8775

Gas density sensor with Modbus output

Applications

- Density measurement in insulating and quenching gas
- High voltage technology
- Medium voltage technology
- SF_6 and variety of alternative mixed gases

Features

- Continuous density measurement
- Suitable for outdoor and indoor applications
- Long term drift free sensor output signal
- Maintenance free

CE EMC: 2014/30/EU

UKCA S.I. 2016 No. 1091

RoHS/Reach compliant

Product description

Swiss based Trafag offers precise, reliable and maintenance-free instruments developed for density measuring of SF_6 and related alternative gases. Measurement is based on the patented quartz tuning fork technology. Thus offering the most reliable and long term drift free solution on the market by directly measuring the insulating gas density.

Technical Data

Measuring principle	Oscillating quartz
Measuring range	max. 0 ... 60 kg/m³
Output signal	RS485/Modbus (RTU)
Ambient temperature	-40°C ... +80°C

Additional information

Data sheet	www.trafag.com/H72519
Instructions	www.trafag.com/H73519
Interface description	www.trafag.com/H73622

Ordering information/Type code

		8775	XX	XX	XX	XX	XX	XX
Density measuring range	0 … 60 kg/m³		51					
	0 … 30 kg/m³		52					
	0 … 15 kg/m³		53					
	0 … 60 kg/m³ (Legacy code, replaced with 51)		50					
Pressure connection	G3/8" male			11				
Output signal	Standard, float register				C5			
	Customised 1, integrated object identification				D5			
	Legacy Standard [1], integer register				05			
Electrical connection	Male electrical connector M12x1, 5-pole, A-coding					35		
Modbus settings	Baudrate and parity fixed							
	Baudrate 9600 and parity even (1 stop bit)						76	
	Baudrate 19200 and parity even (1 stop bit)						77	
	Baudrate and parity customised [2]						78	
	Baudrate and parity open configurable							
	Default baudrate 19200, parity even (1 stop bit)						79	
	Default settings customised [2]						80	
	Server-ID							
	Open configurable (default ID = 1)						95	
	Increasing number per order, start-ID selectable from 1 ... 247						96	
	Fixed, customised per order, selectable from 1 ... 247						97	
Accessories	Female electrical plugs							
	M12x1, 5-pole, A-coding, PA							33
	M12x1, 5-pole, A-coding, brass nickel-plated							35
	Pressure connection adapters							
	G3/8" female - 2200							22
	G3/8" female - 2300							23
	G3/8" female - 2550							27
	G3/8" female - 2570							28
	G3/8" female - 2800							29
	T-adapter M30x2 male - G3/8" female - 2300							25

[1] Only with measuring range 0 … 60 kg/m³
[2] See table Modbus Settings

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-%)

Electronical density measuring

Sensor	Principle	Oscillating quartz sensor
	Range [1]	max. 0 ... 60 kg/m³ max. 0 ... 1250 kPa abs. @ 20°C
	Output	RS485/Modbus (RTU)
	Output parameter	Gas density [kg/m³], Gas pressure [kPa abs. @ 20°C], Temperature [K], Gas pressure [kPa abs.] @ variable temperature [K]
Electrical data	Supply voltage	11 ... 30 VDC
	Current consumption	@ 24 VDC: 7 mA typ. / 20 mA max. @ 12 VDC: 14 mA typ.
	Earthing	Via process connection or wire terminal
	Resistance of insulation	>100 MΩ, 500 VDC, ex factory
	Dielectric strength	500 VAC, 50 Hz, terminal to ground (earth)
EMC protection	ESD	15 kV air, 8 kV contact, EN/IEC 61000-4-2
	Radiated immunity	10 V/m, 80 ... 6000 MHz, EN/IEC 61000-4-3
	Burst	2 kV, EN/IEC 61000-4-4
	Surge	Up to 2 kV, EN/IEC 61000-4-5
	Conducted immunity	10 Vrms, EN/IEC 61000-4-6
Accuracy	Density measurement	See table: Accuracy
	Temperature measurement	± 1.0 % FS typ. ± 3.0 % FS max.
	Resolution density output	Output type resolution 32 bit (float)
	Resolution temperature output	Output type resolution 32 bit (float)
	Repeatability density measurement	See table: Accuracy
	Repeatability temperature measurement	± 0.1 % FS
	Transient response time required for signal output to reach accuracy tolerance band	Less than 1 h after connecting monitor to pressurised compartment Less than 1 min. when monitor is vacuumised together with compartment before gas filling
	Measurement output signal refresh time [2]	Update time < 5ms

[1] Maximum value is either 60 kg/m³ or 1250 kPa abs. @ 20°C, whichever is reached first
[2] Internal integration time for full accuracy approx. 1.3 s
Fast integration time with reduced accuracy 80 ms (for detection of fast density changes)

Accuracy

The indicated accuracy is validated for SF_6 and common SF_6 mixtures, common C4-FN (CAS No. 42532-60-5) mixtures and synthetic air. Please contact us for further information.

Density measuring range	0 … 15 kg/m³	0 … 30 kg/m³	0 … 60 kg/m³
Total error band -40°C … +80°C [1]	± 1.8 % FS typ. ± 2.3 % FS max.	± 1.4 % FS typ. ± 2.0 % FS max.	± 1.0 % FS typ. ± 1.8 % FS max.
Repeatability	± 0.3 % FS typ.	± 0.3 % FS typ.	± 0.2 % FS typ.

[1] Total error band (TEB) for defined ambient temperature range while the insulation gas is completely gaseous

Surge level details

Maximum surge load level [kV]	Coupling category	Coupling settings	Signal coupling	Severity level
1	Line to Line	L-N	U_s+ to U_s–	3
1	Line to Earth	L-PE	U_s+ to Earth	2
1	Line to Earth	N-PE	U_s– to Earth	2
2	Line to Earth	L-N	Shield to Earth	3
1	Line to Earth	I/O	Dataline to Earth	2

Modbus settings

Baudrate	Default 9600 or 19200 optional selectable from 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 56000, 57600 [1]
Parity	Default even (1 stop bit), optional selectable odd (1 stop bit) or none (2 stop bits)
Server-ID	Selectable from 1 … 247
Devices in one bus	Up to 64

[1] See ordering information

General specifications

Environmental conditions	Ambient temperature [1]	-40°C ... +80°C
	Protection [2]	IP65 and IP67
	Humidity	IEC 60068-2-30 (damp heat, cyclic, 100 % RH @ +55°C)
	Overpressure	1600 kPa abs.
	Vibration	15 g, 5 ... 2000 Hz
	Shock	100 g, 6 ms, 10'000 times at all axes excited on process connection without damage to sensor
	Routine inspection of gas tightness	Integral pressure testing with helium, leakage detection rate < $7 \cdot 10^{-8}$ mbar · l/s
Mechanical data	Process gas wetted material	Process connection and measuring system: 1.4435 (AISI316L) Sealing: IIR
	Housing	1.4301 (AISI304)

[1] Approved for extended temperature range –55°C … +80°C for max. 200h per year
[2] While using an appropriate mating connector mounted according to instruction

Electrical connections and options

Wiring diagram
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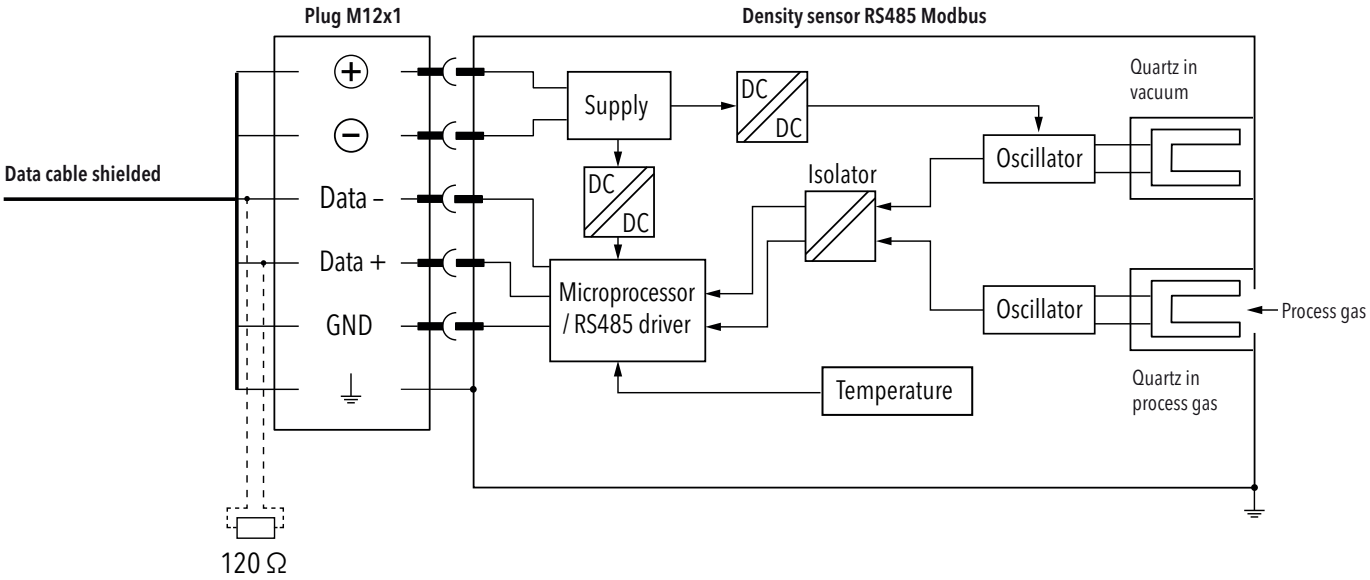
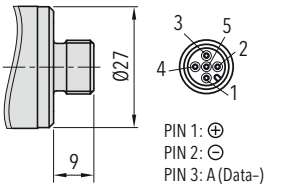


Male electrical connector
M12x1, 5-pole



PIN 1: ⊕
PIN 2: ⊖
PIN 3: A (Data–)
PIN 4: B (Data+)
PIN 5: GND
PE: Shield on cable

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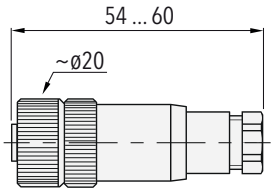
Material:
Thread 1.4435 with PA contact holder

Female electrical plug
M12x1, 5-pole, A-coding



For cable-Ø unified 4 ... 6 mm,
max. 0.75 mm²

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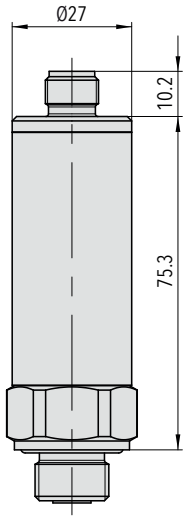
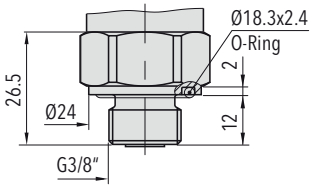
Material:
Type code 33: Polyamide (PA)
Type code 35: Brass, nickel-plated

Dimensions and process connections

Sensor with G3/8" male process connection





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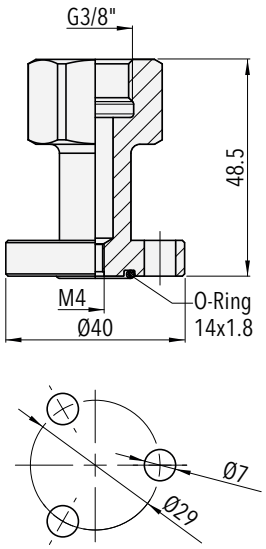
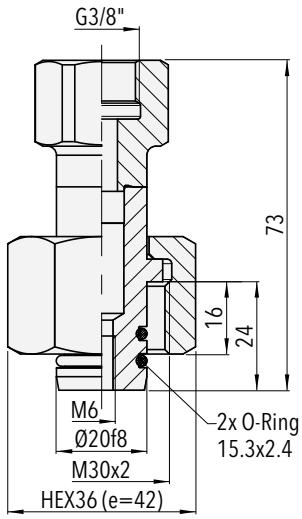
Process connection adapters



8775.XX.11.XX.35.XX.XX.**22**

Adapter G3/8" female –
3-hole flange 2200 series
Material: 1.4435 (AISI316L)



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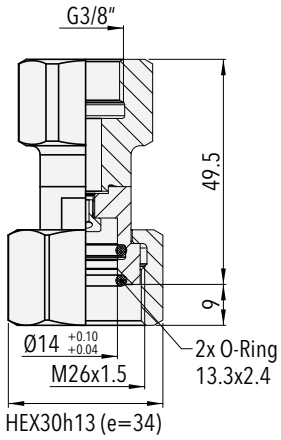
Adapter G3/8" female – 2300
Material: 1.4435 (AISI316L)
with nickel-plated brass nut



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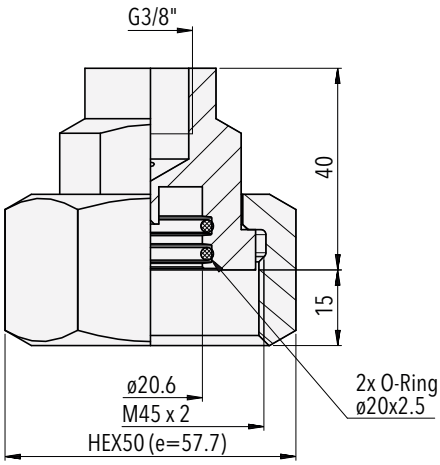
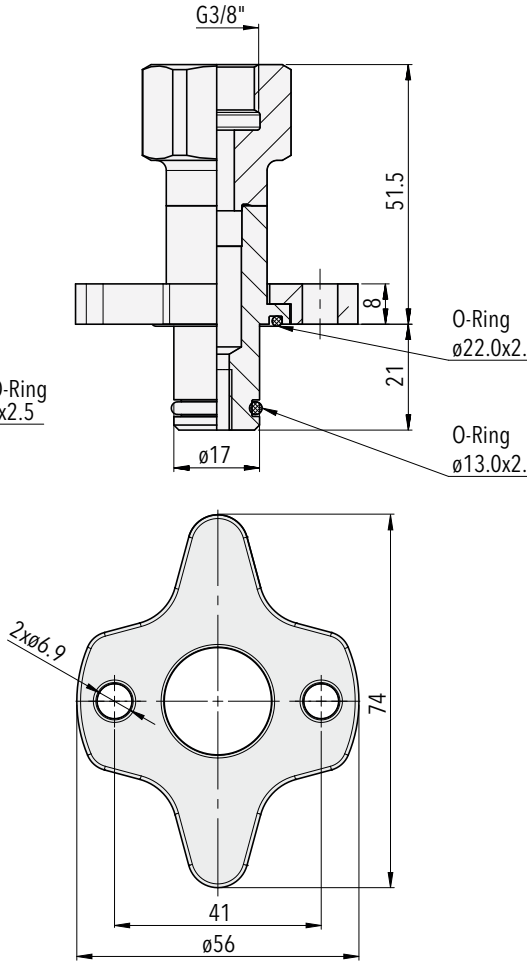
Adapter G3/8" female – 2550 for DN8
Material: 1.4435 (AISI316L)
with nickel-plated brass nut



8775.XX.11.XX.35.XX.XX.**28**

Adapter G3/8" female – 2570 for DN20
Material: 1.4435 (AISI316L)
with nickel-plated brass nut



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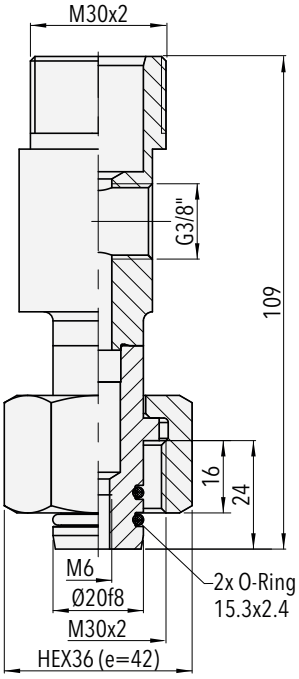
Adapter G3/8" – 2801/2802/2803
(flange process connection)
Material: 1.4404, 1.4572
with flange AlMgSi1



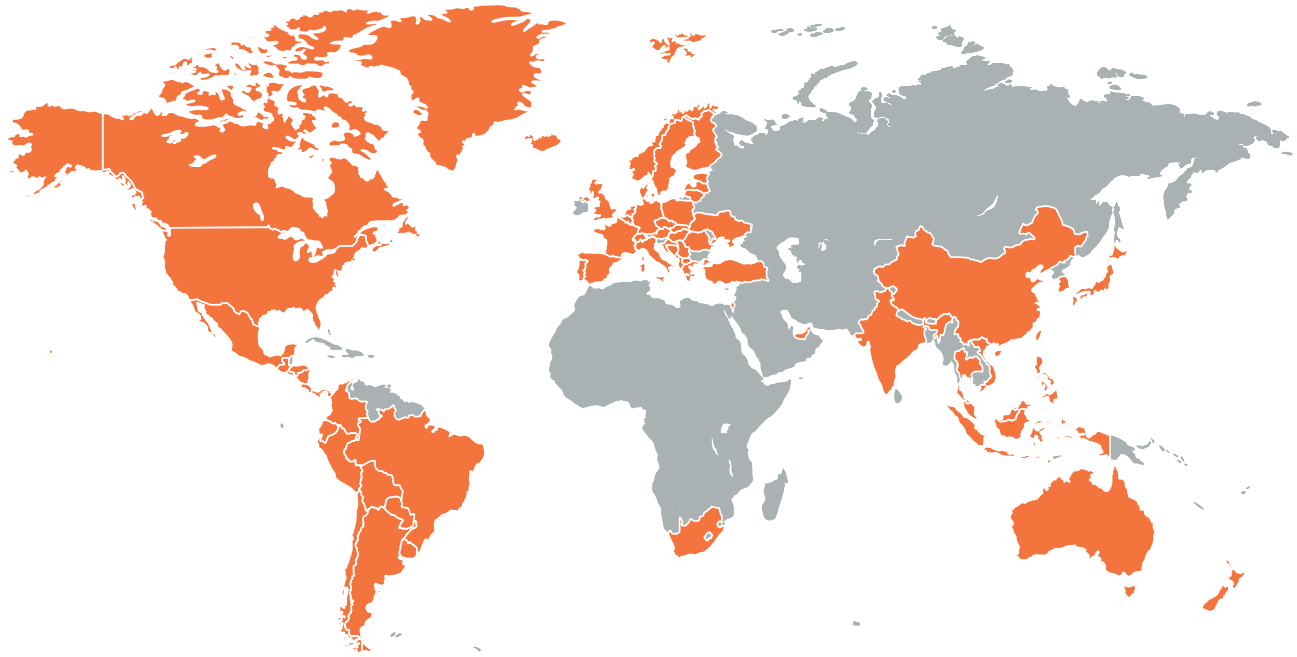
8775.XX.11.XX.35.XX.XX.**25**

T-adapter M30x2 male –
G3/8" female – 2300
Material: 1.4435 (AISI316L)
with nickel–plated brass nut

Reliable quality

Worldwide represented, globally trusted, Swiss based

Trafag develops, manufactures and markets accurate, robust, and maintenance-free instruments for monitoring SF_6 and alternative insulating gases in high and medium voltage switchgear. Trafag also offers a wide range of pressure and temperature monitoring products for various applications.
All innovative products and key components are designed in-house by Trafag's research and development departments in Switzerland, Germany and India and are then produced in the manufacturing sites in Switzerland, Germany, Czech Republic, and India. Strict quality management in accordance with ISO 9001 and ISO 14001 ensure that Trafag products meet the required quality and sustainability standards.
Trafag is headquartered in Switzerland, was founded in 1942 and has an extensive sales and service network in more than 40 countries worldwide.



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Pressure transmitters | Electronic pressure switches | Mechanical pressure switches | Pressure gauge | Thermostats | Temperature transmitters | Gas density