

GAS DENSITY SENSOR RS485/MODBUS

Swiss based Trafag offers precise, reliable and maintenance-free instruments developed for density measuring of SF₆ 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.



Applications

- Density measurement in insulating and quenching gas
- High voltage technology
- Medium voltage technology
- SF₆ and variety of alternative mixed gases

Features

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

Technical Data

Measuring principle	Oscillating quartz	Supply voltage	11 ... 32 VDC
Measuring range	0 ... 60 kg/m ³	Ambient temperature	-40°C ... +80°C
Output signal	RS485/Modbus (RTU)		

03/2021

Data sheet H72519g

Subject to change

Ordering information/type code

		8775 .	XX	XX	XX	XX	XX	XX
Density measuring range	0...60 kg/m ³	50						
Process connections	G3/8" male	11						
	2-hole flange 2800 series	28						
Sensor output	RS485/Modbus	05						
Electrical connection		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 ¹⁾	78						
	Baudrate and parity open configurable							
	Default baudrate 19200, parity even (1 stop bit)	79						
	Default settings customised ¹⁾	80						
	Slave-ID open configurable (default ID = 1)	95						
	Slave-ID with increasing number per order, start-ID selectable from 1 ... 247	96						
	Slave-ID fixed, customised per order, selectable from 1 ... 247	97						
Options	Female electrical plugs							
	M12x1, 5-pole, A-coding, PA	33						
	M12x1, 5-pole, A-coding, brass nickel-plated	35						
	Pressure connection adaptaters							
	G3/8" female - 2200	22						
	G3/8" female - 2300	23						
	G3/8" female - 2550	27						
	G3/8" female - 2570	28						
	T-adapter M30x2 male - G3/8" female - 2300	25						

¹⁾ Selectable baudrate: 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 56000, 57600
 Selectable parity: none (2 stop bits), odd (1 stop bit), even (1 stop bit)

Further customised parameterisation to be indicated

Process gas	SF ₆ , SF ₆ mixed gas, customer specific alternative gas
Gas pressure @ 20°C	Requirement for SF ₆ mixed gas or customer specific alternative gas



Trafag develops and manufactures customised products according to your specifications to meet your specific requirements. Please contact us for further details.

Specifications		
Electronical density measuring	Measuring principle ¹⁾	Oscillating quartz sensor
	Density measuring range ²⁾	0 ... 60 kg/m ³ 0 ... 1100 kPa abs. @ 20°C
	Temperature measuring range	-40°C ... +80°C
	Sensor output	RS485/Modbus (RTU)
	Output parameter	Gas density [kg/m ³], gas pressure [kPa abs.] @ 20°C, gas temperature [K], gas pressure [kPa abs.] @ temperature variable
Electrical data	Supply voltage	11 ... 32 VDC
	Current consumption	@ 24 VDC: 22 mA typ. / 40 mA max. @ 11 VDC: 47 mA typ. @ 32 VDC: 18 mA typ.
	Earthing	Via process connection or plug
	Resistance of insulation	> 100 MΩ, 500 VDC, ex factory
	Dielectric strength	500 VAC, 50 Hz, terminal to ground (earth)
Environmental conditions	Ambient temperature	-40°C ... +80°C ⁴⁾
	Protection ³⁾	IP65 / IP67
	Humidity	IEC 60068-2-30 (damp heat, cyclic, 100 % RH @ +55°C)
	Overpressure	1500 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 6 bar rel. helium SF ₆ leakage rate less than 1·10 ⁻⁸ mbar · l/s
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	2 kV, EN/IEC 61000-4-5
	Conducted immunity	10 Vrms, EN/IEC 61000-4-6
Mechanical data	Process gas wetted material	Process connection and measuring system: 1.4435 (AISI316L) Sealing: EPDM ⁵⁾
	Housing	1.4301 (AISI304)
	Weight	~ 200 ... 400 g

¹⁾ The oscillating quartz sensor principle is a direct density measurement and is fully independent from the process gas composition.

Measuring range is based on density pressure correlation which is defined by the particular gas isochores and is specifically fitted. Please contact us for process gases other than 100 % SF₆.

²⁾ Shown density pressure correlation corresponds to 100 % SF₆ gas. Maximum value is either 60 kg / m³ or 1100 kPa abs. @ 20°C, whichever is reached first.

³⁾ While using an appropriate female electrical plug

⁴⁾ Approved for extended temperature range -60°C ... +80°C for 200h max. per year

⁵⁾ SF₆ qualified

Accuracy

Density measurement	$\pm 1.0\%$ FS typ. $\pm 1.8\%$ FS max.
Temperature measurement	$\pm 1.0\%$ FS typ. $\pm 3.0\%$ FS max.
Resolution density	13 bit
Resolution temperature	10 bit
Repeatability density measurement	$\pm 0.2\%$ FS
Repeatability temperature measurement	$\pm 0.1\%$ FS
Transient response time required for signal output to reach accuracy tolerance band	Less than 1 h after connecting sensor to pressurised compartment Less than 1 min. when sensor is vacuumised together with compartment before gas filling
Measurement output signal refresh time ¹⁾	Less than 40 ms

Modbus settings

Baudrate	Default 9600 or 19200, optional selectable from 1200 ... 57600 ²⁾
Parity	Default even (1 stop bit), optional selectable odd (1 stop bit) or none (2 stop bits)
Slave-ID	Selectable from 1 ... 247
Devices in one bus	Up to 64

¹⁾ The refresh time mainly depends on the density been measured as the oscillating quartz sensor generates a basic frequency signal.
A typical refresh time for a density of 40 kg/m³ is 7 ms, for a density of 10 kg/m³ it is 20 ms.

²⁾ See ordering information

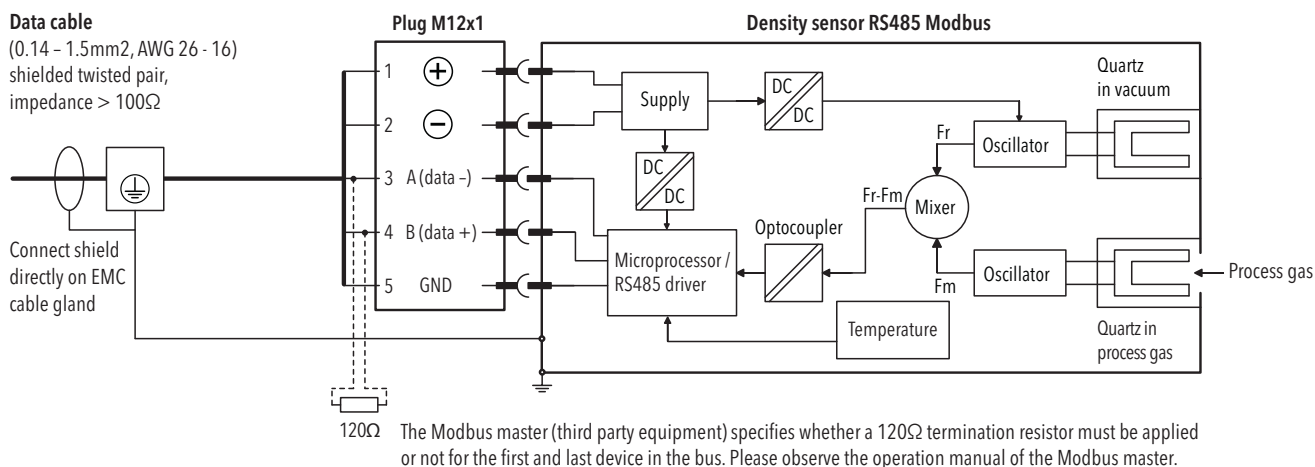
Additional information

Documents	Data sheet	www.trafag.com/H72519
	Instructions	www.trafag.com/H73519
	Flyer	www.trafag.com/H71107

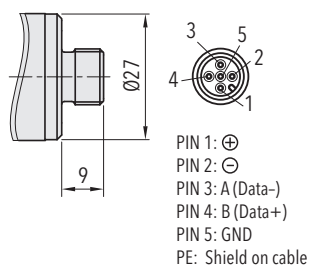
Electrical connections and options

Wiring diagram

8775.50.XX.05.35.XX.XX.XX



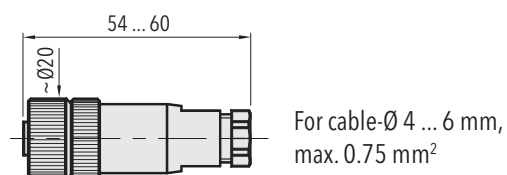
Male electrical connector M12x1, 5-pole, A-coding ¹⁾



8775.50.XX.05.35.XX.XX.XX

Material: Thread 1.4435 with PA contact holder

Female electrical plug M12x1, 5-pole, A-coding ¹⁾



8775.50.XX.05.35.33/35.XX.XX

Material:

Type code 33: Polyamide (PA)

Type code 35: Brass nickel-plated

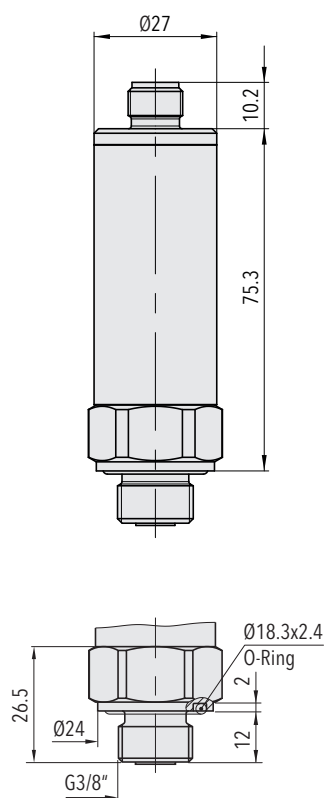
¹⁾ IP67 protection in combination with plug while mounted according to instructions



Instruction www.trafag.com/H73519

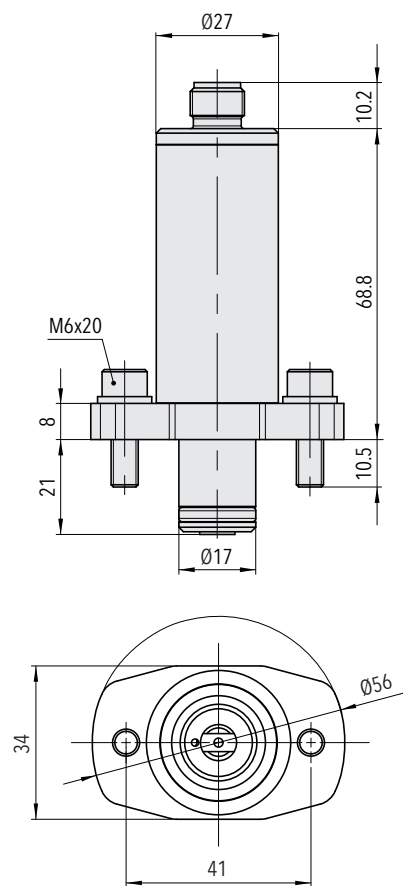
Dimensions and process connections

Sensor with G3/8" male process connection



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Sensor with 2-hole flange 2800 series



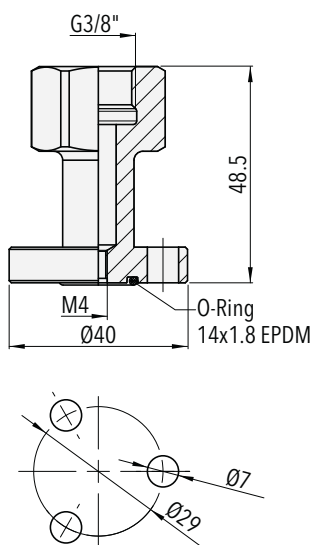
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Instruction www.trafag.com/H73519

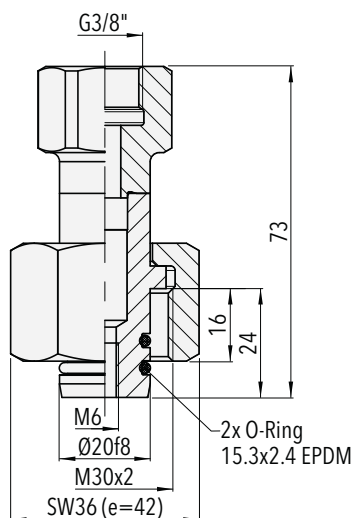
Dimensions and process connections

Process connection adapters



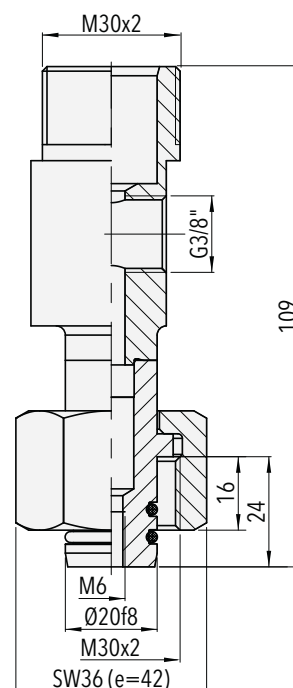
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Adapter G3/8" female -
3-hole flange 2200 series
Material: 1.4435 (AISI316L)



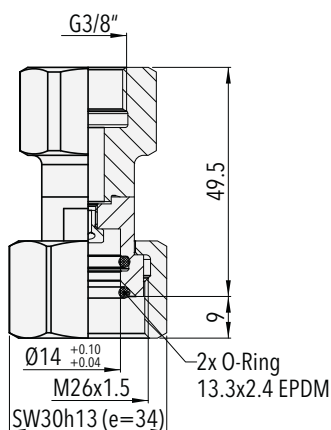
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Adapter G3/8" female - 2300
Material: 1.4435 (AISI316L)
with nickel-plated brass nut



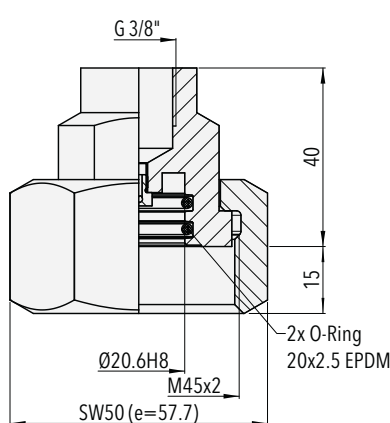
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T-adapter M30x2 male -
G3/8" female - 2300
Material: 1.4435 (AISI316L)
with nickel-plated brass nut



8775.50.11.05.35.XX.XX.27

Adapter G3/8" female - 2550
for DILO DN8
Material: 1.4404 (AISI316L)
with nickel-plated brass nut



8775.50.11.05.35.XX.XX.28

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