8719

Gas Density Monitor with switching contacts

Applications

- High voltage technology
- Medium voltage technology

Features

- Large dial for easy readability
- Up to five galvanically separated circuits
- Fully temperature compensated
- Suitable for outdoor and indoor applications
- Compliant with SF_6 and full spectrum of alternative mixed insulation gases

CE LVD: 2014/35/EU; EMC; 2014/30/EU

UKCA LVD: 2014/35/EU; EMC; 2014/30/EU

RoHS/Reach compliant

SF_6-free reference chamber

Product description

Swiss based Trafag offers precise, reliable and maintenance-free instruments developed for density monitoring of SF_6 and the full spectrum of alternative gases. Monitoring is based on the gas density reference chamber principle. Thus offering the most reliable solution on the market by directly monitoring the insulating gas density.

Technical Data

Measuring principle	Absolute pressure reference gas measuring system
Measuring range	0 … 1300 kPa abs. @ 20°C
Output signal	Floating change-over contact (SPDT)
Quantity of switchpoints	1 … 5 microswitches
Ambient temperature	(-60) -40 ... +80°C

Additional information

Data sheet	www.trafag.com/H72623
Flyer	www.trafag.com/H70623
Instructions	www.trafag.com/H73623

Ordering information/Type code

		8719	XX	XXXX	XX	XX	XX	XX	XX
Monitor type	Axial alignment								
	One (1) microswitch		**A1**						
	Two (2) microswitches		**A2**						
	Three (3) microswitches		**A3**						
	Four (4) microswitches		**A4**						
	Five (5) microswitches [1)]		**A5**						
	Radial alignment								
	One (1) microswitch		**R1**						
	Two (2) microswitches		**R2**						
	Three (3) microswitches		**R3**						
	Four (4) microswitches		**R4**						
	Five (5) microswitches [1)]		**R5**						
Pressure connection	Threaded			**7XXX**					
	Flanged and cap nut			**8XXX**					
Indicator dial and monitor orientation	Without density indicator dial				**1Z**				
	Indicator dial with two colour sectors without markings								
	Monitor orientation 1				**1A**				
	Monitor orientation 2				**2A**				
	Monitor orientation 3				**3A**				
	Monitor orientation 4				**4A**				
	Partial indicator dial with sectors according to customer specification								
	Monitor orientation 1				**1B**				
	Monitor orientation 2				**2B**				
	Monitor orientation 3				**3B**				
	Monitor orientation 4				**4B**				
	Full range indicator dial according to customer specification								
	Monitor orientation 1				**1C**				
	Monitor orientation 2				**2C**				
	Monitor orientation 3				**3C**				
	Monitor orientation 4				**4C**				
Electrical connector housing configuration	Variants and details see section: Electrical connections					**XX**			
Cable outlet	Variants and details see table: Cable outlet configuration						**XX**		

		8719	XX	XXXX	XX	XX	XX	XX	XX
Options	Arctic temperature capability [2]							55	
	Process gas damping element [3]							49	
	Set-up for earthing via cable lug							26	
	Integrated valve for monitor test with DN8 coupling								
	Standard test port orientation (12 o'clock)							W3	
	Test port orientation 180° (6 o'clock)							W0	
	Test port orientation 270° (9 o'clock)							W1	
	Test port orientation 90° (3 o'clock)							W2	
	Integrated valve for process gas service re-filling with DN8 coupling								
	Standard re-filling port orientation (12 o'clock)							F3	
	Re-filling port orientation 180° (6 o'clock)							F0	
	Re-filling port orientation 270° (9 o'clock)							F1	
	Re-filling port orientation 90° (3 o'clock)							F2	
Accessories	Weather protection cover - please contact us for more details								

[1] Upon request
[2] Use for temperatures down to -60°C
[3] Available with pressure connections 8000, 8001, 8300, 8801

Further customised parameterisation to be indicated

Process gas	SF_6, SF_6- based mixed gas, customer specific alternative gas (gas mixtures to be indicated in mol-%)
Units for indicater dial	kPa, MPa, bar, psi, kg/m², kg/cm², absolute (standard) or relative (optional) units [1], optionally available dial indication dual units
Switchpoint @ 20°C	For each microswitch, indicate switching point p@20°C. Standard factory setting is for decreasing pressure. Optionally, factory setting for increasing pressure is available. Especially for outdoor installations in areas with high daily temperature fluctuations it is recommended to maintain a minimum switching point distance of 40-60 kPa from filling pressure to next higher and lower switching point(s). Please contact us for more information.

[1] The monitoring principle is based on a density reference chamber system and is accordingly calibrated. When not using dials scaled to density expressed as "absolute pressure at 20°C of the respective gas mixture", additional environmental factors are required for correct interpretation of the dial reading. E.g. in case of using relative pressure units, local ambient pressure (e.g. altitude or weather derivations) as well as thermal effects have to be considered when comparing with a locally installed relative pressure gauge. The difference between relative and absolute pressure is calibrated to 1 bar

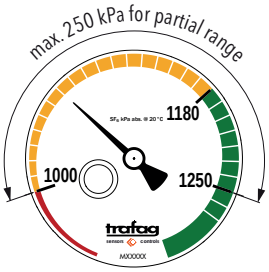
Microswitch and switchpoint

Monitoring	Principle	Reference gas chamber, sealed: Absolute pressure system, no influence due to ambient pressure changes, fully temperature compensated by design
	Range	0 ... 1300 kPa abs. @ 20°C [1]
	Output	Floating change-over contact (SPDT)
	Accuracy	Refer to sections „Density indicator" and „Switchpoint accuracy over temperature based on reference chamber pressure"
Microswitch	Output signal	Floating change-over contact (SPDT)
	Resistive load (inductive load)	AC - 250 V/10 (1.5) A DC - 250 V/0.1 (0.05) A, 220 V/0.25 (0.2) A, 110 V/0.5 (0.3) A, 24 V/2 (1) A
	Resistance of insulation	>100 MΩ, 500 VDC, ex factory
	Dielectric strength	2 kVAC, 50Hz, terminal to ground (earth)
	Switching cycle capacity	Up to 1 Mio. mechanical, more than 10'000 with maximum load
	Effect of vibration	4 g / 20 … 100 Hz effects no contact bounce at 5 kPa minimum distance from set switchpoint
Switchpoint setting	Factory adjustment	Standard setting is for decreasing pressure
	Lowest switchpoint setting	120 kPa abs. @ 20°C
	Highest switchpoint setting	1300 kPa @ 20°C for partial range or none indication 1250 kPa @ 20°C for full range indication
	Distance from the lowest to the highest switchpoint [2]	Up to 250 kPa @ 20°C for partial range or none indication Up to 180 kPa @ 20°C for full range indication
	Switching differential	3 ... 7 kPa typ. (15 kPa max.) if lowest to highest switchpoint distance is up to 130 kPa 5 ... 10 kPa typ. (20 kPa max.) if lowest to highest switchpoint distance is 130 ... 180 kPa 7 ... 12 kPa typ. (25 kPa max.) if lowest to highest switchpoint distance is 180 ... 250 kPa

[1] Gas in closed compartments follow specific isochores and therefore the specific operating temperature range has to be considered in respect to overpressure. E.g. 1200 kPa abs. air @ 20°C shifts to 1330 kPa abs. @ 50°C. Please contact us for more information

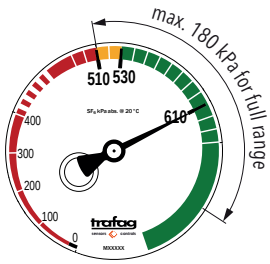
[2] Distance from lock-out to high-alarm pressure, or from lock-out to filling pressure (no high-alarm)

Overview switchpoint settings



Lowest switchpoint setting:
120 kPa abs. @ 20°C for partial and full range indication

Distance from lowest to highest switchpoint:
Up to 250 kPa @ 20°C for partial range indication



Highest switchpoint setting:
1300 kPa @ 20°C for partial range or none indication

Distance from lowest to highest switchpoint:
Up to 180 kPa @ 20°C for full range indication

Switchpoint accuracy over temperature based on reference chamber pressure

Temperature range		+20°C	-25°C … +50°C	-40°C … +60°C	-60°C … +60°C
		Standard	Standard	Standard	With artic option
First alarm switchpoint setting pressure abs. @ 20°C [1]					
≤ 650 kPa	[kPa max.]	± 8	± 10	± 12	± 15
> 650 kPa to 1000kPa	[kPa max.]	± 8	± 12	± 14	± 18
> 1000kPa	[kPa max.]	± 10	± 15	± 16	± 25
High pressure alarm [1] [2]					
≤ 1000 kPa	[kPa max.]	± 10	± 16	± 20	± 25
> 1000kPa	[kPa max.]	± 10	± 17	± 21	± 27

[1] While no liquefaction occurs and the insulation gas is completely gaseous
[2] Only applicable if factory adjustment includes high-alarm switchpoint above filling pressure

Density indicator

	Partial range dial	Full range dial
Indicator principle	Absolute pressure, fully temperature compensated by means of sealed reference gas chamber. Meter movement operated by reference gas chamber	
Visible dial diameter	75 mm	
Scale	Single or double, switchpoint indication and selectable sections with different colours	
Unit	See table „Further customised parameterisation to be indicated“	
Numbered range	Up to 250 kPa @ 20°C between lowest and highest indicated value [1]	Up to 180 kPa @ 20°C between lowest and highest indicated value [1] completed by a low pressure indication down to vaccum
Accuracy @ 20°C within numbered range	± 10 kPa @ 20°C	Switchpoint range: ±10 kPa @ 20°C Low pressure range: ±20 kPa @ 20°C at 100 kPa abs. ±10% MV @ 20°C for remaining actual values

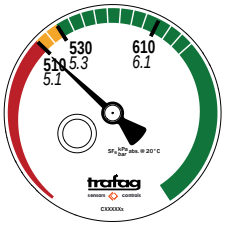
[1] Typically ranges are from lock-out switchpoint to filling pressure (no high-alarm), or from lock-out switchpoint to high-alarm switchpoint

The density indicator is based on the density reference chamber system and is accordingly calibrated. Over the whole dial range, it indicates density, not pressure. When not using dials scaled to density expressed as „absolute pressure at 20°C of the respective gas mixture“, additional environmental factors are required for correct interpretation of the dial reading. E.g.in case of using relative pressure units, local ambient pressure (e.g. altitude or weather derivations) as well as thermal effects have to be considered when comparing with a locally installed relative pressure gauge. The difference between relative and absolute pressure is calibrated to 1 bar.
For more information, see https://www.trafag.com/H70376

Density indicator dial according to customer specification

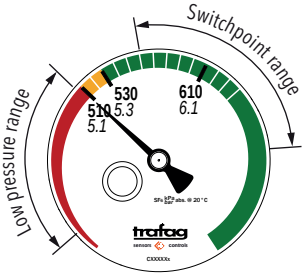
Indicator dial with two colour sectors without markings

8719.XX.XXXX.XX.
1A/**2A**/**3A**/**4A**.XX.XX.XX.XX



Partial indicator dial with sectors according to customer specification

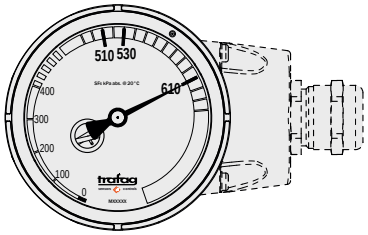
8719.XX.XXXX.XX.
1B/**2B**/**3B**/**4B**.XX.XX.XX.XX



Full range indicator dial according to customer specifications

8719.XX.XXXX.XX.
1C/**2C**/**3C**/**4C**.XX.XX.XX.XX

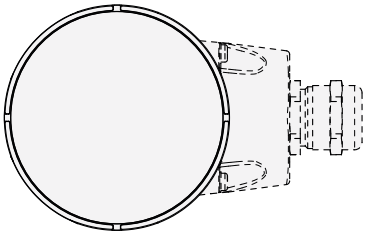
Example of axial gas density monitor with full range indicator dial



8719.**AX**.XXXX.XX.**1C**.XX.XX.XX.XX

For complete choice of monitor and dial alignments see section "Monitor and indicator dial orientation"

Axial gas density monitor without indicator dial

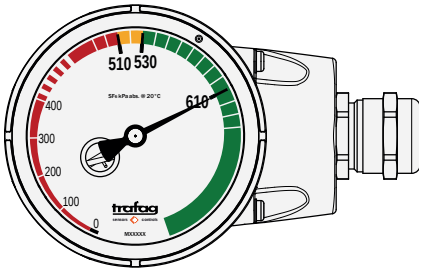


8719.**AX**.XXXX.XX.**1Z**.XX.XX.XX.XX

Monitor and indicator dial orientation for axial alignment configuration

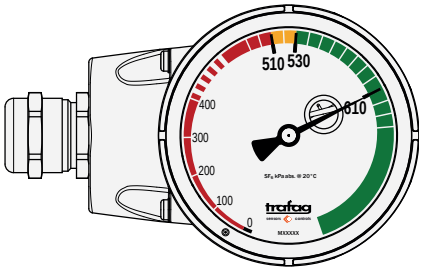
Electrical connector housing is configurable for 12/3/6/9 o'clock orientation. The indicator dial is generally horizontally oriented to ensure optimal readability. The examples shown illustrate a full range indicator dial. The same applies to the other dial variants.

Refer to chapter installation for specific requirements for outdoor installation settings.



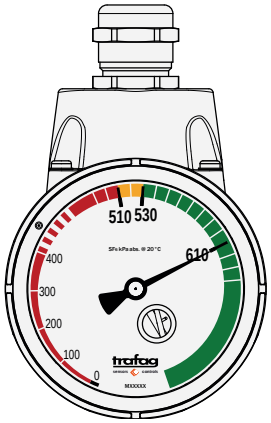
Orientation 1 with electrical connector housing in 3 o'clock alignment

8719.AX.XXXX.XX.**1A/1B/1C**.XX.XX.XX.XX



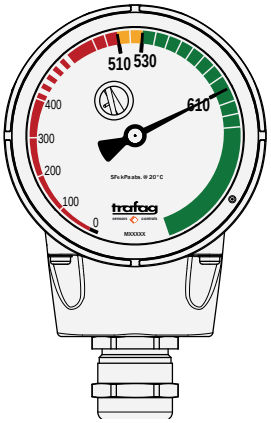
Orientation 2 with electrical connector housing in 9 o'clock alignment

8719.AX.XXXX.XX.**2A/2B/2C**.XX.XX.XX.XX



Orientation 3 with electrical connector housing in 12 o'clock alignment

8719.AX.XXXX.XX.**3A/3B/3C**.XX.XX.XX.XX



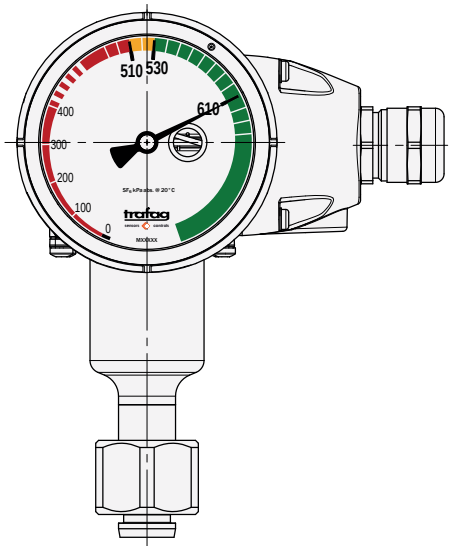
Orientation 4 with electrical connector housing in 6 o'clock alignment

8719.AX.XXXX.XX.**4A/4B/4C**.XX.XX.XX.XX

Monitor and indicator dial orientation for radial alignment configuration

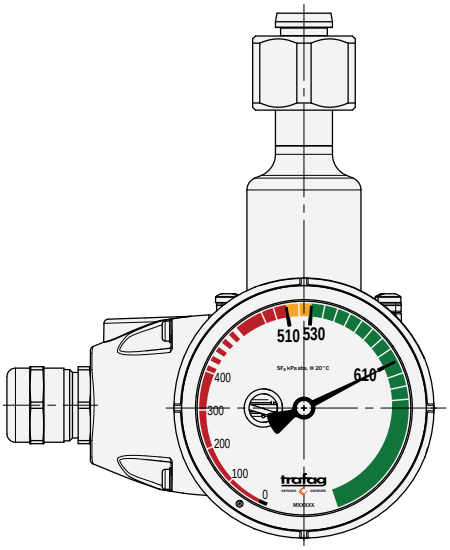
Process connection and related electrical connector housing are configurable for 12/3/6/9 o'clock orientation. The indicator dial is generally horizontally oriented to ensure optimal readability. The examples shown illustrate a full range indicator dial. The same applies to the other dial variants.

Refer to chapter installation for specific requirements for outdoor installation settings.



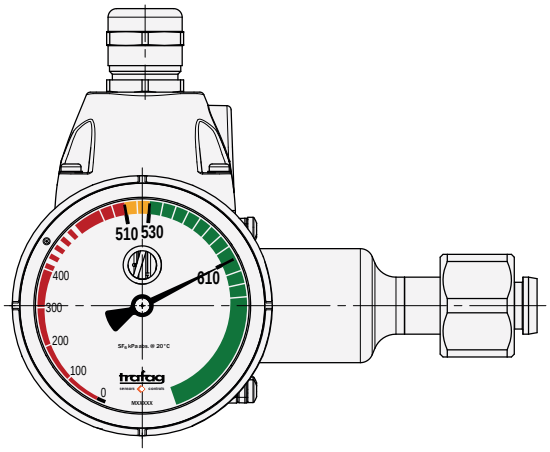
Orientation 1 with process connection in 6 o'clock alignment and electrical connector housing in 3 o'clock alignment

8719.RX.XXXX.XX.**1A/1B/1C**.XX.XX.XX.XX



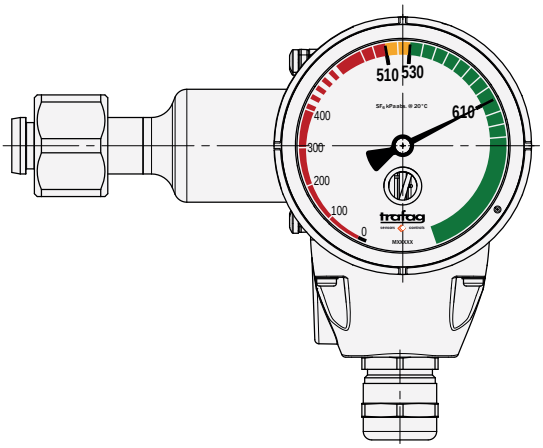
Orientation 2 with process connection in 12 o'clock alignment and electrical connector housing in 9 o'clock alignment

8719.RX.XXXX.XX.**2A/2B/2C**.XX.XX.XX.XX



Orientation 3 with process connection in 3 o'clock alignment and electrical connector housing in 12 o'clock alignment

8719.RX.XXXX.XX.**3A/3B/3C**.XX.XX.XX.XX



Orientation 4 with process connection in 9 o'clock alignment and electrical connector housing in 6 o'clock alignment

8719.RX.XXXX.XX.**4A/4B/4C**.XX.XX.XX.XX

General specifications

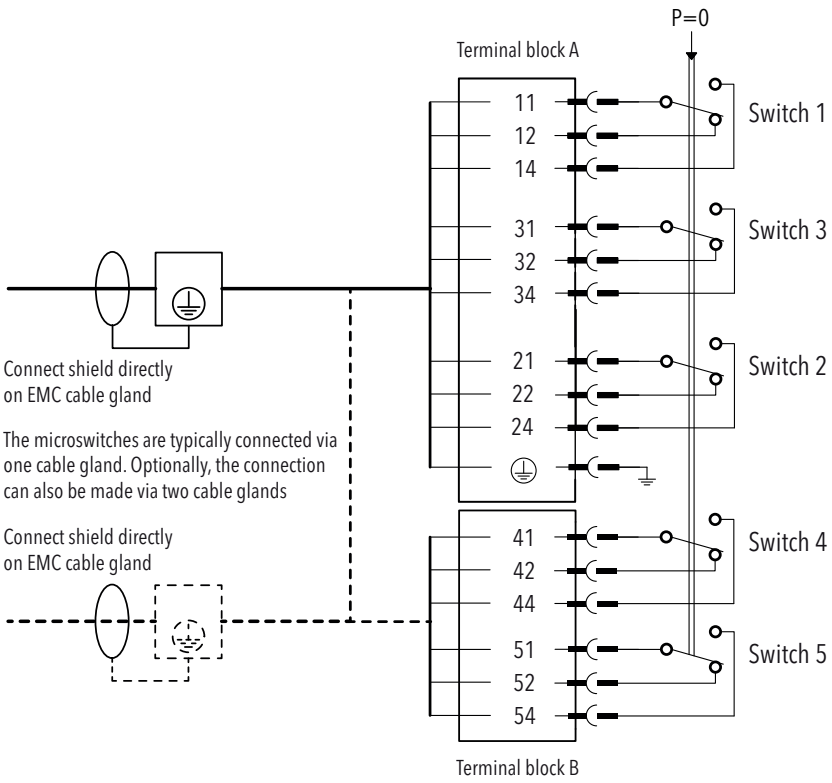
Environmental conditions	Ambient temperature	(-60) -40 ... +80°C
	Altitude	max. 2000m for installations under Low Voltage Directive 2014/35/EU
	Protection [1]	IP65 and IP67
	Humidity	IEC 60068-2-30 (damp heat, cyclic, 100 % RH @ +55°C), membrane provides condensation compensation
	Overpressure	1500 kPa abs.
	Shock	70 g / 6 ms / 10'000 times at all axes excited on process connection without damage to instrument [2]
	Routine inspection of reference chamber gas tightness	Integral pressure testing with 6 bar rel. helium, leakage detection rate < $7 \cdot 10^{-8}$ mbar · l/s
Mechanical data	Process gas wetted material	Process connection and measuring system: 1.4404, 1.4571 (AISI316L, AISI316Ti) Test and re-filling valve: 1.4404 (AISI316L), CuZn39Pb3 (C38500) Sealing: CIIR [3]
	Housing	AlSi10Mg, powder coated
	Screwed cable gland	Brass nickel-plated, PA as option
	Dial	Dial window: PMMA Dial face: PC Pointer: Aluminium sheet
	Weight	Gas density monitor: ~ 900 ... 1100 g Gas density monitor with integrated test or re-filling valve: ~ 1200 ... 1400 g

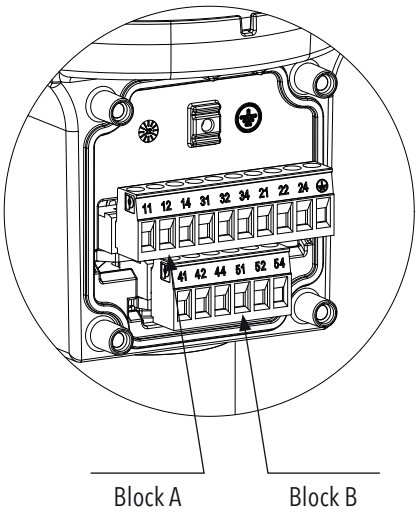
[1] While using appropriate cable gland and/or mating connector mounted according to instruction
[2] Density monitor is configurable for different process connections or valve options that affect the overall dimensions. Maximum shock level shall be limited to 120 g measured at dial window
[3] Sealing only applicable for certain process connections as monitor itself has no internal sealings

Electrical data switch

Standard wiring terminal(s)	
Number of microswitches according to customer application	Up to three (3) switches connected via wire terminal block A Up to two (2) more switches connected via wire terminal block B [1)]
Wire terminal blocks	Plugable, for 0.2 … 2.5mm² wiring Terminal block A: 10-pins Terminal block B: 6-pins

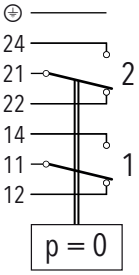
[1)] Wire terminal block B only applicable if monitor is configurated with four (4) or five (5) microswitches



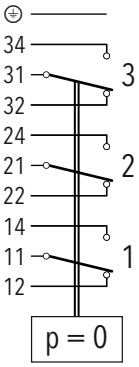


Microswitch in non-pressurised condition (p_{rel} = 0)

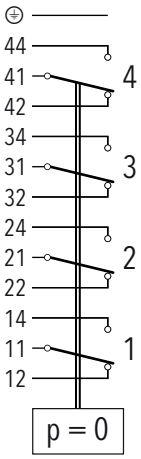
8719.**X1**.XXXX.XX…



8719.**X2**.XXXX.XX…



8719.**X3**.XXXX.XX…

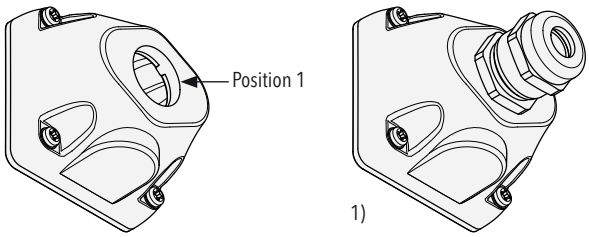


8719.**X4**.XXXX.XX…

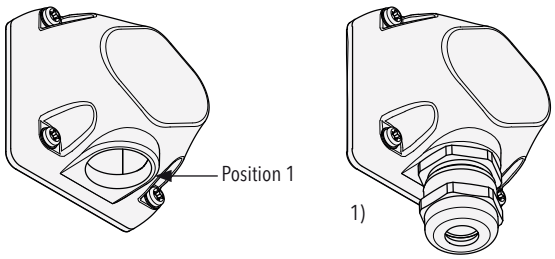
⏚ Connected with all electrically conductive elements of the density monitor

Electrical connections

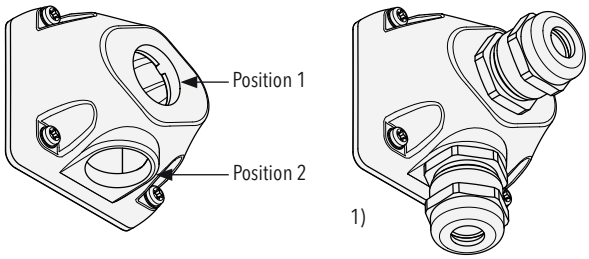
Electrical connector housing configuration, Material AlSi10Mg, powder coated



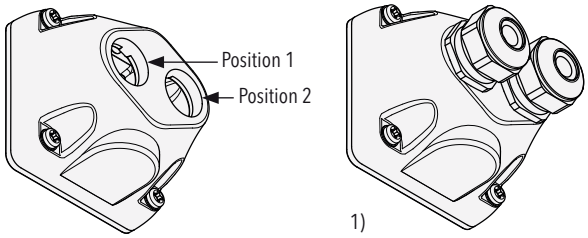
1-thread, horizontal cable outlet
M25x1.5 **8719**.XX.XXXX.XX.XX.XX.**A1**...
M20x1.5 **8719**.XX.XXXX.XX.XX.XX.**A2**... [2)]



1-thread, lateral cable outlet
M25x1.5 **8719**.XX.XXXX.XX.XX.XX.**B1**...
M20x1.5 **8719**.XX.XXXX.XX.XX.XX.**B2**... [2)]

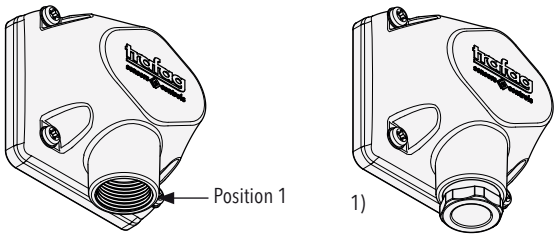


2-threads, horizontal and lateral cable outlets
M25x1.5 horizontal **8719**.XX.XXXX.XX.XX.XX.**C1**...
M25x1.5 lateral
M25x1.5 horizontal **8719**.XX.XXXX.XX.XX.XX.**C2**... [2)]
M20x1.5 lateral



2-threads, horizontal cable outlets
M20x1.5, M20x1.5 **8719**.XX.XXXX.XX.XX.XX.**D1**...

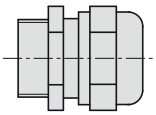
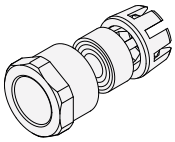
Electrical connector housing configuration, Material Polyamide (PA)



1-thread, lateral cable outlet
M20x1.5 **8719**.XX.XXXX.XX.XX.XX.**E1**...

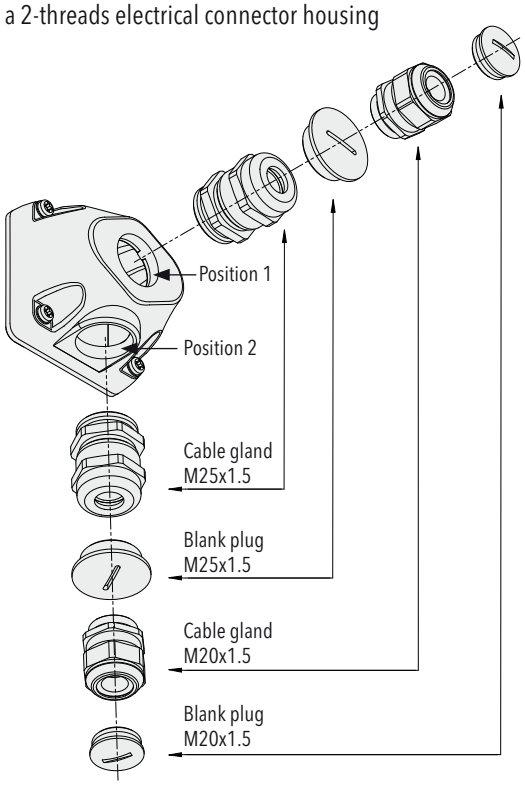
[1)] Example with mounted cable gland
[2)] Upon request, whereas minimum order quantities may apply

Cable outlet configuration

Cable gland		Material	For cable	Ingress protection	Cable outlet options (type code)
EMC	M20x1.5	Brass, nickel-plated	ø 4 ... 10 mm	IP 65 and IP 67	U8
			ø 7 ... 12.5 mm	IP 65 and IP 67	10
			ø 8 ... 11 mm	IP 65 and IP 67	07
			ø 11 ... 14 mm	IP 65 and IP 67	08
	M25x1.5	Brass, nickel-plated	ø 8 ... 16 mm	IP 65 and IP 67	11
			ø 12.5 ... 20.5 mm	IP 65 and IP 67	17
Cable gland insert	M20x1.5	Polyamide (PA)	ø 7 ... 13 mm	IP 65	09
					
Blank plug	M20x1.5	Brass, nickel-plated		IP 65 and IP 67	U2
		Polyamide (PA)		Without IP compatibility, not for use in operation	02
	M25x1.5	Brass, nickel-plated		IP 65 and IP 67	04
		Polyamide (PA)		Without IP compatibility, not for use in operation	05

Examples

Possible cable outlet combinations for a 2-threads electrical connector housing



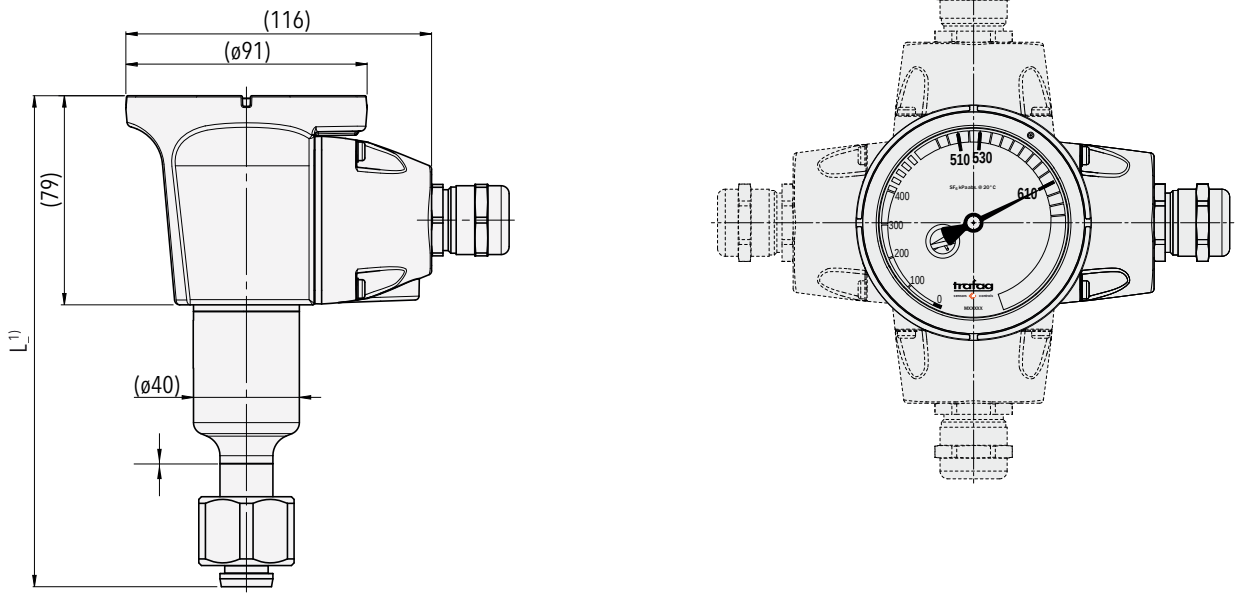
Example 1: 8719.XX.XXXX.XX.C2.17.10.XX...
- Cable connector housing with M25x1.5, horizontal and M20x1.5, lateral threads (option C2)
- EMC-cable gland M25x1.5 for cable ø12.5 ... 20.5 mm and EMC-cable gland M20x1.5 for cable ø7 ... 12.5 mm (options 17 and 10)

Example 2: 8719.XX.XXXX.XX.D1.07.07.XX...
- Cable connector housing with 2-threads M20x1.5, horizontal (option D1)
- Two equal EMC-cable glands M20x1.5 for cable ø8 ... 11 mm (options 07 and 07)

Example 3: 8719.XX.XXXX.XX.B1.11.XX...
- Cable connector housing with M25x1.5, lateral thread (option B1)
- EMC-cable gland M25x1.5 for cable ø8 ... 16 mm (option 11)

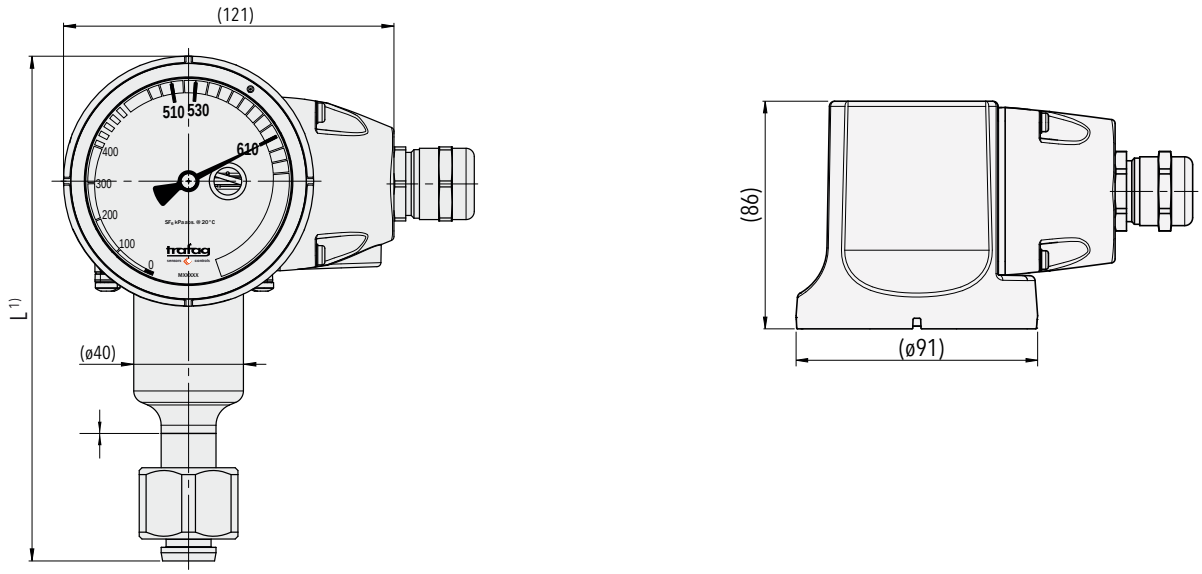
Main dimensions of density monitor

Example model with axial process connection



8719.AX.8XXX.XX.XX.XX.XX…

Example model with radial process connection



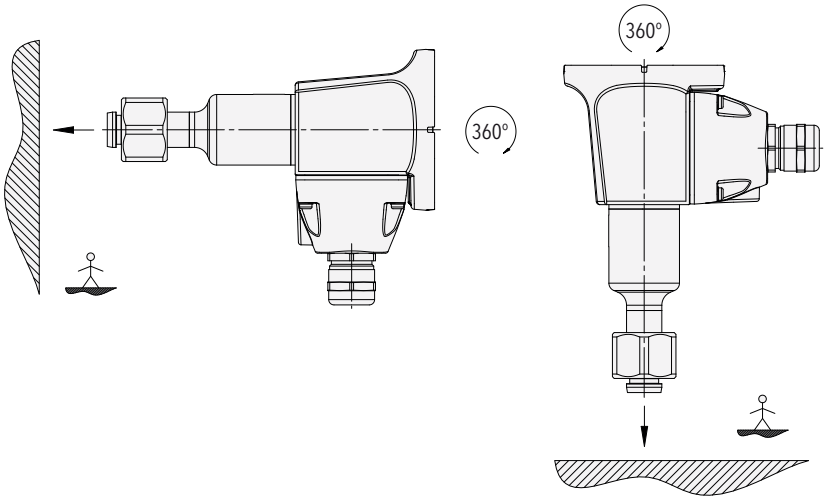
8719.RX.8XXX.XX.XX.XX.XX…

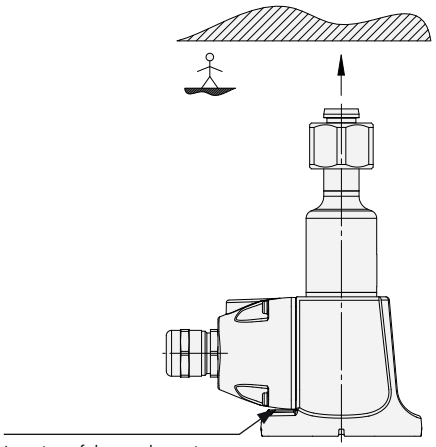
1) See table: Process connections

Installation

	Indoor application	Outdoor application
Installation orientation	No limitations, any orientation possible	• A complete vertical downward orientation of the monitor or the dial face shall be avoided to ensure the functionalty of the membrane providing condensation compensation • Consider a proper cable bending radius to ensure tightness of the cable connection. A complete vertical upward installation of the cable shall be avoided
Recommended option	None	Weather protection cover required. Please contact us for more details.

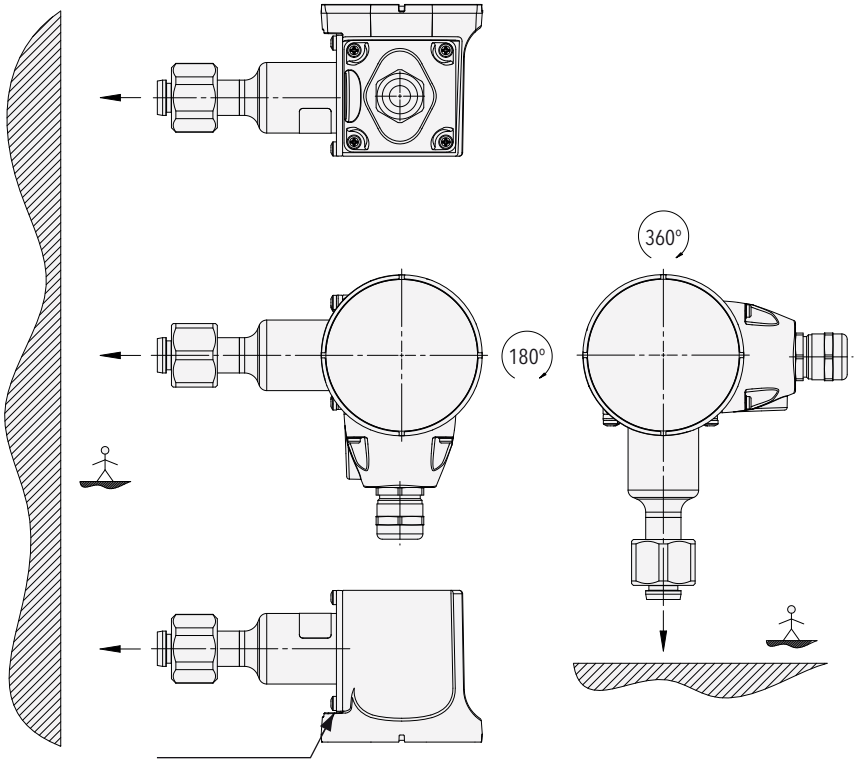
Specifications for axial type alignment installation



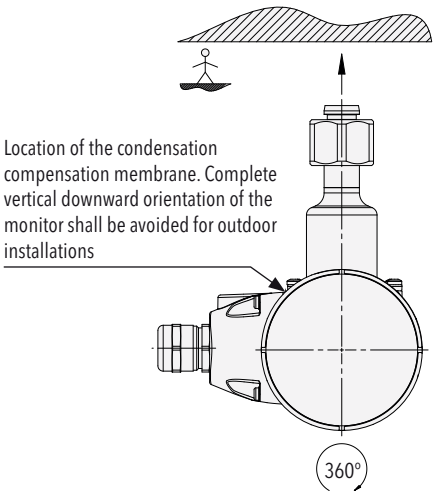


Location of the condensation compensation membrane. Complete vertical downward orientation of dial face shall be avoided for outdoor installations

Specifications for radial type alignment installation



Location of the condensation compensation membrane. Complete vertical downward orientation of dial face shall be avoided for outdoor installations

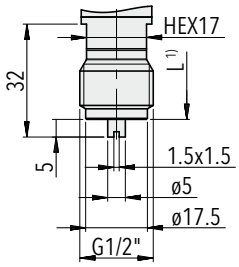


Location of the condensation compensation membrane. Complete vertical downward orientation of the monitor shall be avoided for outdoor installations

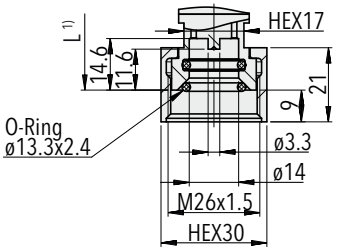
Process connections

		L = Length to top edge of density monitor [mm]			
	Alignment	Axial 8719.AX.XXXX. ...		Radial 8719.RX.XXXX ...	
	Valve	without	with	without	with
Threaded	7000	168	198	167	197
Cap nut	8300	185.5	215.5	184.5	214.5
	8550	160.5	190.5	159.5	189.5
	8570	166	196	165	195

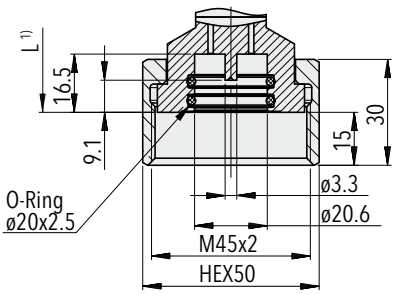
Delivery includes assembly kit and O-Ring set where applicable.
For full range of process connections and more details see data sheet www.trafag.com/H72522



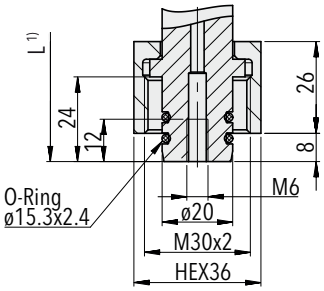
Theaded connection G1/2"
8719.XX.**7000**.XX.XX.XX.XX…



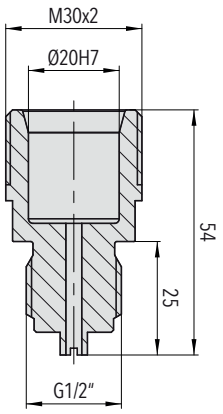
DN8 connection
8719.XX.**8550**.XX.XX.XX.XX…



DN20 connection
8719.XX.**8570**.XX.XX.XX.XX…



Cap nut connection
8719.XX.**8300**.XX.XX.XX.XX...



Adapter 2300 - G1/2" male for rotable G1/2" pressure connection
8719.XX.**8300**.XX.XX.XX.**N1**

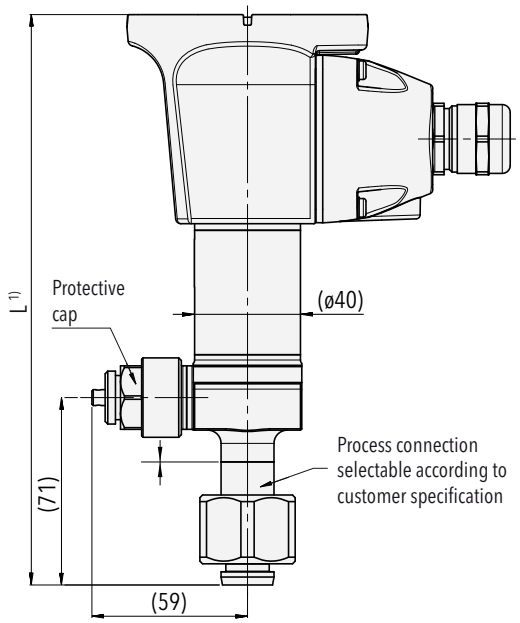
[1)] See table: Process connections

Valve options

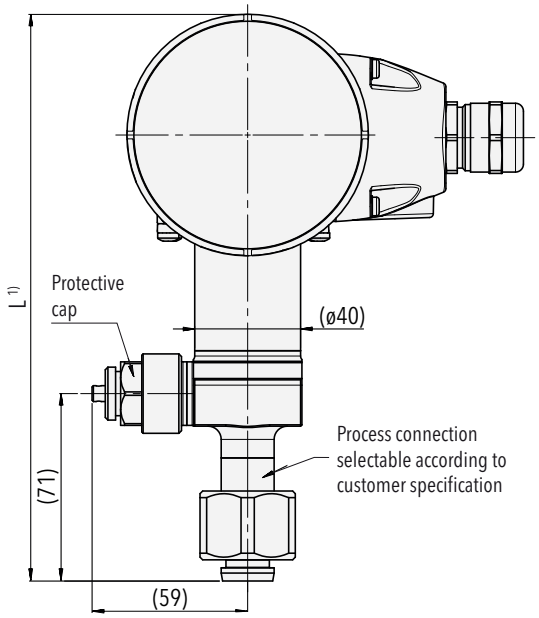
Integrated valve for density monitor test [1)]
Test valve allows in-situ monitor verification without dismounting from pressure compartment. Test equipment is connected via DN8 port. Connection port is configurable for direction W0/W1/W2/W3.

Integrated valve for process gas service and re-filling [1)]
Valve allows in-situ analysing of gas quality and direct insulating gas replenishment of pressure compartment via DN8 port on re-filling valve. Connection port is configurable for direction F0/F1/F2/F3.

Example model with integrated valve and axial aligned process connection

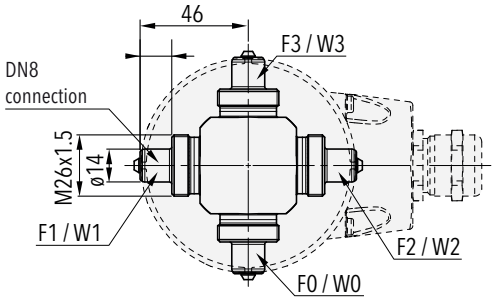


Example model with integrated valve and radial aligned process connection

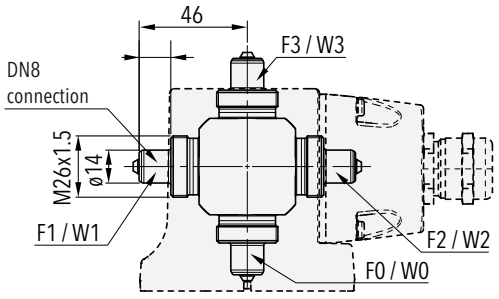


Orientation service connection (top view, valve port orientation is identical for axial and radial types)
Please specify port direction when ordering

Top view axial alignment



Top view radial alignment



8719.AX.XXXX.XX.XX.XX.XX.**W0/F0/W1/F1/W2/F2/W3/F3**.XX

8719.RX.XXXX.XX.XX.XX.XX.**W0/F0/W1/F1/W2/F2/W3/F3**.XX

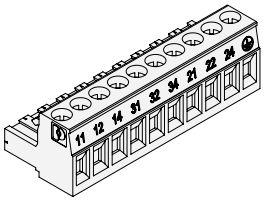
Operating specification for test and re-filling valve:
Opening and closing shall be limited to temperature range of -25°C ... +50°C.
Mechanical lifetime min. 250 actuation cycles.

F3/W3 (12 o'clock, Standard orientation)
F0/W0 (6 o'clock, 180° orientation)
F1/W1 (9 o'clock, 270° orientation)
F2/W2 (3 o'clock, 90° orientation)

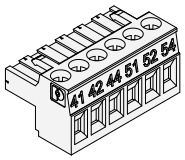
i For more details see instruction: www.trafag.com/H73623

[1)] The outer dimensions for both valves with the respective axis alignment type are the same
See table: Process connections

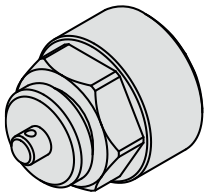
Spare parts



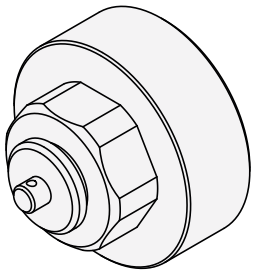
Microswitch wire terminal block A, 10-pins [1)]



Microswitch wire terminal block B, 6-pins [1)]



M26x1.5 protective cap for test and re-filling valve
2 x O-Ring IIR mounted inside
(Trafag part no.: C30645)



M45x1.5 protective cap for filling valve
(Trafag part no.: C35800)

[1)] Please contact us for more details

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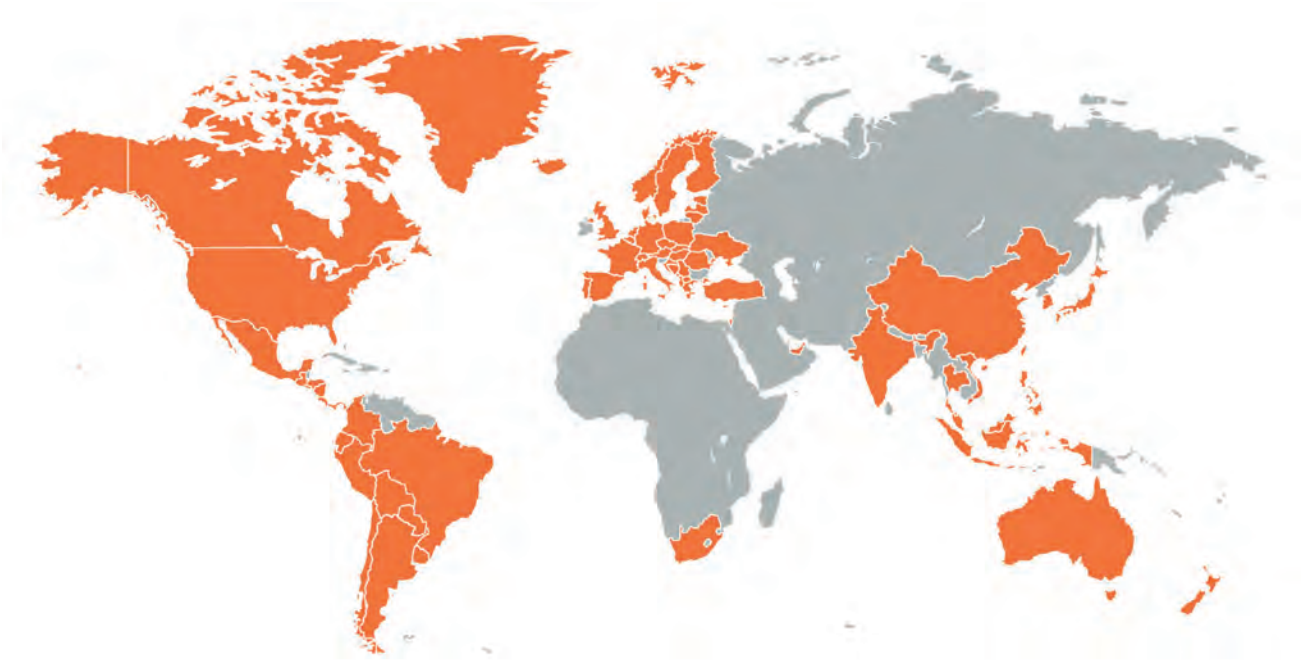

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