/4"

Ordering Information

Stainless steel	Part No.	**899 643**	**899 644**	**899 645**

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KF/NPT Male Adapter



Dimensional drawing
for the KF/NPT male adaptors

Technical Data

DN	KF	16	25	40	40
⌀A	mm	9.5	16.0	25.4	38.2
	in.	0.375	0.625	1.000	1.503
B	mm	10.0	13.5	17.0	19.2
	in.	0.402	0.5343	0.683	0.757
C	mm	38.0	46.0	50.8	63.5
	in.	1.500	1.813	2.000	2.500
Pipe size NPT		1/4"	1/2"	1"	2"

Ordering Information

Carbon steel	Part No.	**992780678**	**992780679**	**992780680**	**899 619**

Technical Data

DN	KF	16	25	25
⌀A	mm	9.5	16.0	23.8
	in.	0.375	0.625	0.937
B	mm	10.0	13.5	17.0
	in.	0.402	0.534	0.683
C	mm	38.0	46.0	63.5
	in.	1.500	1.813	2.500
Pipe size NPT		1/4"	1/2"	1"

Ordering Information

Stainless steel	Part No.	**899 601**	**899 602**	**899 626**

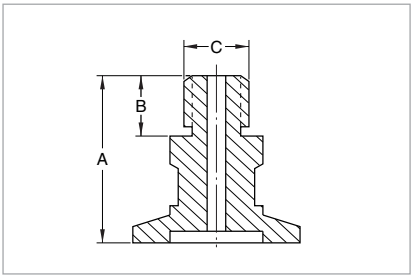
Technical Data

DN	KF	40	40	40	40
⌀A	mm	25.4	31.8	38.1	38.2
	in.	1.000	1.250	1.500	1.503
B	mm	17.0	18.0	18.4	19.2
	in.	0.683	0.707	0.724	0.757
C	mm	50.8	63.5	63.5	63.5
	in.	2.000	2.500	2.500	2.500
Pipe size NPT		1"	1 1/4"	1 1/2"	2"

Ordering Information

Stainless steel	Part No.	**899 603**	**899 627**	**899 628**	**899 629**

KF/Metric Adapter



Dimensional drawing for the KF/metric adaptors

Technical Data

DN	KF	16
A	mm	50.8
	in.	2.000
B	mm	12.7
	in.	0.500
⌀C / thread	mm	M 16 x 1.5
	in.	M 16 x 0.06

Ordering Information

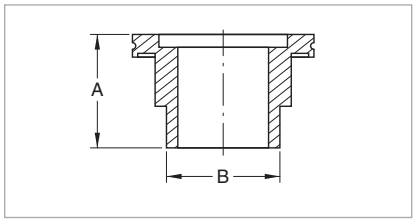
Carbon steel	Part No.	**99258004**

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(ISO-K) Clamp Flange Fittings and Components

ISO-K to NPT Adapter



Dimensional drawing for the ISO-K / NPT adapter

Technical Data

DN	KF	63 ISO-K / 2" NPT
A	mm	60
	in.	2.362
⌀B	mm	51
	in.	2" NPT

Ordering Information

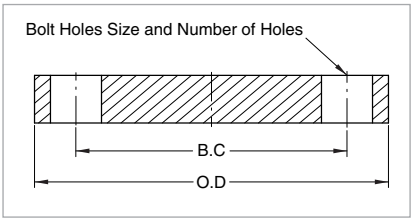
Stainless steel	Part No.	**72103040**

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ISO-F and DIN 2501 Fixed Flange Fittings

Bold Type Flanges

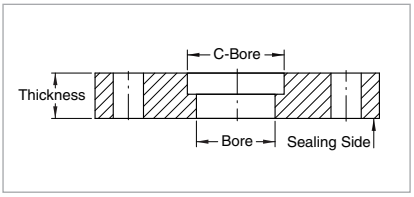


Dimensional drawing for bold type flanges

Technical Data

Size	Bolt circle (B.C.) in.	Outside diameter (O.D.) in.	Bolt holes Size	No. of holes
	dimensions in brakets ( ) are in mm			
DN 63 DIN	5.118 (130)	6.299 (160)	0.551 (14)	4
DN 100 DIN	6.693 (170)	8.268 (210)	0.709 (18)	8
DN 160 DIN	8.858 (225)	10.433 (265)	0.709 (18)	8
DN 250 DIN	13.189 (335)	14.764 (375)	0.709 (18)	12
DN 350 DIN	17.520 (445)	19.291 (490)	0.906 (23)	12
DN 500 DIN	23.622 (600)	25.394 (645)	0.906 (23)	20
ANSI 3 inch	6.000 (152.4)	7.500 (190.5)	0.750 (19)	4
ANSI 4 inch	7.500 (190.5)	9.000 (228.6)	0.750 (19)	8
ANSI 6 inch	9.500 (241)	11.000 (279.4)	0.875 (22)	8
ANSI 8 inch	11.750 (298)	13.500 (343)	0.875 (22)	8
ANSI 10 inch	14.250 (362)	16.000 (406.4)	1.000 (25.4)	12
ANSI 12 inch	17.000 (432)	19.000 (483)	1.000 (25.4)	12
ANSI 16 inch	21.250 (540)	23.500 (597)	1.125 (29)	16
DN 63 ISO-F	4.331 (110)	5.118 (130)	0.393 (10)	4
DN 100 ISO-F	5.709 (145)	6.496 (165)	0.393 (10)	8
DN 160 ISO-F	7.874 (200)	8.858 (225)	0.453 (11.5)	8
DN 250 ISO-F	12.205 (310)	13.189 (335)	0.453 (11.5)	12
DN 400 ISO-F	18.890 (480)	20.080 (510)	0.551 (14)	16

Maximum Recommended Counter Bore for ANSI Blank Flanges (for Carbon or Stainless Steel Pipe)



Dimensional drawing for counter bore for ANSI blank flange

Technical Data

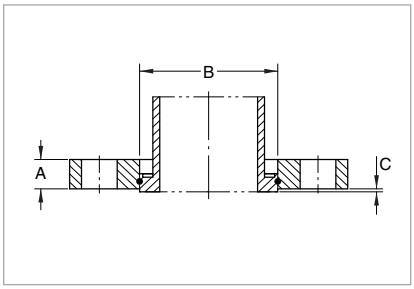
ANSI size	Outside diameter (O.D.)	Bolt circle (B.C.)	Bolt holes No. of holes	Diameter	Thickness	Max. C-Bore
3	7 1/2	6	4	3/4	7/8	4 1/4
4	9	7 1/2	8	3/4	7/8	5 3/4
6	11	9 1/2	8	7/8	15/16	7 1/2

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ANSI Fittings

Flanges, Rotatable Bolt Type



Dimensional drawing for the flanges, rotatable type
(tube piece shown in phantom not included)

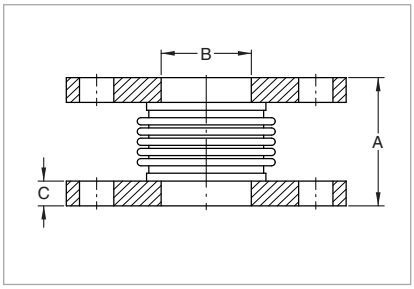
Technical Data

DN	ISO-K to ANSI	63 3 in.	100 4 in.	160 6 in.	250 10 in.
A	mm	13	13	16	22
	in.	0.500	0.500	0.625	0.875
⌀B	mm	95.5	131	181	291
	in.	3.760	5.140	7.120	11.453
C	mm	1	1	1	1
	in.	0.039	0.039	0.039	0.039

Ordering Information

Stainless steel	Part No.	**982780700**	**982780701**	**982780702**	**982780703**
Spare retaining ring	Part No.	**23102401**	**23102402**	**23102412**	**23102413**

Bellows



Dimensional drawing for the bellows

Technical Data

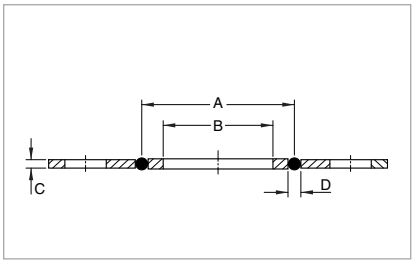
DN	ANSI	3 in.	4 in.	6 in.
A	mm	120	120	200
	in.	4.720	4.720	7.870
⌀B	mm	78	102	154
	in.	3.070	4.030	6.070
C	mm	12.7	12.7	12.7
	in.	0.500	0.500	0.500
Rated deflection in axial	mm	15	18	29.5
	in.	0.580	0.700	1.160
Rated deflection in lateral	mm	5	6	8
	in.	0.190	0.220	0.310
Spring rate	mm	263	340	260
	in.	12 / 4	15 / 4	23 / 7
Compression / tension	mm			
	in.	0.460 / 0.140	0.560 / 0.140	0.900 / 0.260

Ordering Information

Stainless steel bellows with carbon steel flanges	Part No.	**991051013**	**991051014**	**991051016**

Combined axial/lateral deflection cannot exceed 100 %. Example: 75 % axial rating - 25 % lateral rating

Sealing Disk Assembly



Dimensional drawing for the sealing disk assembly

Technical Data

DN	ANSI	3 in.	4 in.	6 in.
⌀A	mm	91	121	171
	in.	3.600	4.750	6.720
⌀B	mm	78	102	154
	in.	3.070	4.030	6.070
C	mm	3.2	3.2	3.2
	in.	0.125	0.125	0.125
⌀D	mm	4	4	4
	in.	0.157	0.157	0.157

Ordering Information

Aluminum	Part No.	**910181605**	**910181606**	**910181607**
Stainless steel	Part No.	**910181616**	**910181617**	**910181618**

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Notes

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