ELECTRONIC PRESSURE SWITCHES

Pressure transmitters

Mechanical pressure switches

Temperature monitoring

trafag
sensors controls


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Trafag product lines

Pressure transmitters

The technically sophisticated pressure transmitters guarantee flawless pressure measurement. They meet the high requirements for long-term stability, vibration resistance, electromagnetic compatibility, shock resistance and temperature insensitivity. As a result, they have proven themselves for decades in a multitude of demanding applications under harsh environmental conditions. Trafag pressure transmitters are available in a wide variety of versions: various pressure and electrical connections, measuring processes, electrical output signals, approvals for explosion protection and shipboard use. Railway-compliant versions are also available.

Pressure transmitters

Electronic pressure switches

The electronic pressure switches from Trafag are based on the million-times proven, in-house developed transmitter sensor technology. The superior technology and precise production guarantee a faultless functioning even where vibration resistance, electromagnetic compatibility, shock resistance or temperature insensitivity are a prerequisite. The robust pressure switches from Trafag monitor the pressure behavior of liquid and gaseous media, e.g. in plant construction and mechanical engineering, hydraulic systems, process engineering, rail vehicles, shipbuilding or in water treatment.

Electronic pressure switches

Mechanical pressure switches

Trafag's electromechanical pressure switches provide high vibration resistance and switch point precision in combination with an extremely robust and durable design. This results in switches that can be operated for decades without requiring maintenance, even under harsh conditions. Various designs with bellows, membrane and piston sensors cover a wide variety of pressure ranges, media and load profiles for many different applications. Pressostats are available with Ex- and ship approvals as well as with railway conformity.

Mechanical pressure switches

Temperature monitoring

For 70 years Trafag thermostats have proven their robustness in order to withstand the most adverse environmental conditions. Industry usage ranges from air conditioning applications to engine and ship manufacturing and even to offshore oil and gas platform production. The appeal of Trafag thermostats lies in their high switching point precision even after decades of operation under harsh conditions without maintenance. Trafag thermostats are available in various sensor and housing versions, with various Ex and ship approvals as well as in railway-compliant versions.

Temperature monitoring

Our products are at home where you are

Shipbuilding

- Propulsion
- Pumps
- Ballast water treatment
- Steering
- Separators
- Tank level

Hydraulics

- Construction machinery
- Agricultural machinery
- Injection molding machines
- Community vehicles
- Elevators

Engines

- Common rail injection
- Cooling water
- Oil pressure
- Fuel pressure
- Turbo charger

Railways

- Brake systems
- Pantograph
- Air compressors

Water treatment

- Drinking water
- Waste water
- Desalination
- Pools
- Sluice steering
- Level control

Various

- Chemical industry
- Mining
- Process technology
- Oil and gas
- Machine building industry
- HVAC

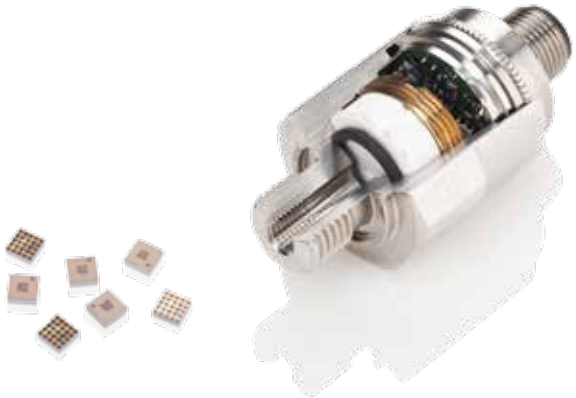
trafag sensors controls

Electronic pressure switches

The electronic pressure switches from Trafag are based on the million-times proven, in-house developed transmitter sensor technology. The superior technology and precise production guarantee a faultless functioning even where vibration resistance, electromagnetic compatibility, shock resistance or temperature insensitivity are a prerequisite. The robust pressure switches from Trafag monitor the pressure behavior of liquid and gaseous media, e.g. in plant construction and mechanical engineering, hydraulic systems, process engineering, rail vehicles, shipbuilding or in water treatment.

Sensor technology

Key components of Trafag pressure transmitters are pressure sensors based on thin-film-on-steel technology (welded design without O-ring) or thick-film-on-ceramic technology. Both sensor technologies come from Trafag's own production and were developed in-house together with the ASIC (application-specific microchip). As a result, pressure sensors and electronics work in perfect partnership and achieve a unique level of long-term stability and reliability, even under the most adverse environmental conditions.



Thin-film-on-steel sensor technology

- Very good long term stability
- Resistant to high media temperatures
- Completely welded stainless steel sensor system without O-rings
- Resistant to very high over pressures and ideal for nominal pressures up to 3000 bar

Thick-film-on-ceramic sensor technology

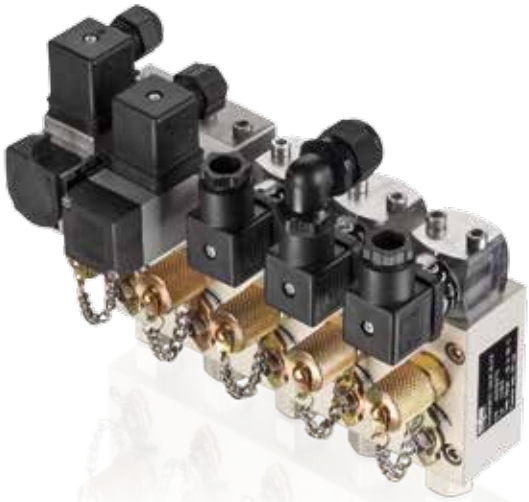
- Resistant to aggressive media
- Ideal for low measuring ranges
- Relative and absolute pressure measurement

Accessories

Trafag offers a wide range of original accessories which are ideally matched to our products. They include devices for configuration and parameterization of electronic pressure switches such as the Sensor Master Interface SMI with Bluetooth to connect with the Android-App, or the Sensor Communicator SC, a handheld device which provides direct access to the calibration values in the Trafag ASIC. Beside hand pumps with precision pressure gauge for the monitoring and diagnostic purposes, Trafag also offers a wide range of accessories, which can be adapted to meet specific application requirements and also make installation easier. They include diagnostic valve manifolds, snubbers and pressure peak damping elements.

Accessories for electronic pressure switches

- SMI Sensor Master Interface
- SC Sensor Communicator
- DVB Diagnostic valve block
- Hand pump with precision manometer
- Pressure peak damping element
- Snubber
- Adapters for different pressure connections
- Stop valve



Electronic pressure switches

	DPC 8380	DPS 8381	EPN-S 8320
	page 12	page 21	page 30
			
Measuring principle	Thick-film-on-ceramic	Thin-film-on-steel	Thin-film-on-steel
Measuring range	0 ... 0.2 to 0 ... 100 bar 0 ... 2.5 to 0 ... 1500 psi adjustable	0 ... 2.5 to 0 ... 600 bar 0 ... 30 to 0 ... 7500 psi adjustable	0 ... 2.5 to 0 ... 600 bar 0 ... 30 to 0 ... 7500 psi
Output signal	4 ... 20 mA, 0 ... 5 VDC, 1 ... 6 VDC, 0 ... 10 VDC, switchable mA or V	4 ... 20 mA, 0 ... 5 VDC, 1 ... 6 VDC, 0 ... 10 VDC, switchable mA or V	Transistor (open source)
Accuracy @ 25°C typ.	± 0.5 % FS typ.	± 0.5 % FS typ.	± 0.5 % FS typ. (Switchpoint)
Ambient temperature	-25°C ... +85°C	-25°C ... +85°C	-25°C ... +85°C
Media temperature	-25°C ... +85°C	-25°C ... +85°C	-40°C ... +125°C
Protection	IP67	IP67	IP65 (IP67), IP69K
Sensor (wetted parts)	Ceramic, Al_2O_3 (96 %)	Ceramic, Al_2O_3 (96 %)1.4542 (AISI630)	Ceramic, Al_2O_3 (96 %)
Pressure connection (wetted parts)	1.4305 (AISI303 1.4404/1.4435 (AISI316L) 1.4462 (AISI318LN) Titanium Grade 5	1.4542 (AISI630)	Pressure ranges ≤ 250 bar: 1.4542 (AISI630) Pressure ranges > 250 bar: 1.4301 (AISI304)
Housing	Zinc based die-casting alloy, nickel plated display housing plastic	Zinc based die-casting alloy, nickel plated display housing plastic	1.4301 (AISI304)
Pressure connections	G1/4" f, G1/4" m, G1/2" m DIN3852-E, 1/4"NPT m, R1/4" m DIN3858, 7/16"-20UNF m DIN 3866, 7/16"-20UNF f SAE J512 valve opener, 7/16"-20UNF f SAE4 (J1926), G3/4" frontal membrane	G1/4" f, G1/4" m Seal, G1/2" m (Manometer), 1/4"NPT m, 1/2"NPT m, R1/4" m DIN3858, M14x1.5 m DIN6149-2, 7/16"-20UNF m, DIN3866, 7/16" -20UNF m SAE4 (J1926), 7/16"-20UNF f SAE J512, valve opener	G1/4" m, 1/4"NPT m, G1/2" m, M14x1.5 m, 1/2"NPT m
Electrical connections	Male electrical plug M12x1, 5-pole; Male electrical plug M12x1, 4-pole	Male electrical plug M12x1, 5-pole; Male electrical plug M12x1, 4-pole	EN175301-803-A (DIN43650-A); Cable
Applications	Machine tools HVAC Refrigeration Water treatment Process technology	Machine tools Hydraulics Process technology Industrial applications	Shipbuilding Engine manufacturing Railways Machine tools Hydraulics
Approval / conformity			DNV-GL, RMRS
Data sheet	www.trafag.com/H72320	www.trafag.com/H72321	www.trafag.com/H72333
Instructions	www.trafag.com/H73320	www.trafag.com/H73320	www.trafag.com/H73333

	NAT 8252	NAH 8254	NAR 8258
	page 35	page 47	page 59
			
	Thin-film-on-steel	Thin-film-on-steel	Thin-film-on-steel
	0 ... 2.5 to 0 ... 600 bar 0 ... 30 to 0 ... 7500 psi	0 ... 0.2 to 0 ... 600 bar 0 ... 3 to 0 ... 7500 psi	0 ... 6 to 0 ... 600 bar 0 ... 100 to 0 ... 7500 psi
	Switching output: 1 or 2 PNP transistors	Switching output: 1 or 2 PNP transistors	Switching output: 1 or 2 PNP transistors
	± 0.5 % FS typ.	± 0.3 % FS typ.	± 0.3 % FS typ.
	–40°C ... +125°C	–40°C ... +125°C	–40°C ... +125°C
	–40°C ... +125°C	–40°C ... +125°C	–40°C ... +125°C
	IP65, IP67, IP68	IP65, IP67, IP68	IP65, IP67
	1.4542 (AISI630)	1.4542 (AISI630)	1.4542 (AISI630)
	1.4542 (AISI630)	1.4542 (AISI630)	1.4542 (AISI630)
	1.4301 (AISI304)	1.4301 (AISI304)	1.4301 (AISI304)
	G1/4" m, G1/4" m (Manometer); 1/4"NPT m, 1/8"NPT m; 7/16"-20UNF f, SAE J512; 7/16"-20UNF m, SAE4 (J1926); 7/16"-20UNF m, DIN3866; 9/16"-18UNF m, SAE6 (J1926); R1/4" m, DIN3858; R1/4" m, DIN2999; R1/8" m, DIN3858; M10x1 m, DIN EN ISO 6149-2; M12x1.5 m, DIN EN ISO 9974-2; M14x1.5 m, DIN EN ISO 6149-2	G1/4" m, G1/4" m (Manometer); 1/4"NPT m, 1/8"NPT m; 7/16"-20UNF f, SAE J512; 7/16"-20UNF m, SAE4 (J1926); 7/16"-20UNF m, DIN3866; 9/16"-18UNF m, SAE6 (J1926); R1/4" m, DIN3858; R1/4" m, DIN2999; R1/8" m, DIN3858; M10x1 m, DIN EN ISO 6149-2; M12x1.5 m, DIN EN ISO 9974-2; M14x1.5 m, DIN EN ISO 6149-2	G1/4" m; G1/4" m (Manometer); 1/4"NPT m; 7/16"-20UNF m, SAE4 (J1926); R1/4" m, DIN2999; M10x1 m, DIN EN ISO 6149-2; M12x1.5 m, DIN EN ISO 9974-2
	M12x1; Cable IP67 (IP68)	M12x1; Cable IP67 (IP68)	M12x1
	Machine tools Hydraulics HVAC Refrigeration Process technology	Machine tools Hydraulics Process technology	Railways
			EN 50155 (Railway) EN 45545-2 (Fire protection) EN 61373 (Shock, vibration) EN 50121-3-2 (EMC)
	www.trafag.com/H72303	www.trafag.com/H72304	www.trafag.com/H72307
	www.trafag.com/H73303	www.trafag.com/H73303	www.trafag.com/H73303

DISPLAY PRESSURE SWITCH

Swiss based Trafag is a leading international supplier of high quality sensors and monitoring instruments for measurement of pressure and temperature. The DPC 8380 is the ideal combination of pressure switch and transmitter with pressure display. The parameters are set on the device or in a timesaving way via an NFC - smartphone App. The settings in combination with a comprehensive set of options make the DPC 8380 suitable for a wide range of industrial applications.

Applications

- Machine tools
- HVAC
- Refrigeration
- Water treatment
- Process technology

Features

- Parameterization also via NFC-smartphone App (Android)
- Display and electrical connection are independently rotatable 335°/343°
- Analogue output switchable mA or V
- Integrated datalogger
- Measuring range adjustable

Technical Data			
Measuring principle	Thick-film-on-ceramic	Media temperature	-25°C ... +85°C
Measuring range	0 ... 0.2 to 0 ... 100 bar 0 ... 2.5 to 0 ... 1500 psi adjustable	Ambient temperature	-25°C ... +85°C
Output signal	4 ... 20 mA, 0 ... 5 VDC, 1 ... 6 VDC, 0 ... 10 VDC, switchable mA or V	Pressure unit for display	bar, psi, MPa, kPa, m WC, mm WC, %, user scale
Switching output	2 transistors PNP	Logger	Ring buffer: 3518 data points Sampling time: 0.1 ... 999.9 s, Off (0)
Accuracy @ 25°C typ.	± 0.5 % FS typ.		

Subject to change

Ordering information/type code

8380 . XX XX XX XX XX XX

Measuring range [1]

Pressure measurement range [bar]	Over pressure [bar]	Burst pressure [bar]		Pressure measurement range [psi]	Over pressure [psi]	Burst pressure [psi]	
0 ... 0.2	1.2	2	**68**	0 ... 2.5	15	30	**F8**
0 ... 0.4	1.2	2	**69**	0 ... 5	15	30	**F9**
0 ... 0.6	1.2	2	**70**	0 ... 7.5	15	30	**G0**
0 ... 1	2	4.8	**71**	0 ... 15	45	70	**G1**
0 ... 1.6	3.2	4.8	**73**	0 ... 20	45	70	**G3**
0 ... 2.5	5	7.5	**75**	0 ... 30	60	90	**G5**
0 ... 4	8	12	**76**	0 ... 50	100	150	**G6**
0 ... 6	12	15	**77**	0 ... 100	200	250	**G7**
0 ... 10	20	25	**78**	0 ... 150	300	375	**G8**
0 ... 16	32	40	**79**	0 ... 250	500	625	**G9**
0 ... 25	50	75	**80**	0 ... 400	800	1200	**H0**
0 ... 40	80	100	**81**	0 ... 500	1000	1250	**H1**
0 ... 60	120	180	**82**	0 ... 1000	2000	3000	**H2**
0 ... 100	200	300	**83**	0 ... 1500	3000	4500	**H3**

Sensor

Relative pressure, 1.4305, accuracy: 0.5 %	**57**	Absolute pressure, 1.4305, accuracy: 0.5 % [3]	**87**
Relative pressure, 1.4404/1.4435, accuracy: 0.5 % [4]	**59**	Absolute pressure, 1.4404/1.4435, accuracy: 0.5 % [3] [4]	**89**
Relative pressure, 1.4462, accuracy: 0.5 % [4]	**52**	Absolute pressure, 1.4462, accuracy: 0.5 % [3] [4]	**82**
Relative pressure, titanium grade 5, accuracy: 0.5 % [4]	**53**	Absolute pressure, Titanium Grade 5, accuracy: 0.5 % [3] [4]	**83**

Pressure connection

G1/4" female	**10**	7/16"-20UNF male, DIN3866 [3] [4]	**18**
G1/4" male	**17**	7/16"-20UNF female SAE J512 with valve opener [3] [4]	**24**
G1/2" male DIN3852-E [4]	**41**	7/16"-20UNF male SAE4 (J1926) [4]	**42**
1/4" NPT male [4]	**30**	G3/4" frontal membrane [4] [6]	**52**
R1/4" male, DIN3858 [4]	**19**		

Electrical connection

Male electrical plug M12x1, 4-pole, Mat. PA (Accessories P3, P4)	**32**
Male electrical plug M12x1, 5-pole, Mat. PA (Accessories P1, P2)	**35**

Output signal

Switching output PNP, current output 4 ... 20 mA, switchable to 0 ... 10 VDC; output detail see accessories P1, P2, P3	**PA**
Switching output PNP, voltage output 1 ... 6 VDC; output detail see accessories P1, P2, P3	**PU**
Switching output PNP, voltage output 0 ... 10 VDC; output detail see accessories P1, P2, P3	**PV**
Switching output PNP, voltage output 0 ... 5 VDC; output detail see accessories P1, P2, P3	**PW**
Switching output PNP; output detail see accessory P4	**PS**

Accessories

Pin configuration 5-pole.; 1: U+, 2: analogue, 3: U-, 4: SP1, 5: SP2	**P1**
Pin configuration 5-pole.; 1: U+, 2: SP2 , 3: U-, 4: SP1, 5: analogue	**P2**
Pin configuration 4-pole.; 1: U+, 2: analogue, 3: U-, 4: SP1	**P3**
Pin configuration 4-pole.; 1: U+, 2: SP2 , 3: U-, 4: SP1	**P4**
Pressure peak damping element ø 1.0 mm, material 1.4305 [7]	**40**
Pressure peak damping element ø 0.4 mm, material 1.4305 (sensors 57, 87) resp. 1.4404 (sensors 52, 53, 59, 82, 83, 89) [7]	**44**
Seal FPM, -18°C ... +125°C	**61**
Seal EPDM, -40°C ... +125°C	**63**
Female electrical plug M12x1, 5-pole [5]	**33**
Parameterization standard for output signal PS, T1 (see table "Parameters")	**ZS**
Parameterization according to customer specification (see table "Parameters")	**ZC**
Function package 1: Zero set / Measuring range zero point adjustment	**Z1**
Function package 2: User scale unit / analogue output adjustment	**Z2**
Protective cap, 1 pc. F89051, package of 5 pcs. F89052, package of 25 pcs. F89075	

[1] Extended overpressure as well as customized pressure ranges upon request
[3] Max. 40 bar or 500 psi
[4] Upon request
[5] For electrical connections 32 and 35
[6] Not for sensors 57 and 87, only for pressure ranges ≤ 25 bar or 400 psi
[7] Not for pressure connections 10, 18, 24, 52

Standard products (extra short lead time)

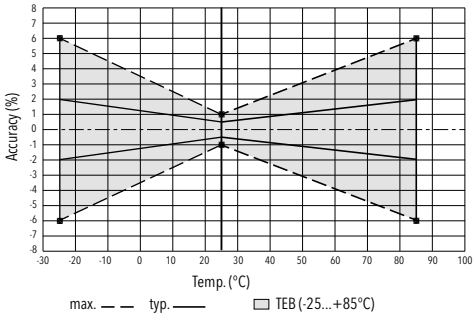
Product No.	Type Code	Pressure range [bar]	Over pressure max. [bar]	Supply [VDC]	Accuracy @ 25°C typ. [%]
DPC0.2PAP1	8380 68 5717 35 0000 0000 PA P1 44 61 ZS	0 ... 0.2	1.2	15 ... 30	± 0.5
DPC0.4PAP1	8380 69 5717 35 0000 0000 PA P1 44 61 ZS	0 ... 0.4	1.2	15 ... 30	± 0.5
DPC0.6PAP1	8380 70 5717 35 0000 0000 PA P1 44 61 ZS	0 ... 0.6	1.2	15 ... 30	± 0.5
DPC1.0PAP1	8380 71 5717 35 0000 0000 PA P1 44 61 ZS	0 ... 1	2	15 ... 30	± 0.5
DPC1.6PAP1	8380 73 5717 35 0000 0000 PA P1 44 61 ZS	0 ... 1.6	3.2	15 ... 30	± 0.5
DPC2.5PAP1	8380 75 5717 35 0000 0000 PA P1 44 61 ZS	0 ... 2.5	5	15 ... 30	± 0.5
DPC4.0PAP1	8380 76 5717 35 0000 0000 PA P1 44 61 ZS	0 ... 4	8	15 ... 30	± 0.5
DPC6.0PAP1	8380 77 5717 35 0000 0000 PA P1 44 61 ZS	0 ... 6	12	15 ... 30	± 0.5
DPC10.0PAP1	8380 78 5717 35 0000 0000 PA P1 44 61 ZS	0 ... 10	20	15 ... 30	± 0.5
DPC16.0PAP1	8380 79 5717 35 0000 0000 PA P1 44 61 ZS	0 ... 16	32	15 ... 30	± 0.5
DPC25.0PAP1	8380 80 5717 35 0000 0000 PA P1 44 61 ZS	0 ... 25	50	15 ... 30	± 0.5
DPC40.0PAP1	8380 81 5717 35 0000 0000 PA P1 44 61 ZS	0 ... 40	80	15 ... 30	± 0.5
DPC60.0PAP1	8380 82 5717 35 0000 0000 PA P1 44 61 ZS	0 ... 60	120	15 ... 30	± 0.5
DPC100.0PAP1	8380 83 5717 35 0000 0000 PA P1 44 61 ZS	0 ... 100	200	15 ... 30	± 0.5

Parameters				
Name	**Standard adjust-ment (Accessory ZS)**	**Value range**	**Shortname**	**Customer adjustment (Accessory ZC)**
Switch point SP1 (hysteresis mode) Upper switch point FH1 (window mode)	75 % Measuring range	SP1 > RP1 FH1 > FL1 Hysteresis ≥ 1 % d.S.	SP1	
Reset point RP1 (hysteresis mode) Lower switch point FL1 (window mode)	25 % Measuring range	RP1 < SP1 FL1 < FH1 Hysteresis ≥ 1 % d.S.	RP1	
Switch point SP2 (hysteresis mode) Upper switch point FH2 (window mode)	75 % Measuring range	SP2 > RP2 FH2 > FL2 Hysteresis ≥ 1 % d.S.	SP2	
Reset point RP2 (hysteresis mode) Lower switch point FL2 (window mode)	25 % Measuring range	RP2 < SP2 FL2 < FH2 Hysteresis ≥ 1 % d.S.	RP2	
Switch point delay time SP1 (hysteresis mode) Switch point delay time FH1 (window mode)	0	0 ... 99.99 s	dS1	
Switch point delay time RP1 (hysteresis mode) Switch point delay time FL1 (window mode)	0	0 ... 99.99 s	dR1	
Switch point delay time SP2 (hysteresis mode) Switch point delay time FH2 (window mode)	0	0 ... 99.99 s	dS2	
Switch point delay time RP2 (hysteresis mode) Switch point delay time FL2 (window mode)	0	0 ... 99.99 s	dR2	
Function switching output 1	Hysteresis, closer (Hno)	Hysteresis NO (Hno), Hysteresis NC (Hnc) Window NO (Fno), Window NC (Fnc)	ou1	
Function switching output 2	Hysteresis, closer (Hno)	Hysteresis NO (Hno), Hysteresis NC (Hnc) Window NO (Fno), Window NC (Fnc)	ou2	
Pressure unit	bar	bar, psi, MPa, kPa, m WC	uni	
Measuring range adjustment	100 % Nominal pressure	50 ... 100 % Nominal	P-EP	
Damping analogue output	0.01 s	0.01 ... 3.00 s (time constant)	dAA	
Display rotation	No	No, yes (180°)	disr	
Display mode	Current pressure value	Pressure value: current, highest, lowest, display off Current value: decimal places selectable (max. 3)	dis	
Display actualisation	2	1, 2, 5, 20 Hz	duPd	

Specifications		
Electrical Data	Output / supply voltage	4 ... 20 mA: 24 (15 ... 30) VDC 0 ... 5 VDC: 24 (15 ... 30) VDC 1 ... 6 VDC: 24 (15 ... 30) VDC 0 ... 10 VDC: 24 (15 ... 30) VDC
	Switch-on-delay	Typ. 200 ms
	Inverse-polarity protection, short-circuit strength @ 25°C during 5 min.	integrated
	Current consumption	≤ 30 mA
Environmental conditions	Media temperature	-25°C ... +85°C
	Ambient temperature	-25°C ... +85°C
	Protection [1)]	IP67
	Humidity	Max. 95 % relative
	Vibration	10 g (10 ... 2000 Hz)
	Shock	50 g / 3 ms
EMC Protection	Emission	EN/IEC 61000-6-3
	Immunity	EN/IEC 61000-6-2
Mechanical Data	Sensor (wetted parts)	Ceramic, Al_2O_3 (96 %)
	Pressure connection (wetted parts)	57/87: 1.4305 (AISI303 59/89: 1.4404/1.4435 (AISI316L) 52/82: 1.4462 (AISI318LN) 53/83: Titanium Grade 5
	Housing	Zinc based die-casting alloy, nickel plated display housing plastic
	Sealing	FPM, EPDM
	Male electrical plug	See ordering information
	Weight	~ 189 g
	Mounting torque	15 ... 20 Nm
	Housing alignment	Display 335° rotatable, max. 2.5 Nm Electrical connection 343° rotatable, max. 5 Nm

[1)] See electrical connection

Measuring accuracy 0.5 %



Analogue output			
Output signal	Switchable 4 ... 20 mA or voltage		
Accuracy	TEB @ -25 ... +85°C	[% FS typ.]	± 2.0
	Accuracy @ +25°C	[% FS typ.]	± 0.5
	NLH @ +25°C (BSL)	[% FS typ.]	± 0.2
	TC zero point and span	[% FS/K typ.]	± 0.03
	Long term stability 1 year	[% FS typ.]	± 0.3
Current limiting output signal	4 ... 20 mA: 25 mA (overload)		
	0 ... 10 VDC: < 40 mA (short-circuit)		
Damping (rise time)	0.01 ... 3.00 s / 10 ... 90 % Nominal pressure		
Zero set; [1] Offset correction of analogue output and display indication	± 0.2 % FS		
Measuring range zero point adjustment (P_nP) [1]	0 ... 50 % FS [2]		
Measuring range end point adjustment (P_EP)	50 ... 100 % FS [2]		
Zero point adjustment analogue output (o_nP) [1]	Voltage output: 0 ... 2 VDC Current output: 3.9 ... o_EP - 8 mA		
End point adjustment analogue output (o_EP) [1]	Voltage output: o_nP + 4 ... 10.5 VDC Current output: o_nP + 8 ... 20.1 mA		

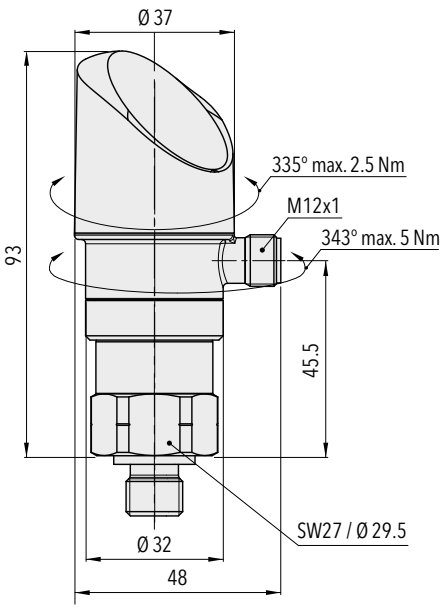
[1] Available with optional function package, see "Accessories"
[2] P_EP – P_nP ≥ 50 % FS

Switching output			
Accuracy	Accuracy @ +25°C	[% FS typ.]	± 0.5
	TEB @ -25 ... +85°C	[% FS typ.]	± 2.0
	Long term stability 1 year	[% FS typ.]	≤ ± 0.3
Adjustment range of switchpoints	0 … 100 % FS		
Switching hysteresis	≥ 1 % FS		
	Switchpoint > reset point		
Switching resistance	≤ 3 Ω		
Output function	Hysteresis, Window; normally closed (NO), normally open (NC)		
Switching current	≤ 0.5 A each switching output		
Current limiting	≤ 2 A each switching output		
Switching frequency	max. 200 Hz		
Delay time	0 ... 99.99 s		

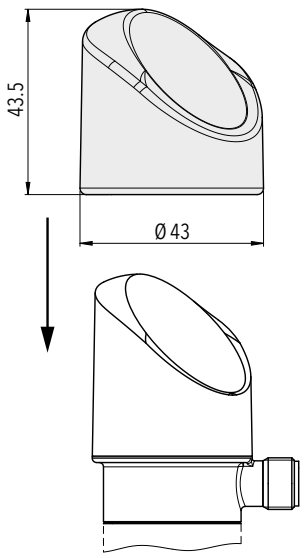
Display	
Display	4-digit 7-segment display 180° flippable with disable function Standard decimal places: ≤ 9: 3 decimal places 10 ... 99: 2 decimal places 100 ... 999: 1 decimal place
Switching status indication	2 LED, red
Operation	With 3 buttons and menu navigation according to VDMA 24574-1
Display resolution	0.1 % FS
Display range	-3 ... 103 % FS
Setting parameters	See table Parameters
User scale unit User defined values for display indication zero point and end point [1]	Display zero point: -999 ... 9998 Display end point: -998 … 9999

[1] Available with optional function package, see "Accessories"

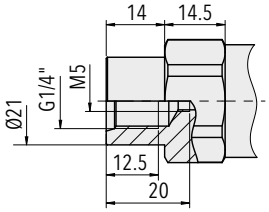
Dimensions



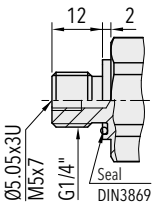
Protective cap



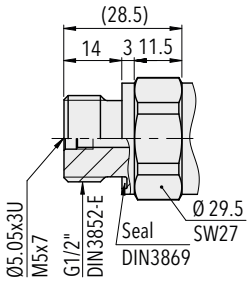
8380.XX.XXXX.**35/32**.XX.XX



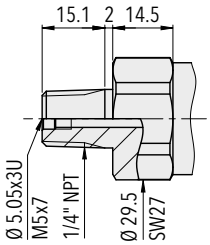
8380.XX.XX**10**.XX.XX.XX



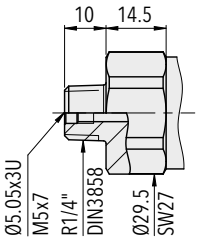
8380.XX.XX**17**.XX.XX.XX



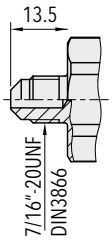
8380.XX.XX**41**.XX.XX.XX



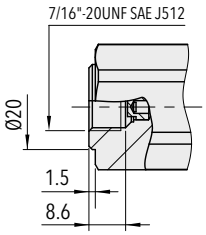
8380.XX.XX**30**.XX.XX.XX



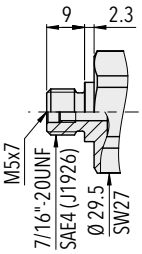
8380.XX.XX**19**.XX.XX.XX



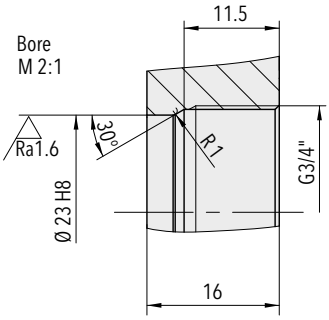
8380.XX.XX**18**.XX.XX.XX



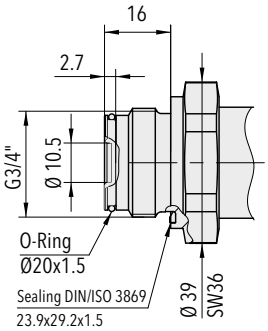
8380.XX.XX**24**.XX.XX.XX



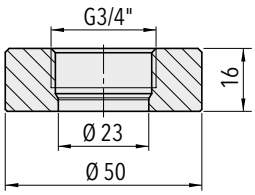
8380.XX.XX**42**.XX.XX.XX



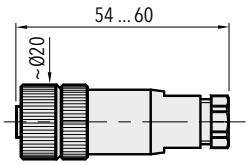
8380.XX.XX**52**.XX.XX.XX



8380.XX.XX**52**.XX.XX.XX

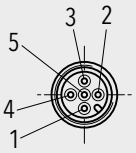
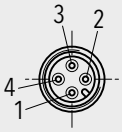


Welding flange for
G3/4" frontal membrane (1.4301)
Ordering No. C27805



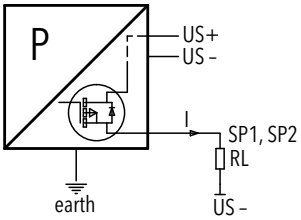
8380.XX.XXXX.XX.XX.**33**

Electrical connection

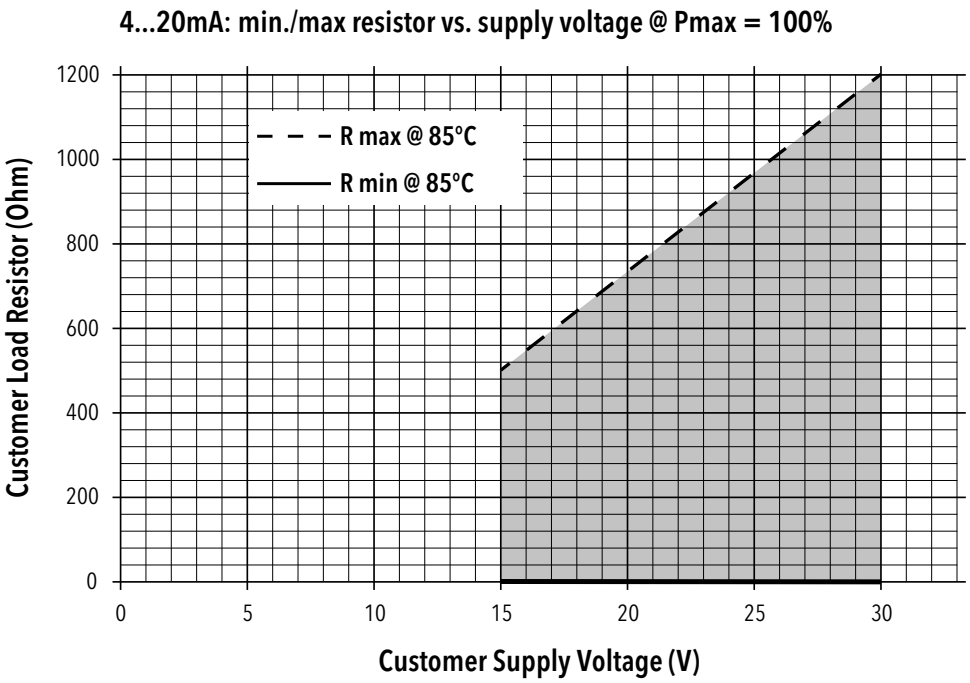
		Protection / electrical connection			
		IP67*)			
		M12x1			
		5-pole4-pole **35** 		**32** 	
Output signal		**P1**	**P2**	**P3**	**P4**
	PA	✓	✓	✓	
	PU	✓	✓	✓	
	PV	✓	✓	✓	
	PW	✓	✓	✓	
	PS				✓
Pin Configuration		**P1**	**P2**	**P3**	**P4**
	P / U / I Out: ⊕ Us +	1	1	1	1
	⊖ Us –	3	3	3	3
	Out analogue	2	5	2	–
	SP1	4	4	4	4
	SP2	5	2		2
	Shield ***)		Shield ***)		Shield ***)
	8380.xx.xxxx.xx.**PA/PU/PV/PW/PS**				

*) Provided female connector is mounted according to instructions

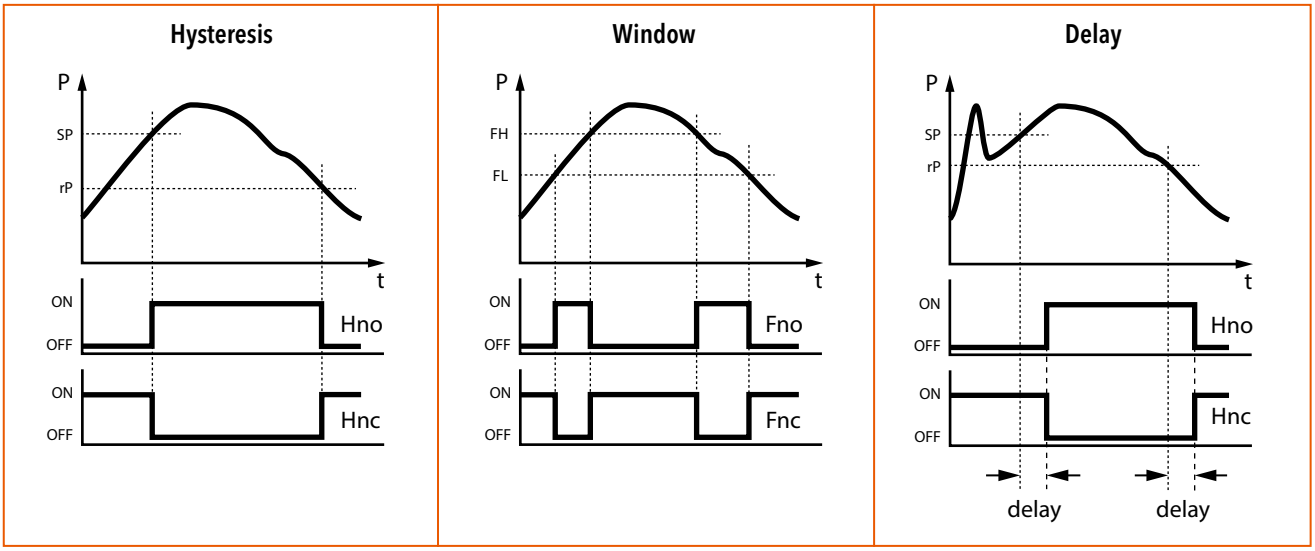
***) The use of a shielded cable is recommended



Connection of loads to switching output



Functions switching output



Additional information		
Documents	Data sheet	www.trafag.com/H72320
	Instructions	www.trafag.com/H73320
	Flyer	www.trafag.com/H70691

DISPLAY PRESSURE SWITCH

Swiss based Trafag is a leading international supplier of high quality sensors and monitoring instruments for measurement of pressure and temperature. The DPS 8381 is the ideal combination of pressure switch and transmitter with a pressure display. The parameters are set on the device or in a timesaving way via an NFC - smartphone App. The settings in combination with a comprehensive set of options make the DPS 8381 suitable for a wide range of demanding applications.

Applications

- Machine tools
- Hydraulics
- Process technology
- Industrial applications

Features

- Parameterization also via NFC-smartphone App (Android)
- Display and electrical connection are independently rotatable 335°/343°
- Analogue output switchable mA or V
- Integrated datalogger
- Measuring range adjustable

Technical Data			
Measuring principle	Thin-film-on-steel	Media temperature	-25°C ... +85°C
Measuring range	0 ... 2.5 to 0 ... 600 bar 0 ... 30 to 0 ... 7500 psi adjustable	Ambient temperature	-25°C ... +85°C
Output signal	4 ... 20 mA, 0 ... 5 VDC, 1 ... 6 VDC, 0 ... 10 VDC, switchable mA or V	Pressure unit for display	bar, psi, MPa, kPa, m WC, mm WC, %, user scale
Switching output	2 transistors PNP	Logger	Ring buffer: 3518 data points Sampling time: 0.1 ... 999.9 s, Off (0)
Accuracy @ 25°C typ.	± 0.5 % FS typ.		

Subject to change

Ordering information/type code

8381 . XX XX XX XX XX XX

Measuring range [1]

Pressure measurement range [bar]	Over pressure [bar]	Burst pressure [bar]		Pressure measurement range [psi]	Over pressure [psi]	Burst pressure [psi]	
0 ... 2.5	7.5	50	**75**	0 ... 30	90	700	**G5**
0 ... 4	12	60	**76**	0 ... 50	150	850	**G6**
0 ... 6	18	100	**77**	0 ... 100	300	1450	**G7**
0 ... 10	30	200	**78**	0 ... 150	450	2500	**G8**
0 ... 16	48	200	**79**	0 ... 200	600	2500	**GA**
0 ... 25	75	300	**80**	0 ... 250	750	2500	**G9**
0 ... 40	120	300	**81**	0 ... 300	900	4000	**HA**
0 ... 60	180	400	**82**	0 ... 400	1200	4000	**H0**
0 ... 100	300	500	**83**	0 ... 500	1500	4000	**H1**
0 ... 160	480	750	**85**	0 ... 1000	3000	5000	**H2**
0 ... 250	750	1000	**74**	0 ... 1500	4500	7000	**H3**
0 ... 400	1000	2000	**84**	0 ... 2000	6000	10000	**H5**
0 ... 600	1500	2500	**86**	0 ... 3000	9000	14500	**G4**
				0 ... 5000	12500	21750	**H4**
				0 ... 7500	18750	29000	**H6**

Sensor

Relative pressure, accuracy: 0.5 %	**25**

Pressure connection

G1/4" female [2]	**10**	1/2" NPT male [2]	**51**
G1/4" male (Seal)	**17**	M14x1.5 male DIN6149-2 [2]	**31**
R1/4" male, DIN3858 [2]	**19**	7/16"-20UNF male, DIN3866 [2] [4]	**18**
G1/2" male (Manometer) [2]	**11**	7/16"-20UNF male SAE4 (J1926) [2]	**42**
1/4" NPT male [2]	**30**	7/16"-20UNF female SAE J512 with valve opener [2] [4]	**24**

Electrical connection

Male electrical plug M12x1, 4-pole, Mat. PA (Accessories P3, P4)	**32**
Male electrical plug M12x1, 5-pole, Mat. PA (Accessories P1, P2)	**35**

Output signal

Switching output PNP, current output 4 ... 20 mA, switchable to 0 ... 10 VDC; output detail see accessories P1, P2, P3	**PA**
Switching output PNP, voltage output 1 ... 6 VDC; output detail see accessories P1, P2, P3	**PU**
Switching output PNP, voltage output 0 ... 10 VDC; output detail see accessories P1, P2, P3	**PV**
Switching output PNP, voltage output 0 ... 5 VDC; output detail see accessories P1, P2, P3	**PW**
Switching output PNP; output detail see accessory P4	**PS**

Accessories

Pin configuration 5-pole.; 1: U+, 2: analogue, 3: U-, 4: SP1, 5: SP2	**P1**
Pin configuration 5-pole.; 1: U+, 2: SP2 , 3: U-, 4: SP1, 5: analogue	**P2**
Pin configuration 4-pole.; 1: U+, 2: analogue, 3: U-, 4: SP1	**P3**
Pin configuration 4-pole.; 1: U+, 2: SP2 , 3: U-, 4: SP1	**P4**
Pressure peak damping element ø 1.0 mm, material 1.4305 [5]	**40**
Pressure peak damping element ø 0.4 mm, material 1.4305 [5]	**44**
Seal FPM, -18°C ... +125°C	**61**
Seal EPDM, -40°C ... +125°C	**63**
Seal NBR, -25°C ... +100°C	**83**
Female electrical plug M12x1, 5-pole [3]	**33**
Parameterization standard for output signal PS, T1 (see table "Parameters")	**ZS**
Parameterization according to customer specification (see table "Parameters")	**ZC**
Function package 1: Zero-set / Measuring range zero-point adjustment	**Z1**
Function package 2: User scale unit / Analogue output adjustment	**Z2**
Protective cap, 1 pc. F89051, package of 5 pcs. F89052, package of 25 pcs. F89075	

[1] Extended overpressure as well as customized pressure ranges upon request
[2] Upon request
[3] For electrical connections 32 and 35
[4] Max. allowable pressure range 60 bar at 120 bar overpressure
[5] Not for pressure connections 10, 18, 24

Standard products (extra short lead time)

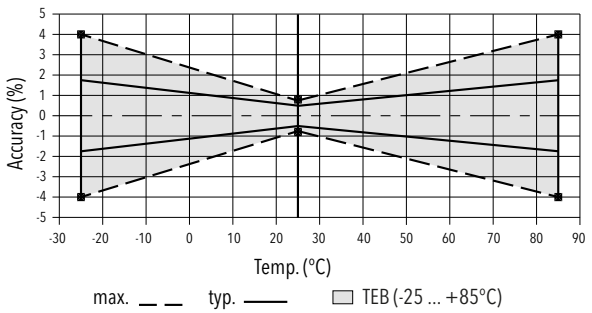
Product No.	Type Code	Pressure range [bar]	Over pressure max. [bar]	Supply [VDC]	Accuracy @ 25°C typ. [%]
DPS2.5PAP1	8381 75 2517 35 0000 0000 PA P1 44 61 ZS	0 ... 2.5	7.5	15 ... 30	± 0.5
DPS4.0PAP1	8381 76 2517 35 0000 0000 PA P1 44 61 ZS	0 ... 4	12	15 ... 30	± 0.5
DPS6.0PAP1	8381 77 2517 35 0000 0000 PA P1 44 61 ZS	0 ... 6	18	15 ... 30	± 0.5
DPS10.0PAP1	8381 78 2517 35 0000 0000 PA P1 44 61 ZS	0 ... 10	30	15 ... 30	± 0.5
DPS16.0PAP1	8381 79 2517 35 0000 0000 PA P1 44 61 ZS	0 ... 16	48	15 ... 30	± 0.5
DPS25.0PAP1	8381 80 2517 35 0000 0000 PA P1 44 61 ZS	0 ... 25	75	15 ... 30	± 0.5
DPS40.0PAP1	8381 81 2517 35 0000 0000 PA P1 44 61 ZS	0 ... 40	120	15 ... 30	± 0.5
DPS60.0PAP1	8381 82 2517 35 0000 0000 PA P1 44 61 ZS	0 ... 60	180	15 ... 30	± 0.5
DPS100.0PAP1	8381 83 2517 35 0000 0000 PA P1 44 61 ZS	0 ... 100	300	15 ... 30	± 0.5
DPS160.0PAP1	8381 85 2517 35 0000 0000 PA P1 44 61 ZS	0 ... 160	480	15 ... 30	± 0.5
DPS250.0PAP1	8381 74 2517 35 0000 0000 PA P1 44 61 ZS	0 ... 250	750	15 ... 30	± 0.5
DPS400.0PAP1	8381 84 2517 35 0000 0000 PA P1 44 61 ZS	0 ... 400	1000	15 ... 30	± 0.5
DPS600.0PAP1	8381 86 2517 35 0000 0000 PA P1 44 61 ZS	0 ... 600	1500	15 ... 30	± 0.5

Parameters				
Name	**Standard setting (accessory ZS)**	**Value range**	**Short name**	**Customer adjust-ment (accessory ZC)**
Switch point SP1 (hysteresis mode) Upper switch point FH1 (window mode)	75 % Measuring range	SP1 > RP1 FH1 > FL1 Hysteresis ≥ 1 % FS	SP1	
Reset point RP1 (hysteresis mode) Lower switch point FL1 (window mode)	25 % Measuring range	RP1 < SP1 FL1 < FH1 Hysteresis ≥ 1 % FS	RP1	
Switch point SP2 (hysteresis mode) Upper switch point FH2 (window mode)	75 % Measuring range	SP2 > RP2 FH2 > FL2 Hysteresis ≥ 1 % FS	SP2	
Reset point RP2 (hysteresis mode) Lower switch point FL2 (window mode)	25 % Measuring range	RP2 < SP2 FL2 < FH2 Hysteresis ≥ 1 % FS	RP2	
Switch point delay time SP1 (hysteresis mode) Switch point delay time FH1 (window mode)	0	0 ... 99.99 s	dS1	
Switch point delay time RP1 (hysteresis mode) Switch point delay time FL1 (window mode)	0	0 ... 99.99 s	dR1	
Switch point delay time SP2 (hysteresis mode) Switch point delay time FH2 (window mode)	0	0 ... 99.99 s	dS2	
Switch point delay time RP2 (hysteresis mode) Switch point delay time FL2 (window mode)	0	0 ... 99.99 s	dR2	
Functions switching output 1	Hysteresis, closer (Hno)	Hysteresis NO (Hno), Hysteresis NC (Hnc) Window NO (Fno), Window NC (Fnc)	ou1	
Functions switching output 2	Hysteresis, closer (Hno)	Hysteresis NO (Hno), Hysteresis NC (Hnc) Window NO (Fno), Window NC (Fnc)	ou2	
Pressure units	bar	bar, psi, MPa, kPa, m WC	uni	
Measuring range adjustment	100 % Nominal pressure	50 ... 100 % Nominal	P-EP	
Damping (analogue output)	0.01 s	0.01 ... 3.00 s (time constant)	dAA	
Display rotation	No	no, yes (180°)	disr	
Display mode	Current pressure value	Pressure value: current, highest, lowest, display off Current value: decimal places selectable (max. 3)	dis	
Display actualisation	2	1, 2, 5, 20 Hz	duPd	

Specifications		
Electrical Data	Output / supply voltage	4 ... 20 mA: 24 (15 ... 30) VDC 0 ... 5 VDC: 24 (15 ... 30) VDC 1 ... 6 VDC: 24 (15 ... 30) VDC 0 ... 10 VDC: 24 (15 ... 30) VDC
	Switch-on-delay	Typ. 200 ms
	Inverse-polarity protection, short-circuit strength @ 25°C during 5 min.	integrated
	Current consumption	≤ 30 mA
Environmental conditions	Media temperature	-25°C ... +85°C
	Ambient temperature	-25°C ... +85°C
	Protection [1)]	IP67
	Humidity	Max. 95 % relative
	Vibration	10 g (10 ... 2000 Hz)
	Shock	50 g / 3 ms
EMC Protection	Emission	EN/IEC 61000-6-3
	Immunity	EN/IEC 61000-6-2
Mechanical Data	Sensor (wetted parts)	1.4542 (AISI630)
	Pressure connection (wetted parts)	1.4542 (AISI630)
	Housing	Zinc based die-casting alloy, nickel plated display housing plastic
	Sealing	FPM, NBR, EPDM
	Male electrical plug	See ordering information
	Weight	~ 189 g
	Mounting torque	15 ... 20 Nm
	Housing alignment	Display 335° rotatable, max. 2.5 Nm Electrical connection 343° rotatable, max. 5 Nm

[1)] See electrical connection

Measuring accuracy 0.5 %



Analogue output			
Output signal	Switchable 4 ... 20 mA or voltage		
Accuracy	TEB @ -25 ... +85°C	[% FS typ.]	± 1.75
	Accuracy @ +25°C	[% FS typ.]	± 0.5
	NLH @ +25°C (BSL)	[% FS typ.]	± 0.2
	TC zero point and span	[% FS/K typ.]	± 0.03
	Long term stability 1 year	[% FS typ.]	± 0.1
Current limiting output signal	4 ... 20 mA: 25 mA (overload)		
	0 ... 10 VDC: < 40 mA (short-circuit)		
Damping (rise time)	0.01 ... 3.00 s / 10 ... 90 % Nominal pressure		
Zero set; [1] Offset correction of analogue output and display indication	± 0.2 % FS		
Measuring range zero point adjustment (P_nP) [1]	0 ... 50 % FS [2]		
Measuring range end point adjustment (P_EP)	50 ... 100 % FS [2]		
Zero point adjustment analogue output (o_nP) [1]	Voltage output: 0 ... 2 VDC Current output: 3.9 ... o_EP - 8 mA		
End point adjustment analogue output (o_EP) [1]	Voltage output: o_nP + 4 ... 10.5 VDC Current output: o_nP + 8 ... 20.1 mA		

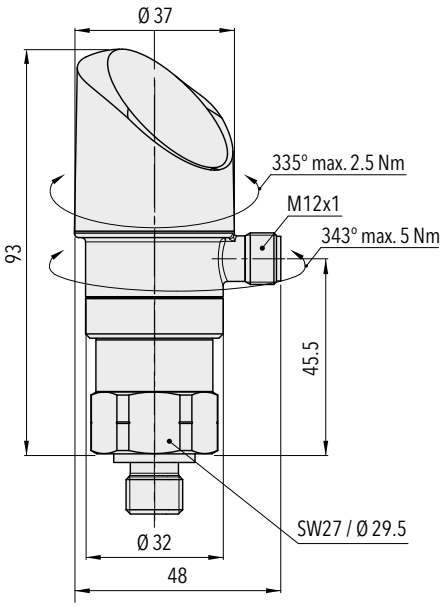
[1] Available with optional function package, see "Accessories"
[2] P_EP – P_nP ≥ 50 % FS

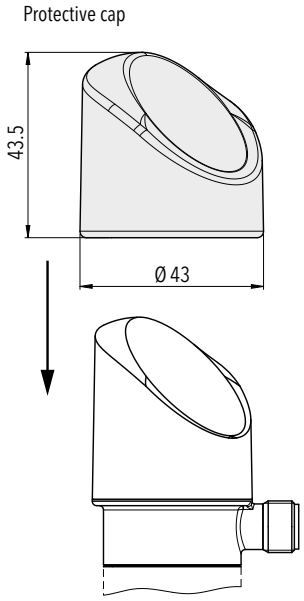
Switching output			
Accuracy	Accuracy @ +25°C	[% FS typ.]	± 0.5
	TEB @ -25 ... +85°C	[% FS typ.]	± 1.0
	Long term stability 1 year	[% FS typ.]	≤ ± 0.3
Adjustment range of switchpoints	0 … 100 % FS		
Switching hysteresis	≥ 1 % FS		
	Switchpoint > reset point		
Switching resistance	≤ 3 Ω		
Output function	Hysteresis, Window; normally closed (NO), normally open (NC)		
Switching current	≤ 0.5 A each switching output		
Current limiting	≤ 2 A each switching output		
Switching frequency	max. 200 Hz		
Delay time	0 ... 99.99 s		

Display	
Display	4-digit 7-segment display 180° flippable with disable function Standard decimal places: ≤ 9: 3 decimal places 10 ... 99: 2 decimal places 100 ... 999: 1 decimal place
Switching status indication	2 LED, red
Operation	With 3 buttons and menu navigation according to VDMA 24574-1
Display resolution	0.1 % FS
Display range	-3 ... 103 % FS
Setting parameters	See table Parameters
User scale unit; User defined values for display indication zero point and end point [1]	Display zero point: -999 ... 9998 Display end point: -998 … 9999

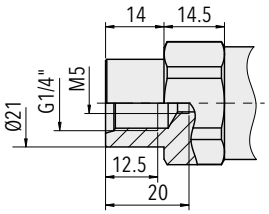
[1] Available with optional function package, see "Accessories"

Dimensions

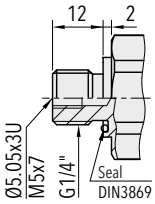




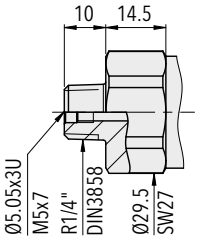
8381.XX.XXXX.**35/32**.XX.XX



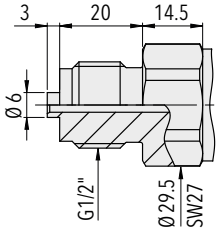
8381.XX.XX**10**.XX.XX.XX



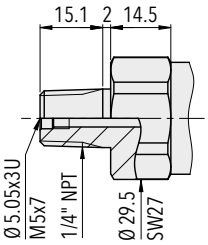
8381.XX.XX**17**.XX.XX.XX



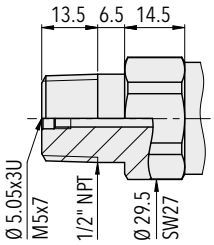
8381.XX.XX**19**.XX.XX.XX



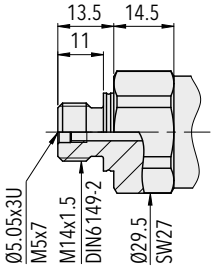
8381.XX.XX**11**.XX.XX.XX



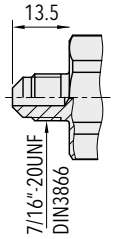
8381.XX.XX**30**.XX.XX.XX



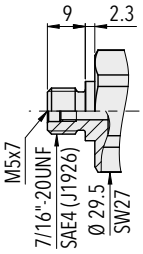
8381.XX.XX**51**.XX.XX.XX



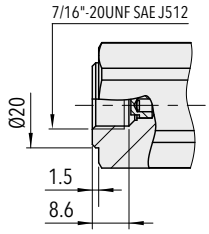
8381.XX.XX**31**.XX.XX.XX



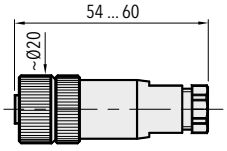
8381.XX.XX**18**.XX.XX.XX



8381.XX.XX**42**.XX.XX.XX

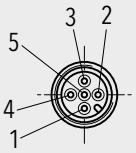
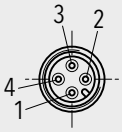


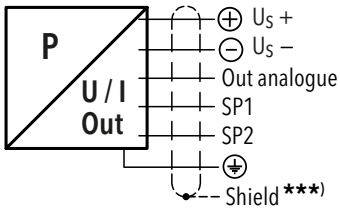
8381.XX.XX**24**.XX.XX.XX



8381.XX.XXXX.XX.XX.**33**

Electrical connection

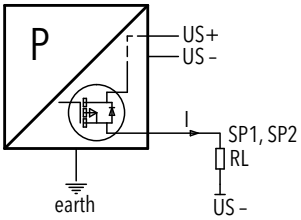
		Protection / electrical connection			
		IP67*)			
		M12x1			
		5-pole4-pole **35** 		**32** 	
Output signal		**P1**	**P2**	**P3**	**P4**
	PA	✓	✓	✓	
	PU	✓	✓	✓	
	PV	✓	✓	✓	
	PW	✓	✓	✓	
	PS				✓
Pin Configuration		**P1**	**P2**	**P3**	**P4**
		1	1	1	1
		3	3	3	3
		2	5	2	-
		4	4	4	4
		5	2		2
			Shield ***)		Shield ***)



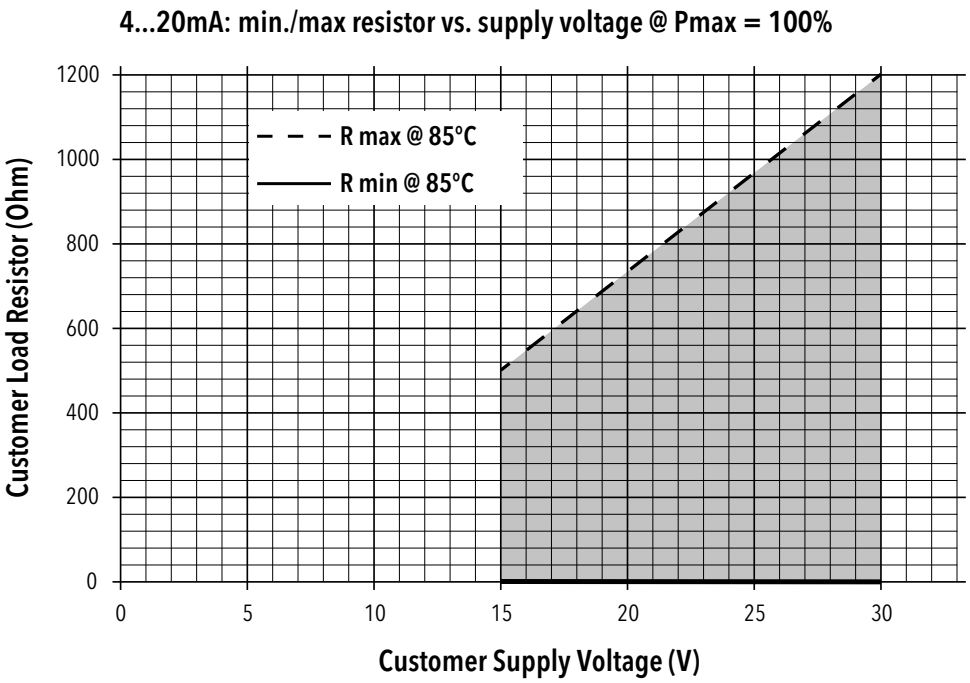
8381.xx.xxxx.xx.**PA/PU/PV/PW/PS**

*) Provided female connector is mounted according to instructions

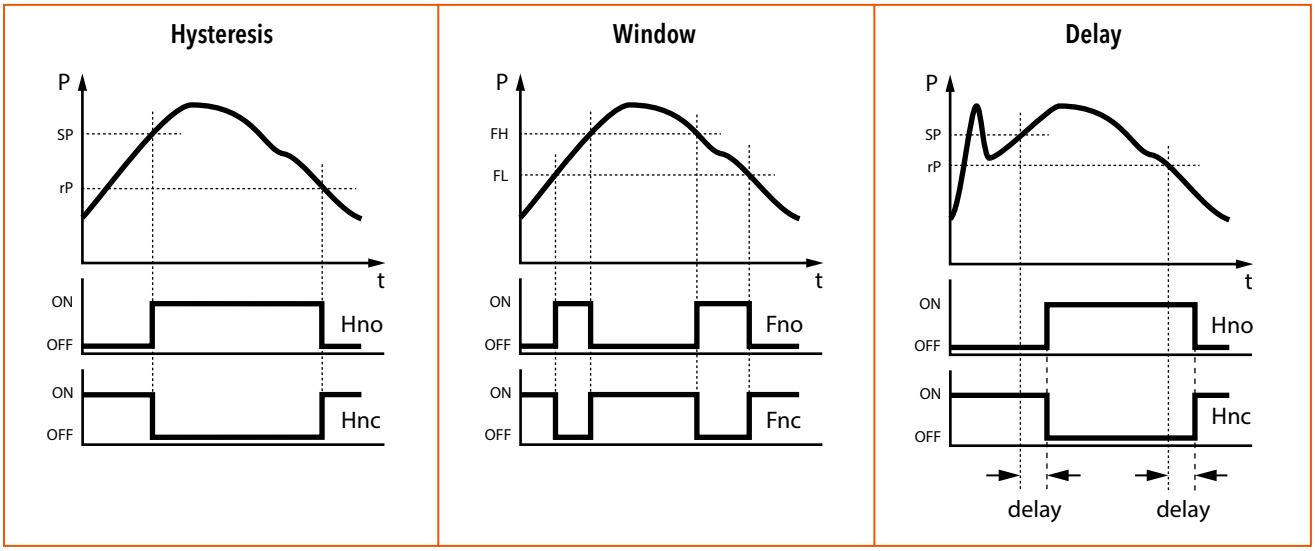
***) The use of a shielded cable is recommended



Connection of loads to switching output



Functions switching output



Additional information		
Documents	Data sheet	www.trafag.com/H72321
	Instructions	www.trafag.com/H73320
	Flyer	www.trafag.com/H70694

ELECTRONIC PRESSURE SWITCH

Swiss based Trafag is a leading international supplier of high quality sensors and monitoring instruments for measurement of pressure and temperature. The Electronic Pressure Switch EPN-S is based on the well-proven EPN transmitter family. It stands for reliable accuracy over a wide temperature range and excellent long-term stability even in harshest environments in the shipbuilding and railway industry. The switchpoint is factory set or can be programmed on site using Trafag's Sensor Communicator SC.

Applications

- Shipbuilding
- Engine manufacturing
- Railways
- Machine tools
- Hydraulics
- HVAC

Features

- Rugged design for harsh environments
- Wide temperature range
- Excellent long-term stability
- Very compact design
- Switchpoint factory set or programmable on site with Trafag Sensor Communicator SC

Technical Data			
Measuring principle	Thin-film-on-steel	Media temperature	-40°C ... +125°C
Measuring range	0 ... 2.5 to 0 ... 600 bar 0 ... 30 to 0 ... 7500 psi	Ambient temperature	Standard: -25°C ... +85°C Option accessory 67: -40°C ... +125°C
Output signal	Transistor (open source)	Approval / conformity	DNV-GL, RMRS
Accuracy @ 25°C typ.	± 0.5 % FS typ. (Switchpoint)		

Subject to change

Ordering information/type code

									8320 . XX	XX	XX	XX	XX	XX
Measuring range [1]	**Pressure measurement range [bar]**	**Over pressure [bar]**	**Burst pressure [bar]**		**Pressure measurement range [psi]**	**Over pressure [psi]**	**Burst pressure [psi]**							
	0 ... 2.5	5	100	**75**	0 ... 30	30	720	**G5**						
	0 ... 4	8	100	**76**	0 ... 50	115	860	**G6**						
	0 ... 6	12	100	**77**	0 ... 100	170	1450	**G7**						
	0 ... 10	20	200	**78**	0 ... 150	290	2900	**G8**						
	0 ... 16	32	200	**79**	0 ... 250	464	2900	**G9**						
	0 ... 25	50	300	**80**	0 ... 400	725	4350	**H0**						
	0 ... 40	80	300	**81**	0 ... 500	1160	4350	**H1**						
	0 ... 60	120	500	**82**	0 ... 1000	1740	5800	**H2**						
	0 ... 100	200	500	**83**	0 ... 1500	2900	7250	**H3**						
	0 ... 160	320	1000	**85**	0 ... 2000	4640	10850	**H5**						
	0 ... 250	500	1000	**74**	0 ... 3000	7250	14500	**G4**						
	0 ... 400	800	1500	**84**	0 ... 5000	11600	21750	**H4**						
	0 ... 600	1000	2000	**86**	0 ... 7500	14500	29000	**H6**						
Sensor	Relative pressure								**23**					
Pressure connection	G1/4" male (Seal)									**17**				
	1/4" NPT male									**30**				
	G1/2" male (DIN3852-A) [2]									**21**				
	M14x1.5 male (DIN3852-A) [2]									**22**				
	1/2" NPT male [2]									**51**				
Electrical connection	Male electrical plug: EN 175301-803-A (DIN43650-A)										**04**			
	Cable with shield: Material: FDR 25 (Raychem) 4 x 0.5mm², -40°C ... +125°C, (Cable lenght see "Accessories")										**78**			
	Cable with shield: Material: Radox Tenuis-TW 600V MM S (EN45545), 4 x 0.5mm², -40°C ... +120°C, (Cable lenght see "Accessories")										**88**			
Output signal	1 Transistor out: switchpoint "ON": ... (bar); switchpoint "OFF": ... (bar); delay time: standard 5 (ms), ... (ms) range: 5...10000 (ms)											**T1**		
Accessories	Pressure peak damping element ø 0.4 mm												**44**	
	Pressure peak damping element ø 1.0 mm												**40**	
	Female electrical connector EN 175301-803-A (DIN43650-A)/NBR, -40°C ... +90°C												**58**	
	Railways version (500 VAC/DC), with shielded cable only												**11**	
	Higher operating temperature: -40°C ... +125°C												**67**	
	Cable length 1.5 m												**1M**	
	Cable length 3.0 m												**3M**	
	Cable length 5.0 m												**5M**	

[1] Customized pressure ranges upon request
[2] Please ask us

Programming device Sensor Communicator SC

Ordering No.

- Sensor Communicator SC: F88030
- Programming cable with connector EN 175301-803A: F88049

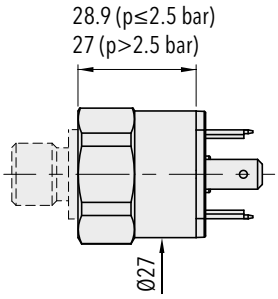
Manual see

- Sensor Communicator SC: www.trafag.com/H73699 (EN) and www.trafag.com/H73698 (DE)

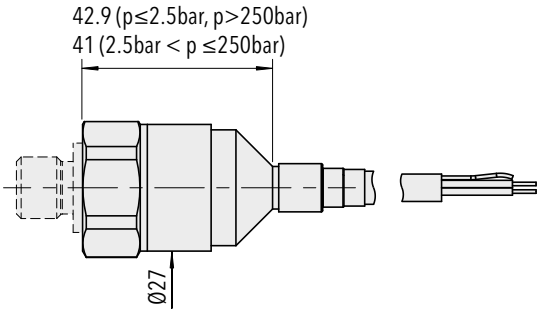
Specifications		
Accuracy	Accuracy @ 25°C typ.	± 0.5 % FS typ. (Switchpoint)
	Temperature dependence switching point	Switchpoint @ +25°C: ± 0.5 % FS typ. Switchpoint @ -25°C ... +85°C: ± 1.0 % FS typ. Switchpoint @ -40°C ... +125°C: ± 1.3 % FS typ. (Accessory 67: higher operating temperature -40°C ... +125°C)
	Long term stability 1 year typ.	≤ ± 0.15 % FS typ.
Electrical Data	Supply voltage	24 (9 ... 32) VDC
	Resistance of insulation	>10 MΩ, 250 VDC 🚢 >10 MΩ, 500 VDC
	Dielectric strength	250 VAC, 50 Hz 🚢 500 VAC, 50 Hz
	Output / supply voltage	Transistor (open source): 24 (9 ... 32) VDC
	Inverse-polarity protection, short-circuit strenght @ 25°C during 5 min.	integrated
	Current consumption	≤ 15 mA
Environmental conditions	Media temperature	-40°C ... +125°C
	Ambient temperature	Standard: -25°C ... +85°C Option accessory 67: -40°C ... +125°C
	Protection	Electrical connection 04: IP65 (IP67) Electrical connection 78/88: IP69K
	Humidity	Max. 95 % relative
	Vibration	15 g (50...2000 Hz)
	Shock	50 g / 11 ms
EMC Protection	Emission	EN/IEC 61000-6-3
	Immunity	EN/IEC 61000-6-2
Mechanical Data	Sensor (wetted parts)	1.4542 (AISI630)
	Pressure connection (wetted parts)	Pressure ranges ≤ 250 bar: 1.4542 (AISI630) Pressure ranges > 250 bar: 1.4301 (AISI304)
	Housing	1.4301 (AISI304)
	Sealing	FKM 70 Sh
	Male electrical plug	See ordering information
	Weight	~ 85 ... 110 g
	Mounting torque	25 Nm

Switching output	
Output signal	1 Transistor (open source)
Switchpoint setting	Switchpoint factory set or programmable on site with Trafag Sensor Communicator SC
Adjustment range	0 … 100 % FS
Switching hysteresis	≥ 1 % FS
Switching current	≤ 0.5 A @ -40°C ... +85°C ≤ 0.4 A @ +85°C ... +125°C (only with accessory 67: higher operating temperature -40°C ... +125°C)
Switching resistance	≤ 3Ω
Delay time	Standard adjustment: 5 ms Adjustable with Trafag Sensor Communicator (only electrical connection 04): 5 ms ... 10 s

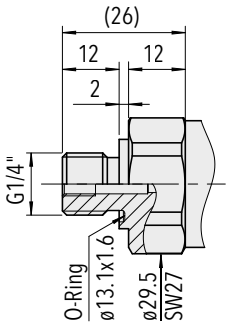
Dimensions



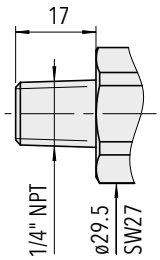
8320.XX.XXXX.**04**.XX.XX
Switchpoint factory set or programmable on site with Trafag Sensor Communicator SC



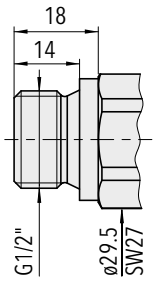
8320.XX.XXXX.**78**.XX.XX Switchpoint factory set
8320.XX.XXXX.**88**.XX.XX



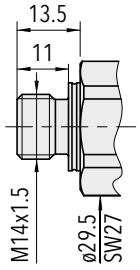
8320.XX.XX**17**.XX.XX.XX



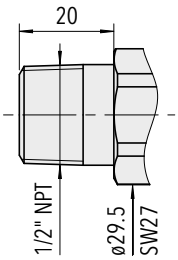
8320.XX.XX **30**.XX.XX.XX



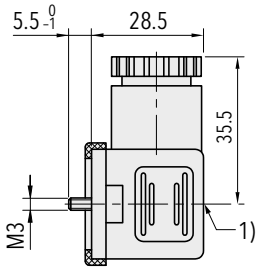
8320.XX.XX **21**.XX.XX.XX



8320.XX.XX **22**.XX.XX.XX



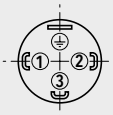
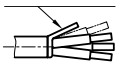
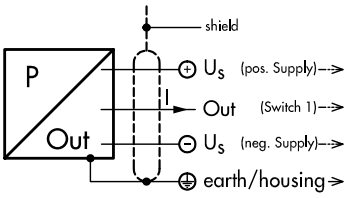
8320.XX.XX**51**.XX.XX.XX



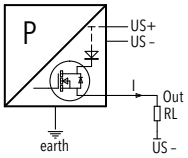
1) Tightening torque 50...60 Ncm

8320.XX.XXXX.XX.XX.**58**

Electrical Connection

		Protection / electrical connection	
		IP65 (IP67)	IP69K
		Industrial standard EN175301-803A **04** 	Cable **) **78/88** Shield 
Output signal	 **8320**.xx.xxxx.xx.**T1**	1 2 3 ⏚	brown blue black yellow / green

**) Ventilation via cable end



Connection of loads to switch contacts

Additional information		
Documents	Data sheet	www.trafag.com/H72333
	Instructions	www.trafag.com/H73333
	Flyer	www.trafag.com/H70652

INDUSTRIAL PRESSURE TRANSMITTER

Swiss based Trafag is a leading international supplier of high quality sensors and monitoring instruments for measurement of pressure and temperature. The industrial pressure transmitter NAT 8252 features an exceptionally long-term stable thin-film-on-steel sensor cell with triple (optionally 5-fold) overpressure safety. Optionally, the NAT 8252 is available as a pressure switch with 1 or 2 switching outputs. The robust design and the wide temperature range from -40°C to +125°C qualify the NAT 8252 as the ideal solution for a wide range of demanding applications.

Applications

- Machine tools
- Hydraulics
- HVAC
- Refrigeration
- Process technology
- Water treatment

Features

- Smallest design
- Completely welded steel sensor system without additional seals
- Excellent long-term stability
- Optional: 5-fold overpressure resistance
- Optional: Switching output 1 or 2 PNP transistors

Technical Data			
Measuring principle	Thin-film-on-steel	Accuracy @ 25°C typ.	± 0.5 % FS typ.
Measuring range	0 ... 2.5 to 0 ... 600 bar 0 ... 30 to 0 ... 7500 psi	Media temperature	–40°C ... +125°C
Output signal	4 ... 20 mA, 0.5 ... 4.5 VDC, 0 ... 5 VDC, 0.5 ... 5 VDC, 1 ... 5 VDC, 0.5 ... 5.5 VDC, 1 ... 6 VDC, 0 ... 10 VDC, 1 ... 10 VDC, 0.1 ... 10.1 VDC, 0.5 ... 4.5 VDC ratiometric, Switching output: 1 or 2 PNP transistors	Ambient temperature	–40°C ... +125°C (Cable PVC 22: -5°C ... +60°C) (Cable PUR 24: -40°C ... +70°C) (Cable Radox Tenuis 88: -40°C ... +120°C)

Subject to change

Ordering information/type code

																		8252 . XX	XX	XX	XX	XX	XX
Measuring range [1]	Pressure measurement range [bar]	Over pressure [bar]	Burst pressure [bar]		Pressure measurement range [psi]	Over pressure [psi]	Burst pressure [psi]																
	0 ... 2.5	7.5	50	**75**	0 ... 30	90	700	**G5**															
	0 ... 4	12	60	**76**	0 ... 50	150	850	**G6**															
	0 ... 6	18	100	**77**	0 ... 100	300	1450	**G7**															
	0 ... 10	30	200	**78**	0 ... 150	450	2500	**G8**															
	0 ... 16	48	200	**79**	0 ... 200	600	2500	**GA**															
	0 ... 25	75	300	**80**	0 ... 250	750	2500	**G9**															
	0 ... 40	120	300	**81**	0 ... 300	900	4000	**HA**															
	0 ... 60	180	400	**82**	0 ... 400	1200	4000	**H0**															
	0 ... 100	300	500	**83**	0 ... 500	1500	4000	**H1**															
	0 ... 160	480	750	**85**	0 ... 1000	3000	5000	**H2**															
	0 ... 250	750	1000	**74**	0 ... 1500	4500	7000	**H3**															
	0 ... 400	1000	2000	**84**	0 ... 2000	6000	10000	**H5**															
	0 ... 600	1500	2500	**86**	0 ... 3000	9000	14500	**G4**															
	Option 5P:	**Fivefold overpressure**			0 ... 5000	12500	21750	**H4**															
	0 ... 2.5	12.5	60	**55**	0 ... 7500	18750	29000	**H6**															
	0 ... 4	20	100	**56**																			
	0 ... 6	30	200	**57**																			
	0 ... 10	50	200	**58**																			
	0 ... 16	80	300	**59**																			
	0 ... 25	125	300	**60**																			
	0 ... 40	200	400	**61**																			
	0 ... 60	300	500	**62**																			
	0 ... 100	500	750	**63**																			
	0 ... 160	800	1000	**65**																			
Sensor	Relative pressure								**25**														
Pressure connection	G1/4" male, seal: DIN 3869 (accessories 61/63/83)			**17**	9/16"-18UNF SAE6 male (J1926), seal: accessory 61			**61**															
	G1/4" male (Manometer) EN 837 [9]			**53**	R1/4" male, DIN3858 [5]			**19**															
	1/4" NPT male			**30**	R1/4" male, DIN2999 [9]			**20**															
	1/8" NPT male [5] [9]			**43**	R1/8" male, DIN3858 [5]			**16**															
	7/16"-20UNF female SAE J512 with valve opener [4]			**24**	M10x1 male, DIN EN ISO 6149-2, seal: accessory 61			**32**															
	7/16"-20UNF female SAE J512 without valve opener [4]			**44**	M12x1.5 male, DIN EN ISO 9974-2, seal: accessory 61 [9]			**49**															
	7/16"-20UNF male, DIN3866 [4]			**18**	M14x1.5 male DIN EN ISO 6149-2, seal: accessory 61 [9]			**31**															
	7/16"-20UNF SAE4 male (J1926), seal: accessory 61			**42**																			
Electrical connection	Male electrical plug, industrial standard, contact distance 9.4 mm, Mat. PA														**01**								
	Male electrical plug M12x1, 4-pole, Mat. PA, IEC 61076-2-101														**32**								
	Male electrical plug M12x1, 5-pole, Mat. PA, IEC 61076-2-101														**35**								
	Male electrical plug MIL-C 26482, 6-pole, metal														**02**								
	Male electrical plug Deutsch DT04-3P, 3-pole														**D3**								
	Male electrical plug Deutsch DT04-4P, 4-pole														**D4**								
	Cable Mat. PVC, IP67/IP68, 2 x 2 x 0.14 mm^2 [7]														**22**								
	Cable Mat. PUR, IP67/IP68, 4 x 0.25 mm^2 [7]														**24**								
	Cable Mat. EPD Raychem FDR25, IP67, 4 x 0.2 mm^2 [7]														**08**								
	Cable Mat. Radox Tenuis, IP67/IP68, 4 x 0.5 mm^2 [7]														**88**								

					8252 . XX	XX	XX	XX	XX	XX
Output signal	**Signal output**	**Load resistance**	**I (supply)**	**U (supply)**						
	4 ... 20 mA	See graphic		24 (9 ... 32) VDC						**19**
	0.5 ... 4.5 VDC	≥ 5.0 kΩ to Us-	≤ 20 mA	24 (9 ... 32) VDC						**20**
	0 ... 5 VDC	≥ 5.0 kΩ to Us-	≤ 20 mA	24 (9 ... 32) VDC						**14**
	0.5 ... 5 VDC	≥ 5.0 kΩ to Us-	≤ 20 mA	24 (9 ... 32) VDC						**22**
	1 ... 5 VDC	≥ 5.0 kΩ to Us-	≤ 20 mA	24 (9 ... 32) VDC						**25**
	0.5 ... 5.5 VDC	≥ 5.0 kΩ to Us-	≤ 20 mA	24 (9 ... 32) VDC						**24**
	1 ... 6 VDC	≥ 5.0 kΩ to Us-	≤ 20 mA	24 (9 ... 32) VDC						**16**
	0 ... 10 VDC	≥ 5.0 kΩ to Us-	≤ 15 mA	24 (15 ... 32) VDC						**17**
	1 ... 10 VDC	≥ 5.0 kΩ to Us-	≤ 15 mA	24 (15 ... 32) VDC						**26**
	0.1 ... 10.1 VDC	≥ 5.0 kΩ to Us-	≤ 15 mA	24 (15 ... 32) VDC						**13**
	0.5 ... 4.5 VDC ratiometric	≥ 5.0 kΩ to Us-	≤ 10 mA	5 (4.75 ... 5.25) VDC						**23**
	2 PNP transistors [3]		≤ 10 mA	24 (9 ... 32) VDC						**PS**
	1 PNP transistor [3]		≤ 10 mA	24 (9 ... 32) VDC						**T1**

Accessories	Female electrical plug M12x1, 5-pole [2]	**33**
	Female electrical connector industrial standard (for electrical connection 01)	**34**
	Pressure peak damping element ø 1.0 mm [6]	**40**
	Pressure peak damping element ø 0.4 mm [6]	**44**
	Seal FPM, -18°C ... +125°C	**61**
	Seal EPDM, -40°C ... +125°C	**63**
	Seal NBR, -25°C ... +100°C	**83**
	Special electrical connection: Pin 2 +, Pin 3 Ground, Pin 4 - (only for output signal 19 and male electrical plug 01, industrial standard)	**90**
	Special electrical connection: Pin 1 Out, Pin 2 +, Pin 3 Ground, Pin 4 - (only for output signals 13, 14, 16, 17, 20, 22, 23, 24, 25, 26 and male electrical plug 01, industrial standard)	**91**
	Special electrical connection: Pin 1 + , Pin 2 Ground, Pin 3 Out, Pin 4 - (only for output signals 13, 14, 16, 17, 20, 22, 23, 24, 25, 26 and male electrical plug 32, M12x1, 4-pole)	**95**
	Special electrical connection: Pin 1 + , Pin 2 Ground, Pin 3 -, Pin 4 Out (only for output signals 13, 14, 16, 17, 20, 22, 23, 24, 25, 26 and male electrical plug 32, M12x1, 4-pole)	**96**
	Special electrical connection: Pin 1 +, Pin 2 -, Pin 4 Ground (only for output signal 19 and male electrical plug 01, industrial standard)	**92**
	Special electrical connection: Pin 1 +, Pin 2 -, Pin 4 Ground (only for output signal 19 and male electrical plug 32, M12x1, 4-pole)	**E1**
	Special electrical connection: Pin 1 +, Pin 2 -, Pin 3 Out, Pin 4 Ground (only for output signals 13, 14, 16, 17, 20, 22, 23, 24, 25, 26 and male electrical plug 32, M12x1, 4-pole)	**E2**
	Special electrical connection: Pin 1 Out , Pin 2 -, Pin 3 +, Pin 4 Ground (only for output signals 13, 14, 16, 17, 20, 22, 23, 24, 25, 26 and male electrical plug 01, industrial standard)	**E3**
	Special electrical connection: Pin 1 + , Pin 2 Ground, Pin 4 - (only for output signal 19 and male electrical plug 32, M12x1, 4-pole)	**E6**
	Special electrical connection: Pin A +, Pin C - (only for output signal 19 and male electrical plug Deutsch DT04-3P, 3-pole)	**F0**
	Special electrical connection: Pin A +, Pin B Out, Pin C - (only for output signals 13, 14, 16, 17, 20, 22, 23, 24, 25, 26 and male electrical plug Deutsch DT04-3P, 3-pole)	**F1**
	Cable length 0.5 m	**EM**
	Cable length 1.0 m	**1M**
	Cable length 2.0 m	**2M**
	Parameterization according to customer specification for output signal PS, T1 (see table "Parameters")	**ZC**
	Parameterization standard for output signal PS, T1 (see table "Parameters")	**ZS**
	Multiple packaging [8]	**VM**

[1] Customized pressure ranges upon request
[2] For electrical connections 32 and 35
[3] Only with electrical connections 32, 22, 24, 08, 88
[4] Max. allowable pressure range 60 bar at 180 bar overpressure
[5] Max. allowable pressure range 160 bar at 480 bar overpressure
[6] Not for pressure connections 53, 24, 44, 18
[7] Cable length see accessories
[8] The order quantity must be a multiple of 50, only for electrical connections 01, 32, 35, 02, D3, D4, not for pressure connection 30 with electrical connections 02, D3, D4
[9] Upon request

Standard products (extra short lead time)

Product No.	Type Code	Pressure range [bar]	Over pressure max. [bar]	Supply [VDC]	Accuracy @ 25°C typ. [%]
NAT2.5A	8252 75 2517 01 0000 0000 19 34 44 61	0 ... 2.5	7.5	9 ... 32	±0.5
NAT4.0A	8252 76 2517 01 0000 0000 19 34 44 61	0 ... 4	12	9 ... 32	±0.5
NAT6.0A	8252 77 2517 01 0000 0000 19 34 44 61	0 ... 6	18	9...32	±0.5
NAT10.0A	8252 78 2517 01 0000 0000 19 34 44 61	0 ... 10	30	9...32	±0.5
NAT16.0A	8252 79 2517 01 0000 0000 19 34 44 61	0 ... 16	48	9 ... 32	±0.5
NAT25.0A	8252 80 2517 01 0000 0000 19 34 44 61	0 ... 25	75	9 ... 32	±0.5
NAT40.0A	8252 81 2517 01 0000 0000 19 34 44 61	0 ... 40	120	9 ... 32	±0.5
NAT100.0A	8252 83 2517 01 0000 0000 19 34 44 61	0 ... 100	300	9 ... 32	±0.5
NAT250.0A	8252 74 2517 01 0000 0000 19 34 44 61	0 ... 250	750	9 ... 32	±0.5
NAT400.0A	8252 84 2517 01 0000 0000 19 34 44 61	0 ... 400	1000	9 ... 32	±0.5
NAT600.0A	8252 86 2517 01 0000 0000 19 34 44 61	0 ... 600	1500	9 ... 32	±0.5
NAT2.5V	8252 75 2517 01 0000 0000 17 34 44 61	0 ... 2.5	7.5	15 ... 32	±0.5
NAT4.0V	8252 76 2517 01 0000 0000 17 34 44 61	0 ... 4	12	15 ... 32	±0.5
NAT6.0V	8252 77 2517 01 0000 0000 17 34 44 61	0 ... 6	18	15 ... 32	±0.5
NAT10.0V	8252 78 2517 01 0000 0000 17 34 44 61	0 ... 10	30	15 ... 32	±0.5
NAT16.0V	8252 79 2517 01 0000 0000 17 34 44 61	0 ... 16	48	15 ... 32	±0.5
NAT25.0V	8252 80 2517 01 0000 0000 17 34 44 61	0 ... 25	75	15 ... 32	±0.5
NAT40.0V	8252 81 2517 01 0000 0000 17 34 44 61	0 ... 40	120	15 ... 32	±0.5
NAT100.0V	8252 83 2517 01 0000 0000 17 34 44 61	0 ... 100	300	15 ... 32	±0.5
NAT250.0V	8252 74 2517 01 0000 0000 17 34 44 61	0 ... 250	750	15 ... 32	±0.5
NAT400.0V	8252 84 2517 01 0000 0000 17 34 44 61	0 ... 400	1000	15 ... 32	±0.5
NAT600.0V	8252 86 2517 01 0000 0000 17 34 44 61	0 ... 600	1500	15 ... 32	±0.5
NAT2.5PS	8252 75 2517 32 0000 0000 PS 44 61 ZS	0 ... 2.5	7.5	9 ... 32	±0.5
NAT4.0PS	8252 76 2517 32 0000 0000 PS 44 61 ZS	0 ... 4	12	9 ... 32	±0.5
NAT6.0PS	8252 77 2517 32 0000 0000 PS 44 61 ZS	0 ... 6	18	9 ... 32	±0.5
NAT10.0PS	8252 78 2517 32 0000 0000 PS 44 61 ZS	0 ... 10	30	9 ... 32	±0.5
NAT16.0PS	8252 79 2517 32 0000 0000 PS 44 61 ZS	0 ... 16	48	9 ... 32	±0.5
NAT25.0PS	8252 80 2517 32 0000 0000 PS 44 61 ZS	0 ... 25	75	9 ... 32	±0.5
NAT40.0PS	8252 81 2517 32 0000 0000 PS 44 61 ZS	0 ... 40	120	9 ... 32	±0.5
NAT60.0PS	8252 82 2517 32 0000 0000 PS 44 61 ZS	0 ... 60	180	9 ... 32	±0.5
NAT100.0PS	8252 83 2517 32 0000 0000 PS 44 61 ZS	0 ... 100	300	9 ... 32	±0.5
NAT160.0PS	8252 85 2517 32 0000 0000 PS 44 61 ZS	0 ... 160	480	9 ... 32	±0.5
NAT250.0PS	8252 74 2517 32 0000 0000 PS 44 61 ZS	0 ... 250	750	9 ... 32	±0.5
NAT400.0PS	8252 84 2517 32 0000 0000 PS 44 61 ZS	0 ... 400	1000	9 ... 32	±0.5
NAT600.0PS	8252 86 2517 32 0000 0000 PS 44 61 ZS	0 ... 600	1500	9 ... 32	±0.5

Parameters				
Name	**Standard setting (accessory ZS)**	**Value range**	**Short name**	**Customer adjustment (accessory ZC)**
Switch point SP1 (hysteresis mode) Upper switch point FH1 (window mode)	75 % Measuring range	> RP1, FL1 (2 ... 99 %) Hysteresis ≥ 1 % FS	SP1	
Reset point RP1 (hysteresis mode) Lower switch point FL1 (window mode)	25 % Measuring range	< SP1, FH1 (1 ... 98 %) Hysteresis ≥ 1 % FS	RP1	
Switch point SP2 (hysteresis mode) Upper switch point FH2 (window mode)	75 % Measuring range	> RP2, FL2 (2 ... 99 %) Hysteresis ≥ 1 % FS	SP2	
Reset point RP2 (hysteresis mode) Lower switch point FL2 (window mode)	25 % Measuring range	< SP2, FH2 (1 ... 98 %) Hysteresis ≥ 1 % FS	RP2	
Switch point delay time SP1 / RP1 (hysteresis mode) Switch point delay time FH1 / FL1 (window mode)	0	0; approx. 2^x[ms], x = 3, 4 ... 16	dS1	
Switch point delay time SP2 / RP2 (hysteresis mode) Switch point delay time FH2 / FL2 (window mode)	0	0; approx. 2^x[ms], x = 3, 4 ... 16	dS2	
Functions switching output 1	Hysteresis, closer (Hno)	Hysteresis NO (Hno), Hysteresis NC (Hnc) Window NO (Fno), Window NC (Fnc)	ou1	
Functions switching output 2	Hysteresis, closer (Hno)	Hysteresis NO (Hno), Hysteresis NC (Hnc) Window NO (Fno), Window NC (Fnc) Device ready	ou2	

Parameterization of switching points

The switching points, delay times and output functions can be parameterized via Smartphone app (Android). The SMI Sensor Master Interface required for the parameterization as well as the Smartphone are not part of the delivery. The Android App is available for free in the Google Play Store.

- Ordering No. SMI Sensor Master Interface: F90170
- Data sheet SMI Sensor Master Interface: H72618

Specifications		
Electrical Data	Output / supply voltage	4 ... 20 mA: 24 (9...32) VDC 0.5 ... 4.5 VDC: 24 (9...32) VDC 0 ... 5 VDC: 24 (9...32) VDC 0.5 ... 5 VDC: 24 (9...32) VDC 1 ... 5 VDC: 24 (9...32) VDC 0.5 ... 5.5 VDC: 24 (9...32) VDC 1 ... 6 VDC: 24 (9...32) VDC 0 ... 10 VDC: 24 (15...32) VDC 1 ... 10 VDC: 24 (15...32) VDC 0.1 ... 10.1 VDC: 24 (15...32) VDC 0.5 ... 4.5 VDC ratiom., 10 ... 90% U_{supply}: 5 ± 0.25 VDC 1 or 2 PNP transistors: 24 (9...32) VDC
	Rise time	Typ. 1 ms / 10 ... 90 % nominal pressure
	Switch-on-delay pressure transmitters	100 ms
	Switch-on-delay pressure switches	50 ms + switching delay time
	Inverse-polarity protection, short-circuit strength @ 25°C during 5 min.	4...20 mA: to U_s = 32 VDC 0.5...4.5 VDC, 0...5 VDC, 0.5...5 VDC, 1...5 VDC, 0.5...5.5 VDC, 1...6 VDC, 0...10 VDC, 1...10 VDC, 0.1...10.1 VDC: to U_s = 28 VDC 0.5...4.5 VDC ratiometric: to U_s = 14 VDC 1 or 2 PNP transistors: to U_s = 32 VDC
Environmental conditions	Media temperature	–40°C ... +125°C
	Ambient temperature	–40°C ... +125°C (Cable PVC 22: -5°C ... +60°C) (Cable PUR 24: -40°C ... +70°C) (Cable Radox Tenuis 88: -40°C ... +120°C)
	Protection [1]	IP65, IP67, IP68
	Humidity	Max. 95 % relative
	Vibration	15 g RMS (20...2000 Hz) (EN60068-2-64) 25 g sin (80...2000 Hz), 1 oct./min, (1x @ 25°C) (EN60068-2-6)
	Shock	50 g / 11 ms 100 g / 6 ms Male electrical plug M12x1 (EN60068-2-27) [2]
EMC Protection	Emission	EN/IEC 61000-6-3
	Immunity	EN/IEC 61000-6-2
Mechanical Data	Sensor (wetted parts)	1.4542 (AISI630)
	Pressure connection (wetted parts)	1.4542 (AISI630)
	Housing	1.4301 (AISI304)
	Sealing	FPM/EPDM/NBR
	Male electrical plug	See ordering information
	Weight	appr. 50 g
	Mounting torque	25 Nm

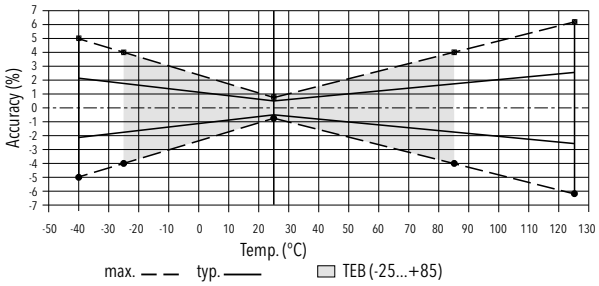
[1] See electrical connection

[2] For electrical connections 32 and 35

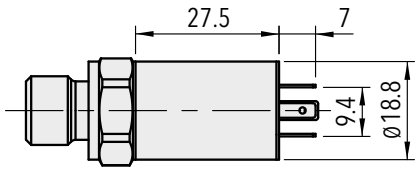
Analogue output			
Accuracy	TEB @ -25 ... +85°C	[% FS typ.]	± 1.75
	Accuracy @ +25°C	[% FS typ.]	± 0.5
	NLH @ +25°C (BSL)	[% FS typ.]	± 0.2
	TC zero point and span	[% FS/K typ.]	± 0.03
	Long term stability 1 year	[% FS typ.]	± 0.1
Rise time	Typ. 1 ms / 10 ... 90 % nominal pressure		

Switching output			
Accuracy	TEB @ -25 ... +85°C	[% FS typ.]	± 1.75
	Accuracy @ +25°C	[% FS typ.]	± 0.5
	Long term stability 1 year	[% FS typ.]	± 0.1
Adjustment range of switchpoints	1 ... 99 % FS		
Distance switch point Switch point > reset point	≥ 1.0 % FS Switchpoint > reset point		
Switching resistance	≤ 3 Ω		
Output function	Hysteresis, Window; normally closed (NO), normally open (NC)		
Switching current	-40°C ... +85°C +85°C ... +125°C	(Ambient and media temperature) (Ambient and media temperature)	≤ 400 mA, total of both switching outputs ≤ 200 mA, total of both switching outputs
Current limiting	integrated		
Delay time	0; approx. 2^x[ms], x = 3, 4 ... 16		
Switching frequency	max. 60 Hz (at switching delay time = 0)		

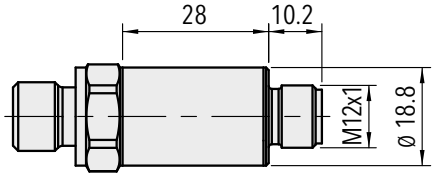
Measuring accuracy



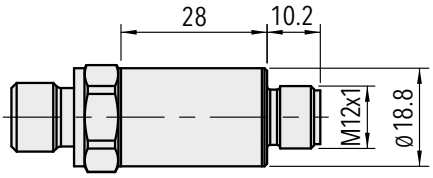
Dimensions



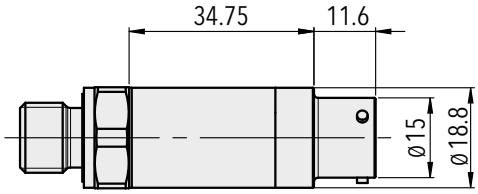
8252.XX.XXXX.**01**.XX.XX



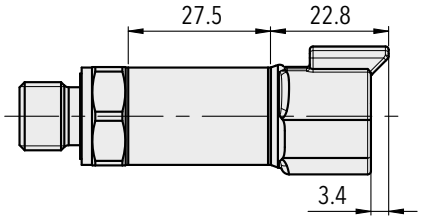
8252.XX.XXXX.**32**.XX.XX



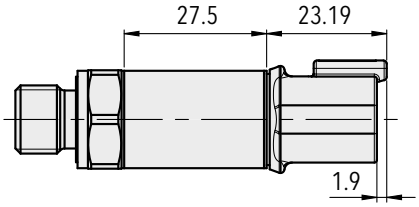
8252.XX.XXXX.**35**.XX.XX



8252.XX.XXXX.**02**.XX.XX



8252.XX.XXXX.**D3**.XX.XX



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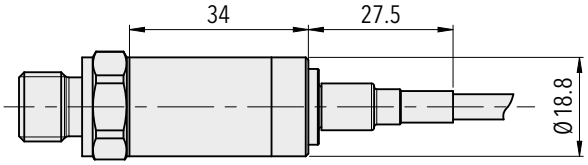
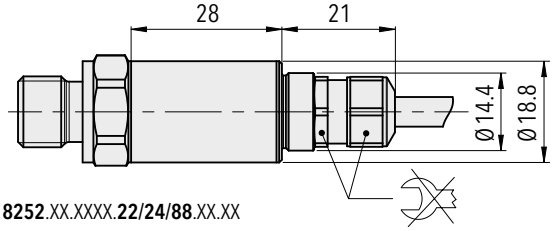
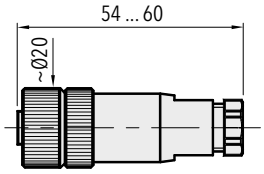


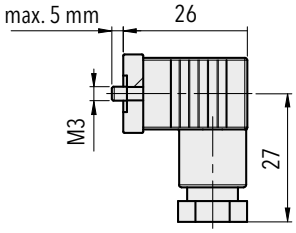
8252.XX.XXXX.**08**.XX.XX



8252.XX.XXXX.**22/24/88**.XX.XX

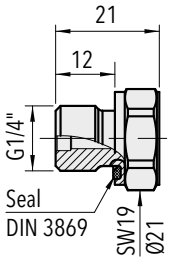


8252.XX.XXXX.XX.XX.**33**

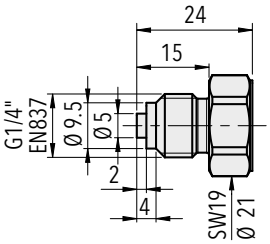


8252.XX.XXXX.XX.XX.**34**

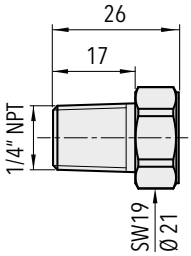
Dimensions



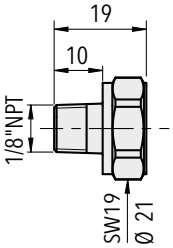
8252.XX.XX**17**.XX.XX.XX



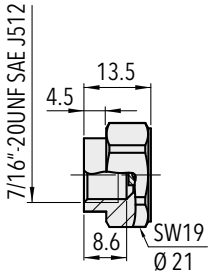
8252.XX.XX**53**.XX.XX.XX



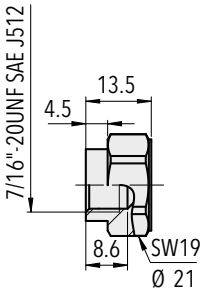
8252.XX.XX**30**.XX.XX.XX



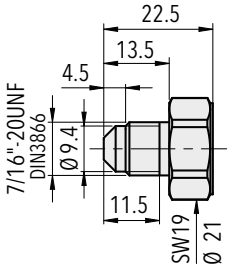
8252.XX.XX**43**.XX.XX.XX



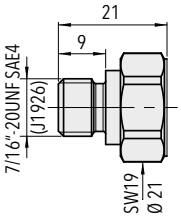
8252.XX.XX**24**.XX.XX.XX



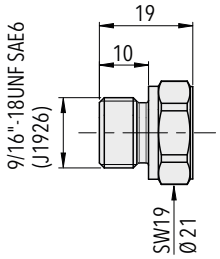
8252.XX.XX**44**.XX.XX.XX



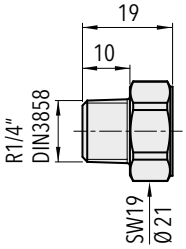
8252.XX.XX**18**.XX.XX.XX



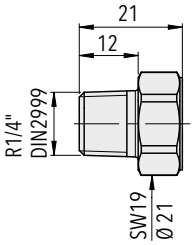
8252.XX.XX**42**.XX.XX.XX



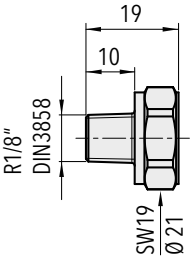
8252.XX.XX**61**.XX.XX.XX



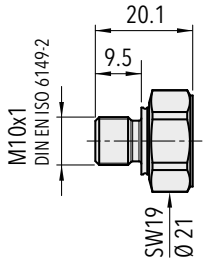
8252.XX.XX**19**.XX.XX.XX



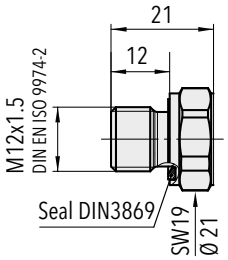
8252.XX.XX**20**.XX.XX.XX



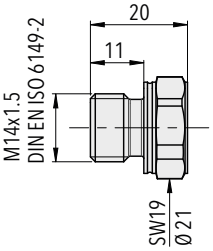
8252.XX.XX**16**.XX.XX.XX



8252.XX.XX**32**.XX.XX.XX

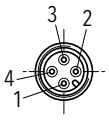
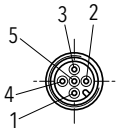
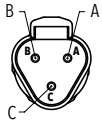
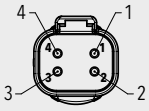
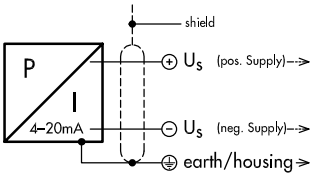
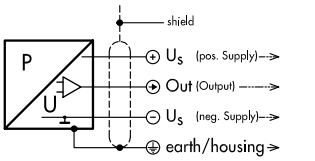


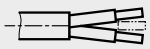
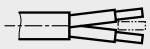
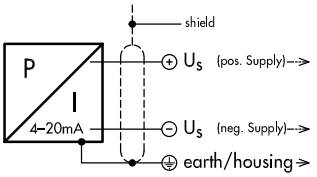
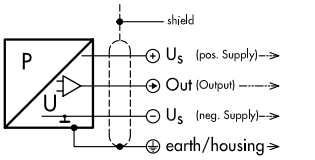
8252.XX.XX**49**.XX.XX.XX



8252.XX.XX**31**.XX.XX.XX

Electrical connection

	Protection / electrical connection										
	IP65 [1) 2)]	IP67 [1) 2)]						IP67 [1) 2)]	IP67, IP68 [1) 4)]		IP67, IP68 [1) 4)]
	Industrial standard Contact distance 9.4 mm	M12x1 4-pole				5-pole		MIL-C 26482	DT04-3P 3-pole		DT04-4P 4-pole
	01	**32**				**35**		**02**	**D3**		**D4**
											
Output signal  **8252**.xx.xxxx.xx.**19**		**90**	**92**		**E1**	**E6**				**F0**	
shield											
U_S (pos. Supply)	2	2	1	1	1	1	4	A	A	A	2
U_S (neg. Supply)	1	4	2	3	2	4	1	B	B	C	1
earth/housing	4	3	4	4	4	2	5	E			3
Output signal  **8252**.xx.xxxxxx.**13/14/16/17/20/22/23/24/25/26**		**91**	**E3**		**95**	**96**	**E2**			**F1**	
shield											
U_S (pos. Supply)	1	2	3	1	1	1	1	2	A	A	A	2
Out (Output)	2	1	1	2	3	4	3	4	B	C	B	4
U_S (neg. Supply)	3	4	2	3	4	3	2	3	C/D	B	C	1
earth/housing	4	3	4	4	2	2	4	5	E			3

	Protection / electrical connection		
	IP67, IP68 [2) 3)]	IP67 [2)]	IP67, IP68 [2) 3)]
	Cable	Cable	Cable
	22/24	**08**	**88**
			
Output signal  **8252**.xx.xxxx.xx.**19**			
shield			
U_S (pos. Supply)	white	red	brown
U_S (neg. Supply)	brown	black	black
earth/housing	yellow	green	yellow / green
Output signal  **8252**.xx.xxxxxx.**13/14/16/17/20/22/23/24/25/26**			
shield			
U_S (pos. Supply)	white	red	brown
Out (Output)	green	white	blue
U_S (neg. Supply)	brown	black	black
earth/housing	yellow	green	yellow / green

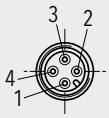
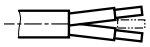
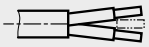
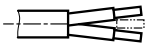
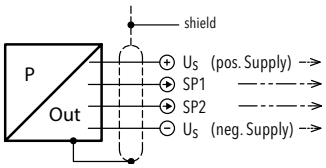
[1)] Provided female connector is mounted according to instructions

[2)] Ventilation via male electric plug/cable end

[3)] IP68, 20 bar, 30 min.

[4)] IP68, 100 mbar, 4h

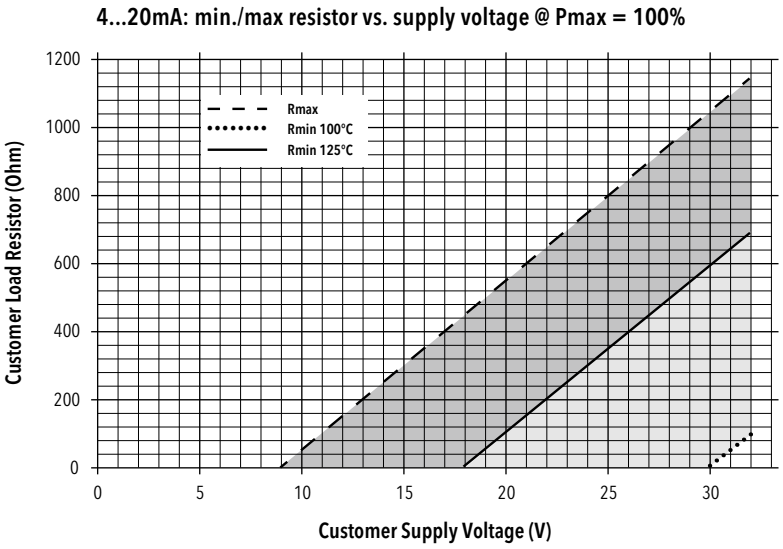
Electrical connection

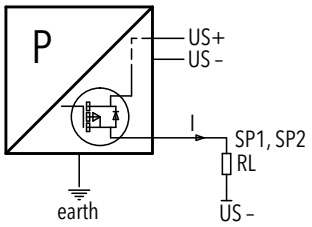
	Protection / electrical connection							
	IP67 [1) 2)]		IP67, IP68 [2) 3)]		IP67 [2)]		IP67, IP68 [2) 3)]	
	M12x1 4-pole **32** 		Cable **22/24** 		Cable **08** 		Cable **88** 	
Output signal  **8252**.xx.xxxx.xx.**PS/T1**	**PS**	**T1**	**PS**	**T1**	**PS**	**T1**	**PS**	**T1**
U_S (pos. Supply)	1	1	white	white	red	red	brown	brown
SP1	4	4	green	green	white	white	blue	blue
SP2	2	–	yellow	–	green	–	yellow / green	–
U_S (neg. Supply)	3	3	brown	brown	black	black	black	black

[1)] Provided female connector is mounted according to instructions

[2)] Ventilation via male electric plug/cable end

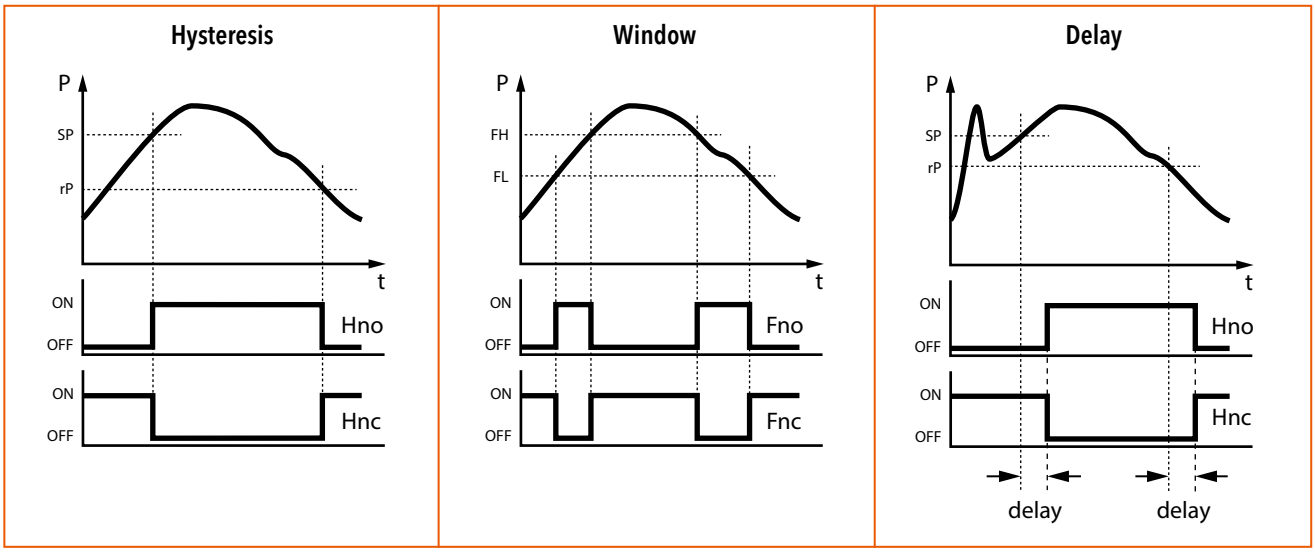
[3)] IP68, 20 bar, 30 min.





Connection of loads to switch contacts

Functions switching output



Additional information		
Documents	Data sheet	www.trafag.com/H72303
	Instructions	www.trafag.com/H73303
	Flyer	www.trafag.com/H70666

PRESSURE TRANSMITTER

Swiss based Trafag is a leading international supplier of high quality sensors and monitoring instruments for measurement of pressure and temperature. The pressure transmitter NAH 8254 with increased accuracy of 0.3% and optional switching outputs has an exceptionally long-term stable thin-film-on-steel sensor cell with triple (optionally 5-fold) overpressure protection. The robust design and the wide temperature range of -40°C to +125°C make the NAH 8254 the ideal solution when pressure needs to be measured accurately and reliably under rough environmental conditions.

Applications

- Machine tools
- Hydraulics
- Process technology
- Measuring and test bench technology

Features

- Measuring accuracy 0.3 %
- Completely welded steel sensor system without additional seals
- Excellent long-term stability
- Optional: 5-fold overpressure resistance
- Optional: Switching output 1 or 2 PNP transistors

Technical Data			
Measuring principle	Thin-film-on-steel	Accuracy @ 25°C typ.	± 0.3 % FS typ.
Measuring range	0 ... 0.2 to 0 ... 600 bar 0 ... 3 to 0 ... 7500 psi	Media temperature	–40°C ... +125°C
Output signal	4 ... 20 mA, 0.5 ... 4.5 VDC, 0 ... 5 VDC, 0.5 ... 5 VDC, 1 ... 5 VDC, 0.5 ... 5.5 VDC, 1 ... 6 VDC, 0 ... 10 VDC, 1 ... 10 VDC, 0.1 ... 10.1 VDC, 0.5 ... 4.5 VDC ratiometric, Switching output: 1 or 2 PNP transistors	Ambient temperature	–40°C ... +125°C (Cable PVC 22: -5°C ... +60°C) (Cable PUR 24: -40°C ... +70°C) (Cable Radox Tenuis 88: -40°C ... +120°C)

Subject to change

Ordering information/type code

												8254 .	XX	XX	XX	XX	XX	XX
Measuring range [1]	**Pressure measurement range [bar]**	**Over pressure [bar]**	**Burst pressure [bar]**		**Pressure measurement range [psi]**	**Over pressure [psi]**	**Burst pressure [psi]**											
	0 ... 0.2 [10]	1.2	25	**68**	0 ... 3 [10]	18	350	**F8**										
	0 ... 0.4 [10]	1.2	25	**69**	0 ... 5 [10]	18	350	**F9**										
	0 ... 0.6 [10]	1.2	25	**70**	0 ... 10 [10]	20	350	**G0**										
	0 ... 1.0 [10]	2	25	**71**	0 ... 15 [10]	30	350	**G1**										
	0 ... 1.6 [10]	3.2	50	**73**	0 ... 25 [10]	50	700	**G3**										
	0 ... 2.5	7.5	50	**75**	0 ... 30	90	700	**G5**										
	0 ... 4	12	60	**76**	0 ... 50	150	850	**G6**										
	0 ... 6	18	100	**77**	0 ... 100	300	1450	**G7**										
	0 ... 10	30	200	**78**	0 ... 150	450	2500	**G8**										
	0 ... 16	48	200	**79**	0 ... 200	600	2500	**GA**										
	0 ... 25	75	300	**80**	0 ... 250	750	2500	**G9**										
	0 ... 40	120	300	**81**	0 ... 300	900	4000	**HA**										
	0 ... 60	180	400	**82**	0 ... 400	1200	4000	**H0**										
	0 ... 100	300	500	**83**	0 ... 500	1500	4000	**H1**										
	0 ... 160	480	750	**85**	0 ... 1000	3000	5000	**H2**										
	0 ... 250	750	1000	**74**	0 ... 1500	4500	7000	**H3**										
	0 ... 400	1000	2000	**84**	0 ... 2000	6000	10000	**H5**										
	0 ... 600	1500	2500	**86**	0 ... 3000	9000	14500	**G4**										
	Option 5P:	**Fivefold overpressure**			0 ... 5000	12500	21750	**H4**										
					0 ... 7500	18750	29000	**H6**										
	0 ... 2.5	12.5	60	**55**														
	0 ... 4	20	100	**56**														
	0 ... 6	30	200	**57**														
	0 ... 10	50	200	**58**														
	0 ... 16	80	300	**59**														
	0 ... 25	125	300	**60**														
	0 ... 40	200	400	**61**														
	0 ... 60	300	500	**62**														
	0 ... 100	500	750	**63**														
	0 ... 160	800	1000	**65**														
Sensor	Relative pressure, accuracy: 0.3 %												**23**					
Pressure connection	G1/4" male, seal: DIN 3869 (accessory 61/63/83)			**17**	9/16"-18UNF SAE6 male (J1926), seal: accessory 61			**61**										
	G1/4" male (Manometer) EN 837 [9]			**53**	R1/4" male, DIN3858 [5]			**19**										
	1/4" NPT male			**30**	R1/4" male, DIN2999 [9]			**20**										
	1/8" NPT male [5] [9]			**43**	R1/8" male, DIN3858 [5]			**16**										
	7/16"-20UNF female SAE J512 with valve opener [4]			**24**	M10x1 male, DIN EN ISO 6149-2, seal: accessory 61			**32**										
	7/16"-20UNF female SAE J512 without valve opener [4]			**44**	M12x1.5 male, DIN EN ISO 9974-2, seal: accessory 61 [9]			**49**										
	7/16"-20UNF male, DIN3866 [4]			**18**	M14x1.5 male DIN EN ISO 6149-2, seal: accessory 61 [9]			**31**										
	7/16"-20UNF SAE4 male (J1926), seal: accessory 61			**42**														
Electrical connection	Male electrical plug, industrial standard, contact distance 9.4 mm, Mat. PA														**01**			
	Male electrical plug M12x1, 4-pole, Mat. PA, IEC 61076-2-101														**32**			
	Male electrical plug M12x1, 5-pole, Mat. PA, IEC 61076-2-101														**35**			
	Male electrical plug MIL-C 26482, 6-pole, metal														**02**			
	Male electrical plug Deutsch DT04-3P, 3-pole														**D3**			
	Male electrical plug Deutsch DT04-4P, 4-pole														**D4**			
	Cable Mat. PVC, IP67/IP68, 2 x 2 x 0.14 mm^2 [7]														**22**			
	Cable Mat. PUR, IP67/IP68, 4 x 0.25 mm^2 [7]														**24**			
	Cable Mat. EPD Raychem FDR25, IP67, 4 x 0.2 mm^2 [7]														**08**			
	Cable Mat. Radox Tenuis, IP67/IP68, 4 x 0.5 mm^2 [7]														**88**			

					8254 . XX	XX	XX	XX	XX	XX
Output signal	**Signal output**	**Load resistance**	**I (supply)**	**U (supply)**						
	4 ... 20 mA	See graphic		24 (9 ... 32) VDC						**19**
	0.5 ... 4.5 VDC	≥ 5.0 kΩ to Us-	≤ 20 mA	24 (9 ... 32) VDC						**20**
	0 ... 5 VDC	≥ 5.0 kΩ to Us-	≤ 20 mA	24 (9 ... 32) VDC						**14**
	0.5 ... 5 VDC	≥ 5.0 kΩ to Us-	≤ 20 mA	24 (9 ... 32) VDC						**22**
	1 ... 5 VDC	≥ 5.0 kΩ to Us-	≤ 20 mA	24 (9 ... 32) VDC						**25**
	0.5 ... 5.5 VDC	≥ 5.0 kΩ to Us-	≤ 20 mA	24 (9 ... 32) VDC						**24**
	1 ... 6 VDC	≥ 5.0 kΩ to Us-	≤ 20 mA	24 (9 ... 32) VDC						**16**
	0 ... 10 VDC	≥ 5.0 kΩ to Us-	≤ 15 mA	24 (15 ... 32) VDC						**17**
	1 ... 10 VDC	≥ 5.0 kΩ to Us-	≤ 15 mA	24 (15 ... 32) VDC						**26**
	0.1 ... 10.1 VDC	≥ 5.0 kΩ to Us-	≤ 15 mA	24 (15 ... 32) VDC						**13**
	0.5 ... 4.5 VDC ratiom.	≥ 5.0 kΩ to Us-	≤ 10 mA	5 (4.75 ... 5.25) VDC						**23**
	2 PNP transistors [3]		≤ 10 mA	24 (9 ... 32) VDC						**PS**
	1 PNP transistor [3]		≤ 10 mA	24 (9 ... 32) VDC						**T1**

Accessories	Female electrical plug M12x1, 5-pole [2]	**33**
	Female electrical connector industrial standard (for electrical connection 01)	**34**
	Pressure peak damping element ø 1.0 mm [6]	**40**
	Pressure peak damping element ø 0.4 mm [6]	**44**
	Seal FPM, -18°C ... +125°C	**61**
	Seal EPDM, -40°C ... +125°C	**63**
	Seal NBR, -25°C ... +100°C	**83**
	Special electrical connection: Pin 2 +, Pin 3 Ground, Pin 4 - (only for output signal 19 and male electrical plug 01, industrial standard)	**90**
	Special electrical connection: Pin 1 Out, Pin 2 +, Pin 3 Ground, Pin 4 - (only for output signals 13, 14, 16, 17, 20, 22, 23, 24, 25, 26 and male electrical plug 01, industrial standard)	**91**
	Special electrical connection: Pin 1 + , Pin 2 Ground, Pin 3 Out, Pin 4 - (only for output signals 13, 14, 16, 17, 20, 22, 23, 24, 25, 26 and male electrical plug 32, M12x1, 4-pole)	**95**
	Special electrical connection: Pin 1 + , Pin 2 Ground, Pin 3 -, Pin 4 Out (only for output signals 13, 14, 16, 17, 20, 22, 23, 24, 25, 26 and male electrical plug 32, M12x1, 4-pole)	**96**
	Special electrical connection: Pin 1 +, Pin 2 -, Pin 4 Ground (only for output signal 19 and male electrical plug 01, industrial standard)	**92**
	Special electrical connection: Pin 1 +, Pin 2 -, Pin 4 Ground (only for output signal 19 and male electrical plug 32, M12x1, 4-pole)	**E1**
	Special electrical connection: Pin 1 +, Pin 2 -, Pin 3 Out, Pin 4 Ground (only for output signals 13, 14, 16, 17, 20, 22, 23, 24, 25, 26 and male electrical plug 32, M12x1, 4-pole)	**E2**
	Special electrical connection: Pin 1 Out , Pin 2 -, Pin 3 +, Pin 4 Ground (only for output signals 13, 14, 16, 17, 20, 22, 23, 24, 25, 26 and male electrical plug 01, industrial standard)	**E3**
	Special electrical connection: Pin 1 + , Pin 2 Ground, Pin 4 - (only for output signal 19 and male electrical plug 32, M12x1, 4-pole)	**E6**
	Special electrical connection: Pin A +, Pin C - (only for output signal 19 and male electrical plug Deutsch DT04-3P, 3-pole)	**F0**
	Special electrical connection: Pin A +, Pin B Out, Pin C - (only for output signals 13, 14, 16, 17, 20, 22, 23, 24, 25, 26 and male electrical plug Deutsch DT04-3P, 3-pole)	**F1**
	Cable length 0.5 m	**EM**
	Cable length 1.0 m	**1M**
	Cable length 2.0 m	**2M**
	Parameterization according to customer specification for output signal PS, T1 (see table "Parameters")	**ZC**
	Parameterization standard for output signal PS, T1 (see table "Parameters")	**ZS**
	Multiple packaging [8]	**VM**
	Signal processing, cut-off frequency (see table Signal processing)	

[1] Customized pressure ranges upon request
[2] For electrical connections 32 and 35
[3] Only with electrical connections 32, 22, 24, 08, 88
[4] Max. allowable pressure range 60 bar at 180 bar overpressure
[5] Max. allowable pressure range 160 bar at 480 bar overpressure
[6] Not for pressure connections 53, 24, 44, 18
[7] Cable length see accessories
[8] The order quantity must be a multiple of 50, only for electrical connections 01, 32, 35, 02, D3, D4, not for pressure connection 30 with electrical connections 02, D3, D4
[9] Upon request
[10] Only for pressure connections 17 and 30 and with output signal 4 ... 20 mA, code 19

Signal processing						
Code	Cut-off frequency f_G	Rise time (10 ... 90 % nominal pressure)	Output signal			
			4 ... 20 mA	0.5 ... 4.5 VDC ratiometric	0 ... 6 VDC	0 ... 10 VDC
GA [1]	11 Hz	32 ms	x	x	-	-
GU [1] [2]	20 kHz	18 µs	x	x	-	-
Standard specification	350 Hz	1 ms	x	x	x	x

[1] Upon request

[2] Only with electrical connections 32, 35 with shielded cable and 22, 24, 08, 88, only for pressure ranges ≥ 2 bar

Standard products (extra short lead time)					
Product No.	Type Code	Pressure range [bar]	Over pressure max. [bar]	Supply [VDC]	Accuracy @ 25°C typ. [%]
NAH2.5A	8254 75 2317 32 0000 0000 19 33 44 61	0 ... 2.5	7.5	9 ... 32	± 0.3
NAH4.0A	8254 76 2317 32 0000 0000 19 33 44 61	0 ... 4	12	9 ... 32	± 0.3
NAH6.0A	8254 77 2317 32 0000 0000 19 33 44 61	0 ... 6	18	9 ... 32	± 0.3
NAH10.0A	8254 78 2317 32 0000 0000 19 33 44 61	0 ... 10	30	9 ... 32	± 0.3
NAH16.0A	8254 79 2317 32 0000 0000 19 33 44 61	0 ... 16	48	9 ... 32	± 0.3
NAH25.0A	8254 80 2317 32 0000 0000 19 33 44 61	0 ... 25	75	9 ... 32	± 0.3
NAH40.0A	8254 81 2317 32 0000 0000 19 33 44 61	0 ... 40	120	9 ... 32	± 0.3
NAH100.0A	8254 83 2317 32 0000 0000 19 33 44 61	0 ... 100	300	9 ... 32	± 0.3
NAH250.0A	8254 74 2317 32 0000 0000 19 33 44 61	0 ... 250	750	9 ... 32	± 0.3
NAH400.0A	8254 84 2317 32 0000 0000 19 33 44 61	0 ... 400	1000	9 ... 32	± 0.3
NAH600.0A	8254 86 2317 32 0000 0000 19 33 44 61	0 ... 600	1500	9 ... 32	± 0.3

Parameters				
Name	**Standard setting (accessory ZS)**	**Value range**	**Short name**	**Customer adjustment (accessory ZC)**
Switch point SP1 (hysteresis mode) Upper switch point FH1 (window mode)	75 % Measuring range	> RP1, FL1 (2 ... 99 %) Hysteresis ≥ 1 % FS	SP1	
Reset point RP1 (hysteresis mode) Lower switch point FL1 (window mode)	25 % Measuring range	< SP1, FH1 (1 ... 98 %) Hysteresis ≥ 1 % FS	RP1	
Switch point SP2 (hysteresis mode) Upper switch point FH2 (window mode)	75 % Measuring range	> RP2, FL2 (2 ... 99 %) Hysteresis ≥ 1 % FS	SP2	
Reset point RP2 (hysteresis mode) Lower switch point FL2 (window mode)	25 % Measuring range	< SP2, FH2 (1 ... 98 %) Hysteresis ≥ 1 % FS	RP2	
Switch point delay time SP1 / RP1 (hysteresis mode) Switch point delay time FH1 / FL1 (window mode)	0	0; approx. 2^x[ms], x = 3, 4 ... 16	dS1	
Switch point delay time SP2 / RP2 (hysteresis mode) Switch point delay time FH2 / FL2 (window mode)	0	0; approx. 2^x[ms], x = 3, 4 ... 16	dS2	
Functions switching output 1	Hysteresis, closer (Hno)	Hysteresis NO (Hno), Hysteresis NC (Hnc) Window NO (Fno), Window NC (Fnc)	ou1	
Functions switching output 2	Hysteresis, closer (Hno)	Hysteresis NO (Hno), Hysteresis NC (Hnc) Window NO (Fno), Window NC (Fnc) Device ready	ou2	

Parameterization of switching points

The switching points, delay times and output functions can be parameterized via Smartphone app (Android). The SMI Sensor Master Interface required for the parameterization as well as the Smartphone are not part of the delivery. The Android App is available for free in the Google Play Store.

- Ordering No. SMI Sensor Master Interface: F90170
- Data sheet SMI Sensor Master Interface: H72618

Specifications		
Electrical Data	Output / supply voltage	4 ... 20 mA: 24 (9...32) VDC 0.5 ... 4.5 VDC: 24 (9...32) VDC 0 ... 5 VDC: 24 (9...32) VDC 0.5 ... 5 VDC: 24 (9...32) VDC 1 ... 5 VDC: 24 (9...32) VDC 0.5 ... 5.5 VDC: 24 (9...32) VDC 1 ... 6 VDC: 24 (9...32) VDC 0 ... 10 VDC: 24 (15...32) VDC 1 ... 10 VDC: 24 (15...32) VDC 0.1 ... 10.1 VDC: 24 (15...32) VDC 0.5 ... 4.5 VDC ratiom., 10 ... 90% U_{supply}: 5 ± 0.25 VDC 1 or 2 PNP transistors: 24 (9...32) VDC
	Rise time	Rise time of the supply voltage: > 32 V/s
	Switch-on-delay pressure transmitters	100 ms
	Switch-on-delay pressure switches	50 ms + switching delay time
	Inverse-polarity protection, short-circuit strength @ 25°C during 5 min.	4...20 mA: to U_s = 32 VDC 0.5...4.5 VDC, 0...5 VDC, 0.5...5 VDC, 1...5 VDC, 0.5...5.5 VDC, 1...6 VDC, 0...10 VDC, 1...10 VDC, 0.1...10.1 VDC: to U_s = 28 VDC 0.5...4.5 VDC ratiometric: to U_s = 14 VDC 1 or 2 PNP transistors: to U_s = 32 VDC
Environmental conditions	Media temperature	–40°C ... +125°C
	Ambient temperature	–40°C ... +125°C (Cable PVC 22: -5°C ... +60°C) (Cable PUR 24: -40°C ... +70°C) (Cable Radox Tenuis 88: -40°C ... +120°C)
	Protection [1]	IP65, IP67, IP68
	Humidity	Max. 95 % relative
	Vibration	15 g RMS (20...2000 Hz) (EN60068-2-64) 25 g sin (80...2000 Hz), 1 oct./min, (1x @ 25°C) (EN60068-2-6)
	Shock	50 g / 11 ms 100 g / 6 ms Male electrical plug M12x1 (EN60068-2-27) [2]
EMC Protection	Emission	EN/IEC 61000-6-3
	Immunity	EN/IEC 61000-6-2
Mechanical Data	Sensor (wetted parts)	1.4542 (AISI630)
	Pressure connection (wetted parts)	1.4542 (AISI630)
	Housing	1.4301 (AISI304)
	Sealing	FPM/EPDM/NBR
	Male electrical plug	See ordering information
	Weight	appr. 50 g
	Mounting torque	25 Nm

[1] See electrical connection

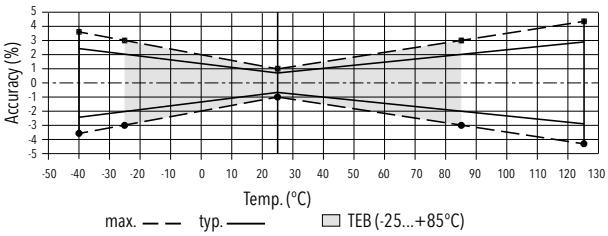
[2] For electrical connections 32 and 35

Analogue output			≥ 0.2 bar ≤ 0.6 bar	> 0.6 bar < 2.0 bar	≥ 2.0 bar
Accuracy	TEB @ -25 ... +85°C	[% FS typ.]	± 2.0	± 1.5	± 1.0
	Accuracy @ +25°C	[% FS typ.]	± 0.8	± 0.6	± 0.3
	NLH @ +25°C (BSL)	[% FS typ.]	± 0.2	± 0.2	± 0.2
	TC zero point and span	[% FS/K typ.]	± 0.02	± 0.02	± 0.01
	Long term stability 1 year	[% FS typ.]	± 0.3	± 0.2	± 0.1
	Mounting dependency with 180° rotation (vibration and shock)	[% FS max.]	0.5 mbar	0.5 mbar	0.5 mbar
Rise time	Typ. 1 ms / 10 ... 90 % nominal pressure				

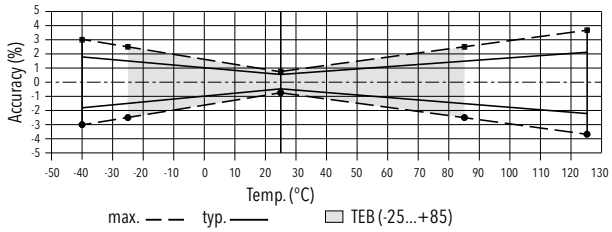
Switching output			
Accuracy	TEB @ -25 ... +85°C	[% FS typ.]	± 1.0
	Accuracy @ +25°C	[% FS typ.]	± 0.3
	Long term stability 1 year	[% FS typ.]	± 0.1
Adjustment range of switchpoints	1 ... 99 % FS		
Distance switch point Switch point > reset point	≥ 1.0 % FS Switchpoint > reset point		
Switching resistance	≤ 3 Ω		
Output function	Hysteresis, Window; normally closed (NO), normally open (NC)		
Switching current	-40°C ... +85°C +85°C ... +125°C	(Ambient and media temperature) (Ambient and media temperature)	≤ 400 mA, total of both switching outputs ≤ 200 mA, total of both switching outputs
Current limiting	integrated		
Delay time	0; approx. 2^x[ms], x = 3, 4 ... 16		
Switching frequency	max. 60 Hz (at switching delay time = 0)		

Measuring accuracy

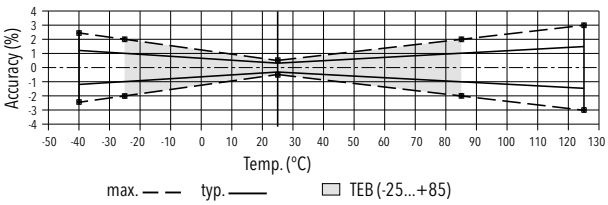
≥ 0.2 bar ... ≤ 0.6 bar



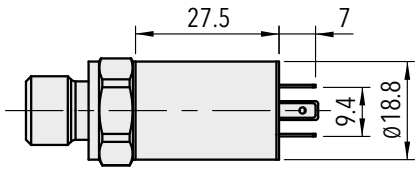
>0.6 bar ... <2.0 bar



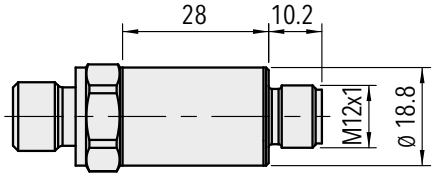
≥ 2.0 bar



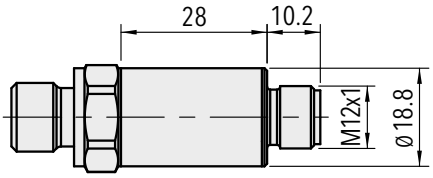
Dimensions



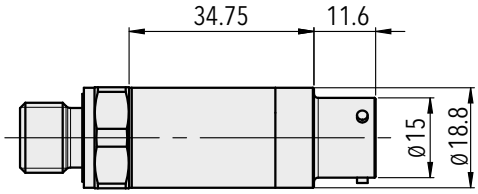
8254.XX.XXXX.**01**.XX.XX



8254.XX.XXXX.**32**.XX.XX



8254.XX.XXXX.**35**.XX.XX



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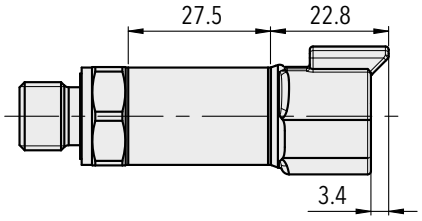
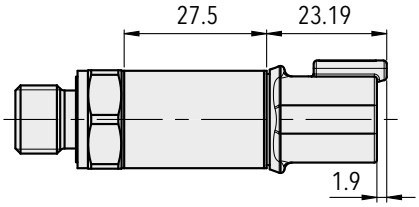
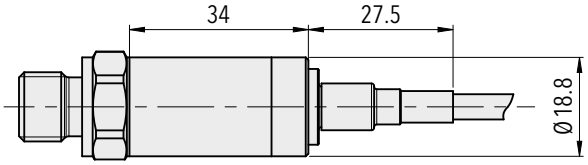


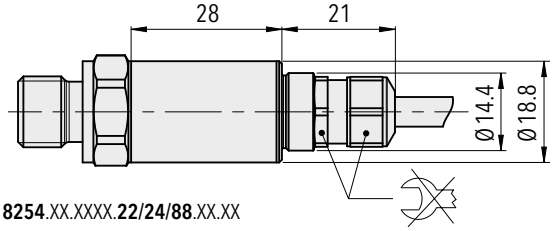
8254.XX.XXXX.**D3**.XX.XX



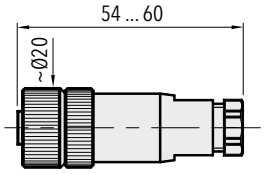
8254.XX.XXXX.**D4**.XX.XX



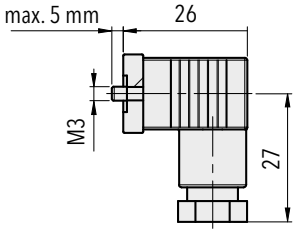
8254.XX.XXXX.**08**.XX.XX



8254.XX.XXXX.**22/24/88**.XX.XX

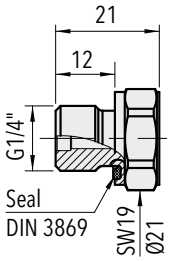


8254.XX.XXXX.XX.XX.**33**

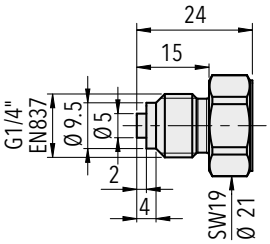


8254.XX.XXXX.XX.XX.**34**

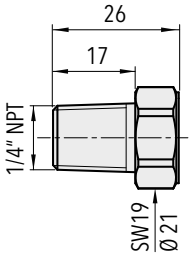
Dimensions



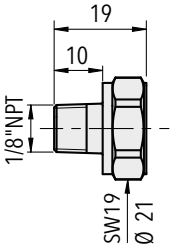
8254.XX.XX**17**.XX.XX.XX



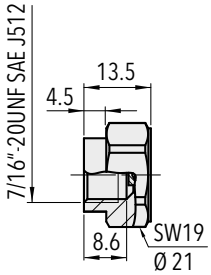
8254.XX.XX**53**.XX.XX.XX



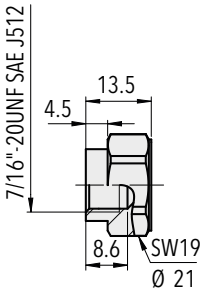
8254.XX.XX**30**.XX.XX.XX



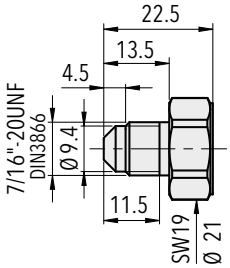
8254.XX.XX**43**.XX.XX.XX



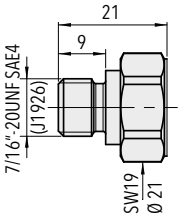
8254.XX.XX**24**.XX.XX.XX



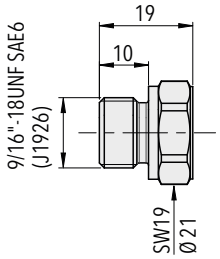
8254.XX.XX**44**.XX.XX.XX



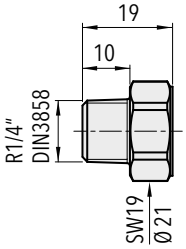
8254.XX.XX**18**.XX.XX.XX



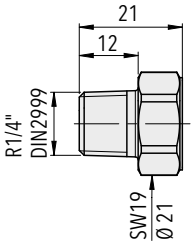
8254.XX.XX**42**.XX.XX.XX



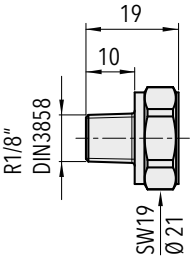
8254.XX.XX**61**.XX.XX.XX



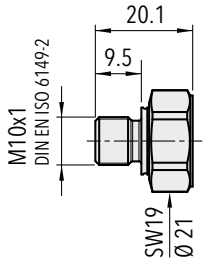
8254.XX.XX**19**.XX.XX.XX



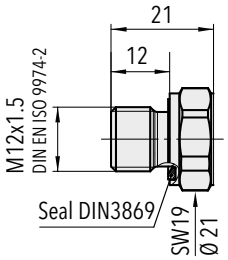
8254.XX.XX**20**.XX.XX.XX



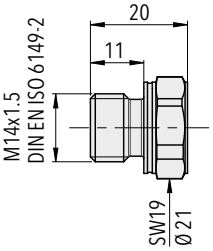
8254.XX.XX**16**.XX.XX.XX



8254.XX.XX**32**.XX.XX.XX

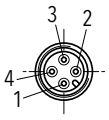
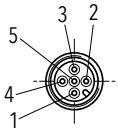
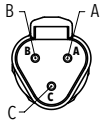
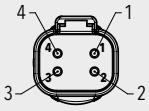
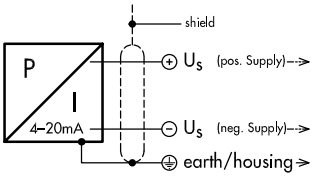
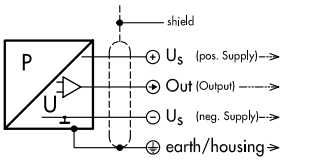


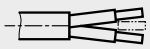
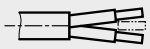
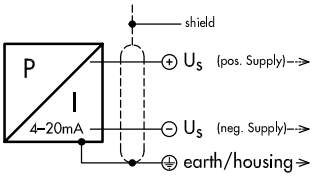
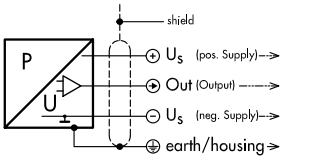
8254.XX.XX**49**.XX.XX.XX



8254.XX.XX**31**.XX.XX.XX

Electrical connection

	Protection / electrical connection										
	IP65 [1) 2)]	IP67 [1) 2)]						IP67 [1) 2)]	IP67, IP68 [1) 4)]		IP67, IP68 [1) 4)]
	Industrial standard Contact distance 9.4 mm	M12x1 4-pole				M12x1 5-pole		MIL-C 26482	DT04-3P 3-pole		DT04-4P 4-pole
	01	**32**				**35**		**02**	**D3**		**D4**
											
Output signal											
 **8254**.xx.xxxx.xx.**19**		**90**	**92**		**E1**	**E6**				**F0**	
	2	2	1	1	1	1	4	A	A	A	2
	1	4	2	3	2	4	1	B	B	C	1
	4	3	4	4	4	2	5	E			3
 **8254**.xx.xxxxxx.**13/14/16/17/20/22/23/24/25/26**		**91**	**E3**		**95**	**96**	**E2**			**F1**	
	1	2	3	1	1	1	1	2	A	A	A	2
	2	1	1	2	3	4	3	4	B	C	B	4
	3	4	2	3	4	3	2	3	C/D	B	C	1
	4	3	4	4	2	2	4	5	E			3

	Protection / electrical connection		
	IP67, IP68 [2) 3)]	IP67 [2)]	IP67, IP68 [2) 3)]
	Cable	Cable	Cable
	22/24	**08**	**88**
			
Output signal			
 **8254**.xx.xxxx.xx.**19**	white	red	brown
	brown	black	black
	yellow	green	yellow / green
 **8254**.xx.xxxxxx.**13/14/16/17/20/22/23/24/25/26**	white	red	brown
	green	white	blue
	brown	black	black
	yellow	green	yellow / green

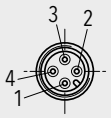
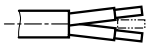
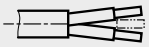
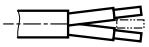
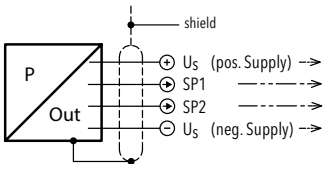
[1)] Provided female connector is mounted according to instructions

[2)] Ventilation via male electric plug/cable end

[3)] IP68, 20 bar, 30 min.

[4)] IP68, 100 mbar, 4h

Electrical connection

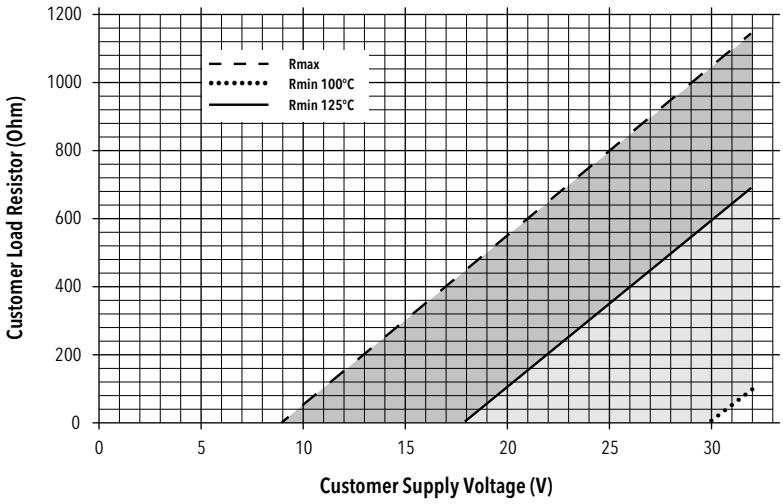
	Protection / electrical connection							
	IP67 [1] [2]		IP67, IP68 [2] [3]		IP67 [2]		IP67, IP68 [2] [3]	
	M12x1 4-pole **32**		Cable **22/24**		Cable **08**		Cable **88**	
								
Output signal	**PS**	**T1**	**PS**	**T1**	**PS**	**T1**	**PS**	**T1**
 **8254**.xx.xxxx.xx.**PS/T1**	1 4 2 3	1 4 – 3	white green yellow brown	white green – brown	red white green black	red white – black	brown blue yellow / green black	brown blue – black

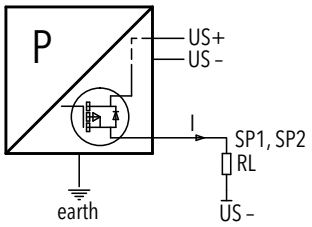
[1] Provided female connector is mounted according to instructions

[2] Ventilation via male electric plug/cable end

[3] IP68, 20 bar, 30 min.

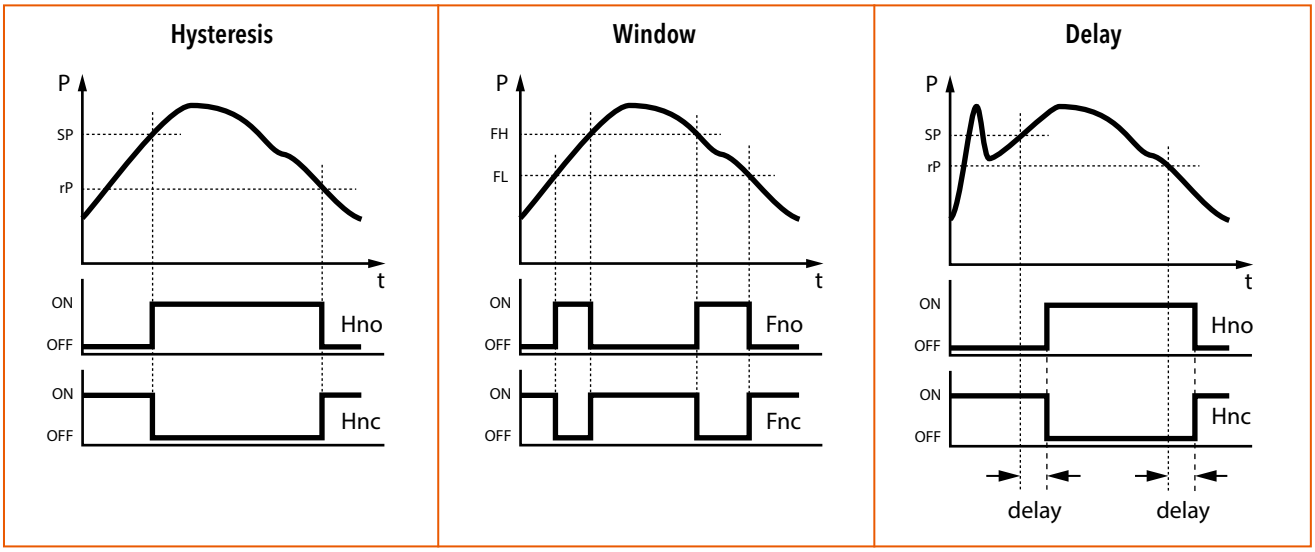
4...20mA: min./max resistor vs. supply voltage @ Pmax = 100%





Connection of loads to switching output

Functions switching output



Additional information		
Documents	Data sheet	www.trafag.com/H72304
	Instructions	www.trafag.com/H73303
	Flyer	www.trafag.com/H70682

RAILWAY PRESSURE TRANSMITTER

Swiss based Trafag is a leading international supplier of high quality sensors and monitoring instruments for measurement of pressure and temperature. The pressure transmitter NAR 8258 with increased accuracy of 0.3 % was specifically designed for railway vehicles (EN 50155) and has a long-term stable thin-film-on-steel sensor cell. The wide temperature range from -40°C to +125°C and the triple over-pressure protection make the NAR 8258 the ideal choice for railway vehicles in rough environmental conditions.

Applications

- Railways

Features

- Measuring accuracy 0.3 %
- Optional: Switching output 1 or 2 PNP transistors
- Excellent long-term stability
- Dielectrical strength: 710 VDC, meets EN 50155 (Railways)

Technical Data			
Measuring principle	Thin-film-on-steel	Media temperature	–40°C ... +125°C
Measuring range	0 ... 6 to 0 ... 600 bar 0 ... 100 to 0 ... 7500 psi	Ambient temperature	–40°C ... +125°C (Cable Radox Tenuis 88: -40°C ... +120°C)
Output signal	4 ... 20 mA, Switching output: 1 or 2 PNP transistors	Approval / conformity	EN 50155 (Railway) EN 45545-2 (Fire protection) EN 61373 (Shock, vibration) EN 50121-3-2 (EMC)
Accuracy @ 25°C typ.	± 0.3 % FS typ.		

Subject to change

Ordering information/type code

8258 . XX XX XX XX XX XX

Measuring range [1]

Pressure measurement range [bar]	Over pressure [bar]	Burst pressure [bar]	
0 ... 6	18	100	77
0 ... 10	30	200	78
0 ... 16	48	200	79
0 ... 25 [5]	75	300	80
0 ... 40 [5]	120	300	81
0 ... 60 [5]	180	400	82
0 ... 100 [5]	300	500	83
0 ... 160 [5]	480	750	85
0 ... 250	750	1000	74
0 ... 400	1000	2000	84
0 ... 600	1500	2500	86

Pressure measurement range [ps]	Over pressure [ps]	Burst pressure [ps]	
0 ... 100	300	1450	G7
0 ... 150	450	2500	G8
0 ... 200	600	2500	GA
0 ... 250	750	2500	G9
0 ... 300 [5]	900	4000	HA
0 ... 400 [5]	1200	4000	H0
0 ... 1000 [5]	3000	5000	H2
0 ... 1500 [5]	4500	7000	H3
0 ... 2000 [5]	6000	10000	H5
0 ... 3000	9000	14500	G4
0 ... 5000	12500	21750	H4
0 ... 7500	18750	29000	H6

Sensor

Relative pressure, accuracy: 0.3 %	23

Pressure connection

G1/4" male, seal: DIN 3869 (accessory 61/63/83)	17
G1/4" male (Manometer) EN 837 [5]	53
1/4" NPT male	30
7/16"-20UNF SAE4 male (J1926), seal: accessory 61	42
R1/4" male, DIN2999 [5]	20
M10x1 male, DIN EN ISO 6149-2, seal: accessory 61	32
M12x1.5 male, DIN EN ISO 9974-2, seal: accessory 61 [5]	49

Electrical connection

Male electrical plug, industrial standard, contact distance 9.4 mm, Mat. PA	01
Male electrical plug M12x1, 4-pole, Mat. PA, IEC 61076-2-101	32
Male electrical plug M12x1, 5-pole, Mat. PA, IEC 61076-2-101	35
Cable Mat. Radox Tenuis, IP67/IP68, 4 x 0.5 mm²	88

Output signal

Signal output	Load resistance	I (supply)	U (supply)	
4 ... 20 mA	See graphic		24 (9 ... 32) VDC	19
2 PNP transistors [3]		≤ 10 mA	24 (9 ... 32) VDC	PS
1 PNP transistor [3]		≤ 10 mA	24 (9 ... 32) VDC	T1

Accessories

Female electrical plug M12x1, 5-pole [2]	33
Female electrical connector industrial standard (for electrical connection 01)	34
Pressure peak damping element ø 1.0 mm [4]	40
Pressure peak damping element ø 0.4 mm [4]	44
Seal FPM, -18°C ... +125°C	61
Seal EPDM, -40°C ... +125°C	63
Seal NBR, -25°C ... +100°C	83
Special electrical connection: Pin 2 +, Pin 3 Ground, Pin 4 - (only for output signal 19 and male electrical plug 01, industrial standard)	90
Special electrical connection: Pin 1 +, Pin 2 -, Pin 4 Ground (only for output signal 19 and male electrical plug 01, industrial standard)	92
Special electrical connection: Pin 1 +, Pin 2 -, Pin 4 Ground (only for output signal 19 and male electrical plug 32, M12x1, 4-pole)	E1
Parameterization according to customer specification for output signal PS, T1 (see table "Parameters")	ZC
Parameterization standard for output signal PS, T1 (see table "Parameters")	ZS

[1] Customized pressure ranges upon request
[2] For electrical connections 32 and 35
[3] Only with electrical connection 32
[4] Not for pressure connection 53
[5] Upon request

Parameters				
Name	**Standard setting (accessory ZS)**	**Value range**	**Short name**	**Customer adjustment (accessory ZC)**
Switch point SP1 (hysteresis mode) Upper switch point FH1 (window mode)	75 % Measuring range	> RP1, FL1 (2 ... 99 %) Hysteresis ≥ 1 % FS	SP1	
Reset point RP1 (hysteresis mode) Lower switch point FL1 (window mode)	25 % Measuring range	< SP1, FH1 (1 ... 98 %) Hysteresis ≥ 1 % FS	RP1	
Switch point SP2 (hysteresis mode) Upper switch point FH2 (window mode)	75 % Measuring range	> RP2, FL2 (2 ... 99 %) Hysteresis ≥ 1 % FS	SP2	
Reset point RP2 (hysteresis mode) Lower switch point FL2 (window mode)	25 % Measuring range	< SP2, FH2 (1 ... 98 %) Hysteresis ≥ 1 % FS	RP2	
Switch point delay time SP1 / RP1 (hysteresis mode) Switch point delay time FH1 / FL1 (window mode)	0	0; approx. 2^x[ms], x = 3, 4 ... 16	dS1	
Switch point delay time SP2 / RP2 (hysteresis mode) Switch point delay time FH2 / FL2 (window mode)	0	0; approx. 2^x[ms], x = 3, 4 ... 16	dS2	
Functions switching output 1	Hysteresis, closer (Hno)	Hysteresis NO (Hno), Hysteresis NC (Hnc) Window NO (Fno), Window NC (Fnc)	ou1	
Functions switching output 2	Hysteresis, closer (Hno)	Hysteresis NO (Hno), Hysteresis NC (Hnc) Window NO (Fno), Window NC (Fnc) Device ready	ou2	

Parameterization of switching points

The switching points, delay times and output functions can be parameterized via Smartphone app (Android). The SMI Sensor Master Interface required for the parameterization as well as the Smartphone are not part of the delivery. The Android App is available for free in the Google Play Store.

- Ordering No. SMI Sensor Master Interface: F90170
- Data sheet SMI Sensor Master Interface: H72618

Specifications		
Electrical Data	Output / supply voltage	4 ... 20 mA: 24 (9...32) VDC 1 or 2 PNP transistors: 24 (9...32) VDC
	Switch-on-delay pressure transmitters	100 ms
	Switch-on-delay pressure switches	50 ms + switching delay time
	Inverse-polarity protection, short-circuit strength @ 25°C during 5 min.	4...20 mA: to U_s = 32 VDC 1 or 2 PNP transistors: to U_s = 32 VDC
Environmental conditions	Media temperature	–40°C ... +125°C
	Ambient temperature	–40°C ... +125°C (Cable Radox Tenuis 88: -40°C ... +120°C)
	Protection [1]	IP65, IP67, IP68
	Humidity	Max. 95 % relative
	Vibration	15 g RMS (20...2000 Hz) (EN60068-2-64) 25 g sin (80...2000 Hz), 1 oct./min, (1x @ 25°C) (EN60068-2-6)
	Shock	50 g / 11 ms 100 g / 6 ms Male electrical plug M12x1 (EN60068-2-27) [3]
EMC Protection	Emission	EN/IEC 61000-6-3 EN50121-3-2
	Immunity	EN/IEC 61000-6-2 EN50121-3-2 [2]
Mechanical Data	Sensor (wetted parts)	1.4542 (AISI630)
	Pressure connection (wetted parts)	1.4542 (AISI630)
	Housing	1.4301 (AISI304)
	Sealing	FPM/EPDM/NBR
	Male electrical plug	See ordering information
	Weight	appr. 50 g
	Mounting torque	25 Nm

[1] See electrical connection

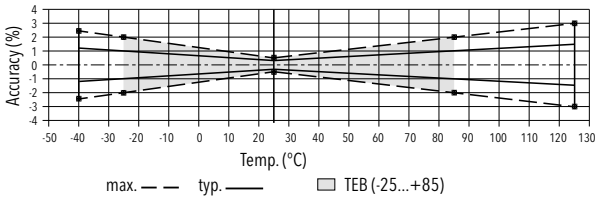
[2] Surge voltage on shield, shield connected on both sides

[3] For electrical connections 32 and 35

Analogue output			
Accuracy	TEB @ -25 ... +85°C	[% FS typ.]	± 1.0
	Accuracy @ +25°C	[% FS typ.]	± 0.3
	NLH @ +25°C (BSL)	[% FS typ.]	± 0.2
	TC zero point and span	[% FS/K typ.]	± 0.01
	Long term stability 1 year	[% FS typ.]	± 0.1
Rise time	Typ. 1 ms / 10 ... 90 % nominal pressure		

Switching output			
Accuracy	TEB @ -25 ... +85°C	[% FS typ.]	± 1.0
	Accuracy @ +25°C	[% FS typ.]	± 0.3
	Long term stability 1 year	[% FS typ.]	± 0.1
Adjustment range of switchpoints	1 ... 99 % FS		
Distance switch point Switch point > reset point	≥ 1.0 % FS Switchpoint > reset point		
Switching resistance	≤ 3 Ω		
Output function	Hysteresis, Window; normally closed (NO), normally open (NC)		
Switching current	-40°C ... +85°C +85°C ... +125°C	(Ambient and media temperature) (Ambient and media temperature)	≤ 400 mA, total of both switching outputs ≤ 200 mA, total of both switching outputs
Current limiting	integrated		
Delay time	0; approx.2^x[ms], x = 3, 4 ... 16		
Switching frequency	max. 60 Hz (at switching delay time = 0)		

Measuring accuracy

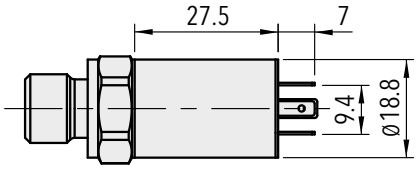


Additional specifications railways			
Environmental conditions	Cold	EN 60068-2-1	Ab: -40°C, 2 h (not in operation) Ae: -40°C, 1 h (in operation)
	Dry heat	EN 60068-2-2	Be: 85°C, 6 h (in operation)
	Damp heat, cyclic	EN 60068-2-30	Db: 55°C, variant 1, 2 cycles (2 x 24 h)
	Ambient temperature	EN 50155	Class TX
	Vibration and shock	EN 61373	Vibration: category 3 [1)] Shock: category 3 [1)]
	Dielectrical strength	EN 50155	710 VDC
	Resistance of insulation	EN 50155	>100 MΩ, 500 VDC
	Behavior in case of fire (electrical connections 01, 32, 35)	EN 45545-2	Weight: < 10 g Surface: < 0.2 m^2
Supply	Nominal voltage	EN 50155 [2)]	24 V
	Interruptions of the voltage supply	EN 50155 [2)]	Class S1
	Switching between two supply voltages	EN 50155 [2)]	Class C1

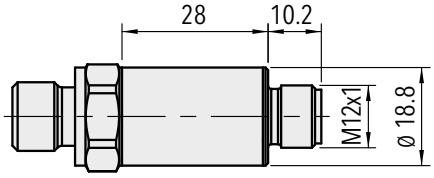
[1)] In Category 3 the 2010 versions' higher severity levels apply in each case

[2)] Chapter 5.1 Voltage supply

Dimensions



8258.XX.XXXX.**01**.XX.XX



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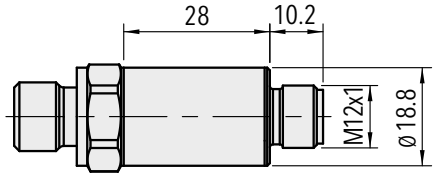

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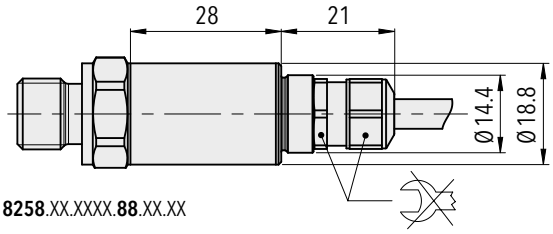

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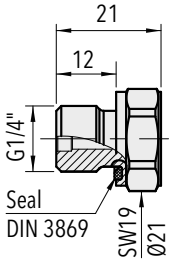

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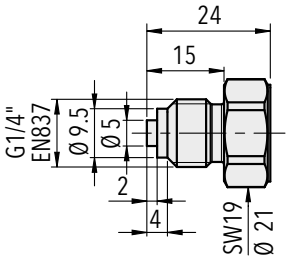

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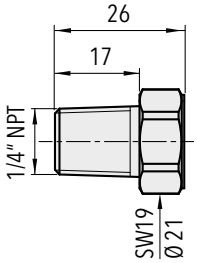

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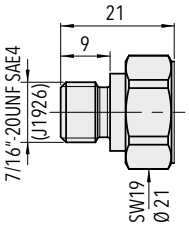

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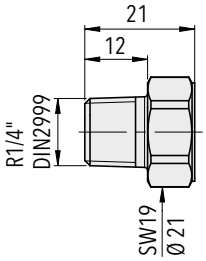

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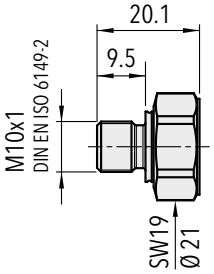
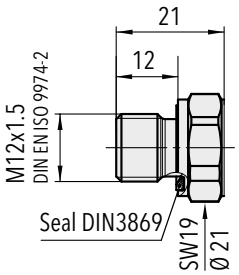
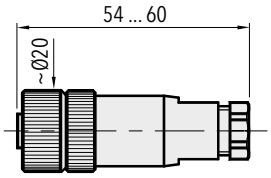


8258.XX.XX**32**.XX.XX.XX



8258.XX.XX**49**.XX.XX.XX



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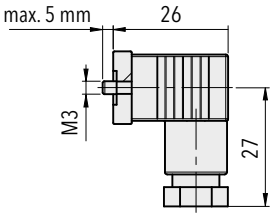
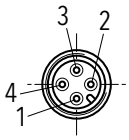
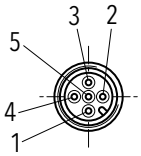
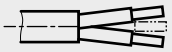
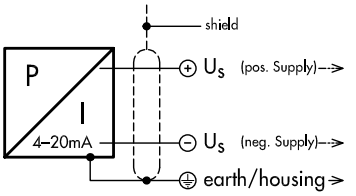
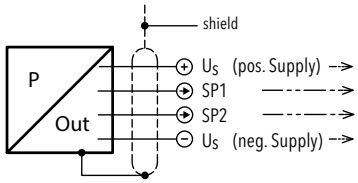


8258.XX.XXXX.XX.XX.**34**

Electrical connection

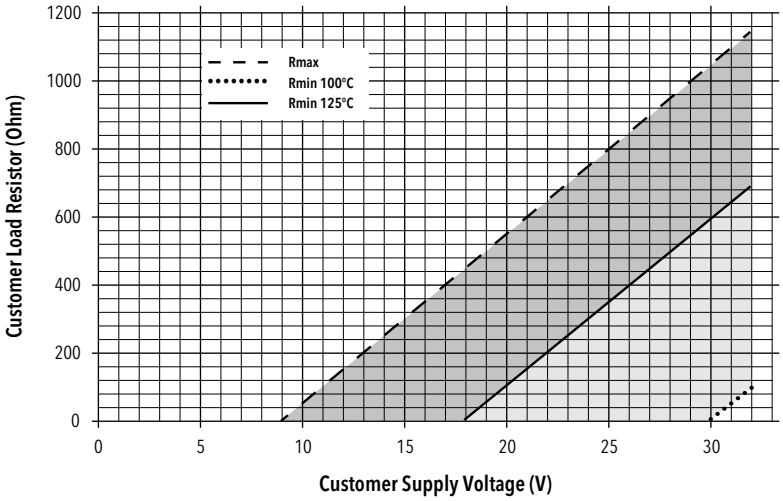
		Protection / electrical connection						
		IP65 [1)2)]			IP67 [1)2)]			IP67, IP68 [2)3)]
		Industrial standard Contact distance 9.4 mm			M12x1 4-pole		M12x1 5-pole	Cable
		01			**32**		**35**	**88**
								
Output signal	 **8258**.xx.xxxx.xx.**19**		**90**	**92**		**E1**		
	U_S (pos. Supply)	2	2	1	1	1	4	brown
	U_S (neg. Supply)	1	4	2	3	2	1	black
	earth/housing	4	3	4	4	4	5	yellow / green
	 **8258**.xx.xxxx.xx.**PS/T1**				**PS**	**T1**		
	U_S (pos. Supply)				1	1		
	SP1				4	4		
	SP2				2	-		
	U_S (neg. Supply)				3	3		

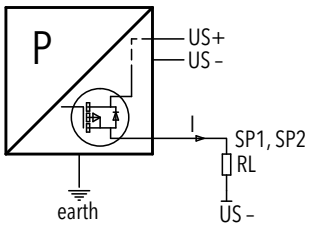
[1)] Provided female connector is mounted according to instructions

[2)] Ventilation via male electric plug/cable end

[3)] IP68, 20 bar, 30 min.

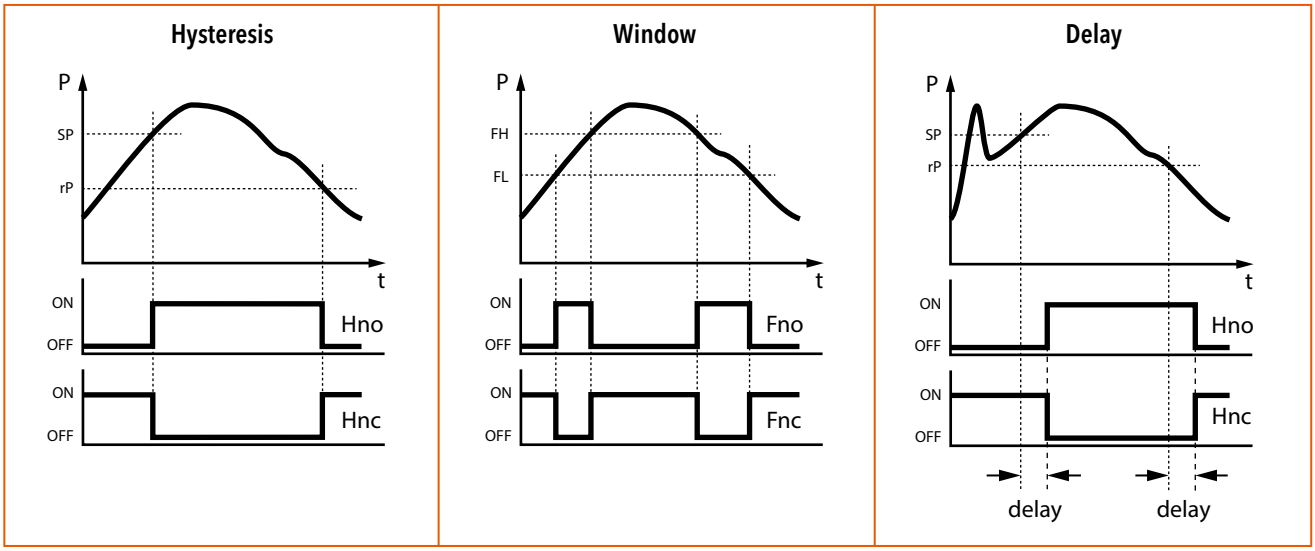
4...20mA: min./max resistor vs. supply voltage @ Pmax = 100%



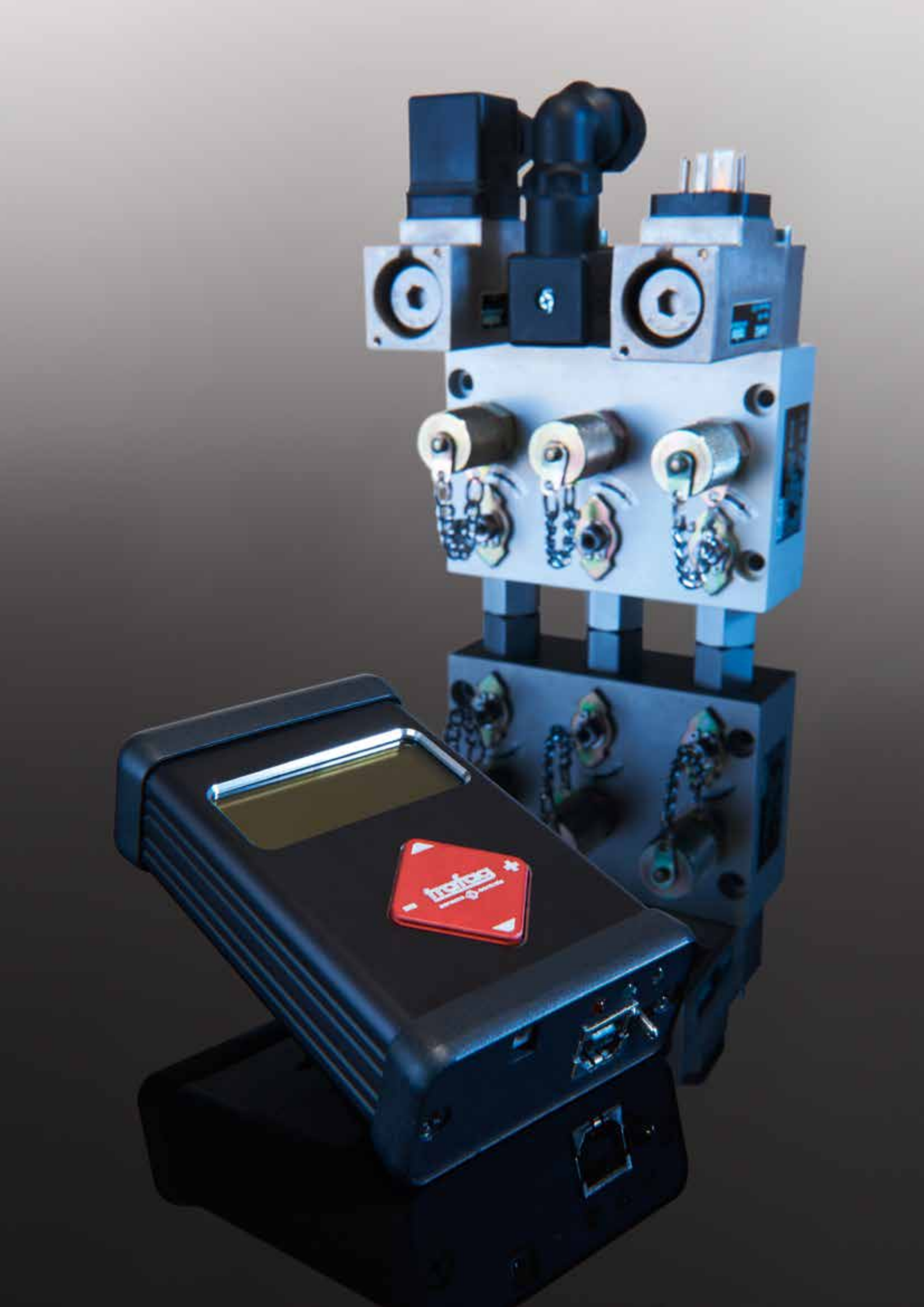


Connection of loads to switching output

Functions switching output



Additional information		
Documents	Data sheet	www.trafag.com/H72307
	Instructions	www.trafag.com/H73303
	Flyer	www.trafag.com/H70697

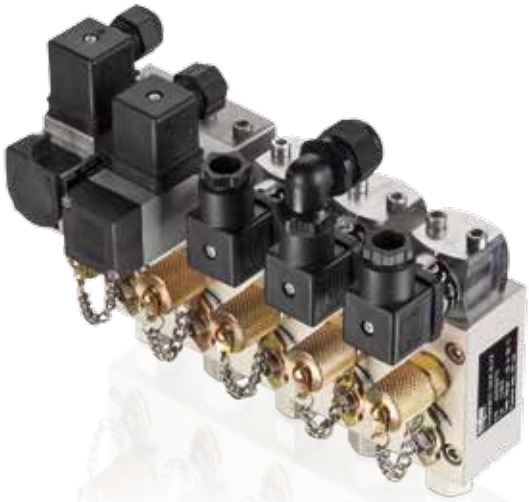


Accessories

Trafag offers a wide range of original accessories which are ideally matched to our products. They include devices for configuration and parameterization of electronic pressure switches such as the Sensor Master Interface SMI with Bluetooth to connect with the Android-App, or the Sensor Communicator SC, a handheld device which provides direct access to the calibration values in the Trafag ASIC. Beside hand pumps with precision pressure gauge for the monitoring and diagnostic purposes, Trafag also offers a wide range of accessories, which can be adapted to meet specific application requirements and also make installation easier. They include diagnostic valve manifolds, snubbers and pressure peak damping elements.

Accessories for electronic pressure switches

- SMI Sensor Master Interface
- SC Sensor Communicator
- DVB Diagnostic valve block
- Hand pump with precision manometer
- Pressure peak damping element
- Snubber
- Adapters for different pressure connections
- Stop valve



SMI

Sensor Master Interface

Swiss based Trafag is a leading international supplier of high quality sensors and monitoring instruments for measurement of pressure and temperature. The Sensor Master Interface SMI is used to set parameters of electronic pressure switches such as switching points, output function and switching delay time as well as to adjust the measuring range of submersible pressure transmitters. By reading the device data, the connected pressure measurement device can be precisely identified and the parameters can be checked.

Applications

- Supports device types NAT 8252, NAH 8254, NAR 8258, ECL 8439

Features

- Read out of sensor data
- Parameterization of switching points on NAx pressure switches
- Measuring range adjustment on submersible pressure transmitter ECL
- Fast and easy operation via Android App "Sensor Master Communicator SMC"
- Reset pressure measurement instruments to factory settings

Technical Data			
Ambient temperature	0°C ... +40°C	Dimensions	LxWxH: 120x76x27 mm
Supply voltage	5 VDC, ±0.25, 1 A (Supply via USB interface)	Communication SMC/SMI	via Bluetooth LE
Protection	IP20	Operation Interface	via Android App "Sensor Master Communicator SMC"
Storage temperature	-10°C ... +50°C		

SMI

Ordering information		
	Ordering no.	
SMI Packet containing:	**F90170**	
SMI		
USB Bluetooth Dongle (Trafag)	F90172	(Spare part)
Device connector SMI (5-pole, push-in)	F90171	(Spare part)
Cable USB 2.0 A male, Micro-B 1.0 m	F90173	(Spare part)
Accessories		
Cable PVC, M12x1 connector	F90174	
Device connector SMI with housing (5-pole)	F90175	
Case for SMI and accessories (325x248x50 mm)	H30782	

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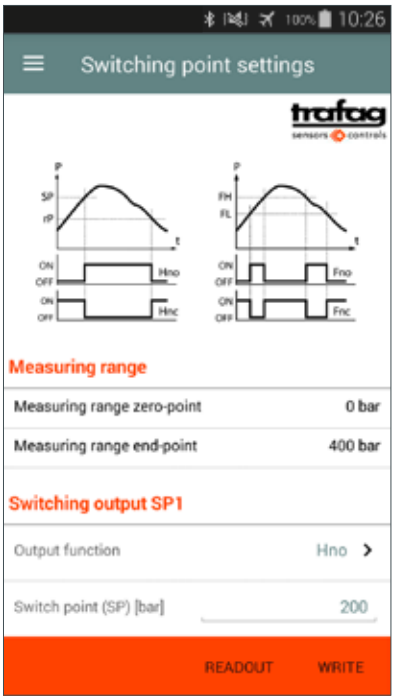
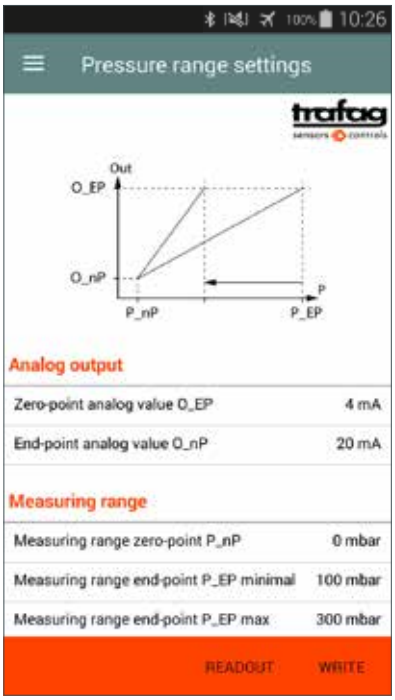
Reading out of device data

Parameterization of switching points on NAx pressure switches



Measuring range adjustment on submersible pressure transmitter ECL



Erweiterte Informationen		
Dokumente	Datenblatt	www.trafag.com/H72618
	Betriebsanleitung	www.trafag.com/H73618
	Flyer	www.trafag.com/H70602

trafag sensors controls

SC

Sensor Communicator

Features

- Read out of sensor data
- Adjustment of set point or zero point and span
- Real time pressure measuring
- Software update and battery charge with USB-interface

Technical Data

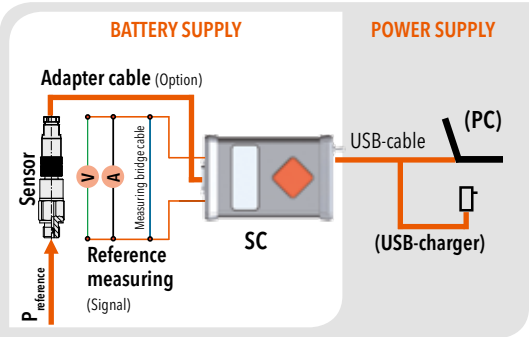
- Identification of device data: Model, signal output, type plate, manufacturing date
- Setting of switchpoint (8320 EPN-S)
- CANopen: Setting of Node-ID and baudrate
- Reset to factory settings

Instruction www.trafag.com/H73699 (english)
H73698 (german)

Compatible devices and adapter cables

		Output signal		
Model	**Connector**	4 ... 20 mA	0 ... 10 VDC 0 ... 5 VDC 1 ... 6 VDC	0.5 ... 4.5 VDC ratiometric
NAT (8251) NAH (8253) NAE (8255) NSL (8257)	**Industrial standard** 82XX.XXXX.**01**.XX..	**SC01A**	**SC01V**	**SC01R**
	M12, 4-pole 82XX.XXXX.**32**.XX..	**SC32A**	**SC32V**	**SC32R**
	M12, 5-pole 82XX.XXXX.**35**.XX..	**SC35A**	**SC35V**	**SC35R**
		Output signal		
Model	**Connector**	4 ... 20 mA	CANopen	Switching output
CMP (8270)	**M12, 5-pole** 82XX.XXXX.**35**.XX..		**SC35CAN**	
EPN-S (8320)	**DIN43650** 8320.XXXX.**40**.XX..			**SC04SW**
EPR (8293) EPN (8298) NPN (8264)	**DIN43650** 82XX.XXXX.**04**.XX..	**SC04A**		
	DIN43650 (invers) 82XX.XXXX.**04**.XX.**92**..	**SC04A92**		

Connection scheme

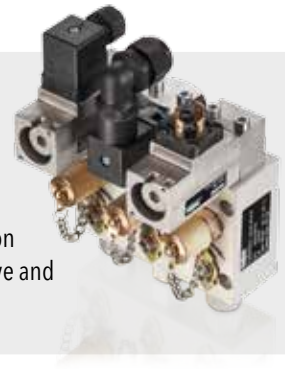


Content of delivery:

- 1 pce SC incl. batteries
- 1 pce USB-cable
- 1 pce Measuring bridge cable
- Option: Adapter cable (see table)

DVB

Diagnostic Valve Block



Features

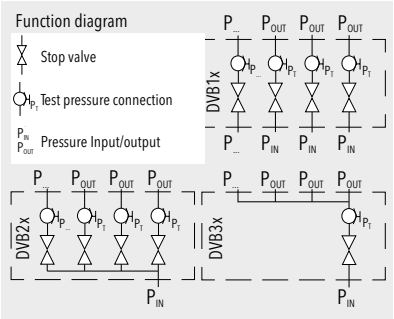
- Function tests during operation (no interruption necessary) with stop valve and test connection

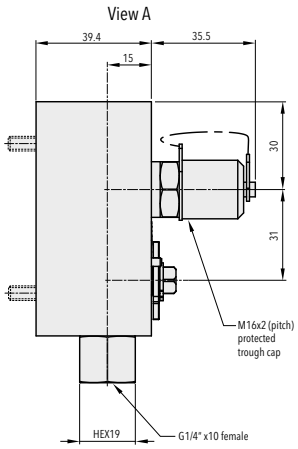
Technical Data	
Pressure	-0.8 ... 100 bar
Ambient temperature	-20°C ... +120°C

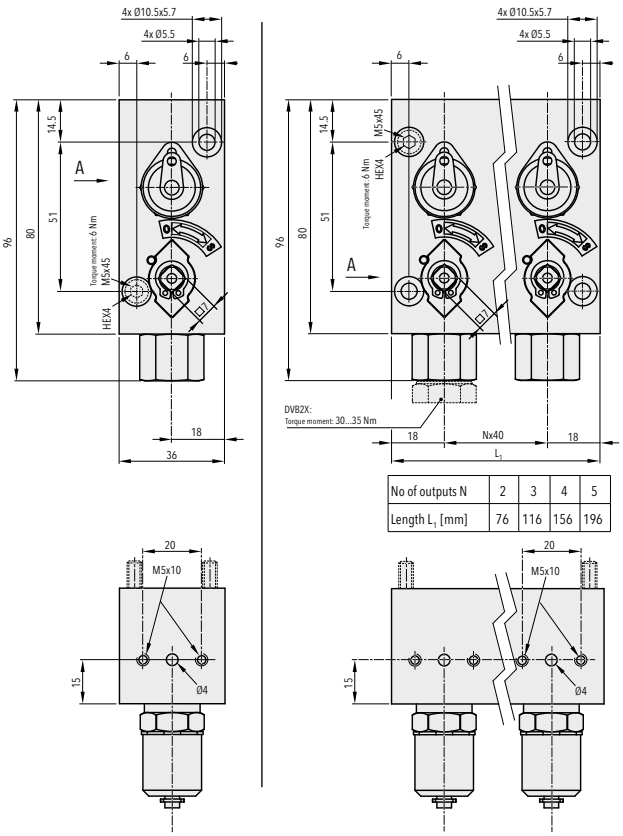
Data sheet www.trafag.com/H72361
Instruction www.trafag.com/H73361

Standard products (extra short lead time)

Product No		Material	Product No		Material
DVB11	1 P-in, 1 test connection, 1 P-out	Al, PEEK, FPM	DVB24	1 P-in, 4 test connection, 4 P-out	Al, PEEK, FPM
DVB12	2 P-in, 2 test connection, 2 P-out	Al, PEEK, FPM	DVB25	1 P-in, 5 test connection, 5 P-out	Al, PEEK, FPM
DVB13	3 P-in, 3 test connection, 3 P-out	Al, PEEK, FPM	DVB32	1 P-in, 1 test connection, 2 P-out	Al, PEEK, FPM
DVB14	4 P-in, 4 test connection, 4 P-out	Al, PEEK, FPM	DVB33	1 P-in, 1 test connection, 3 P-out	Al, PEEK, FPM
DVB15	5 P-in, 5 test connection, 5 P-out	Al, PEEK, FPM	DVB34	1 P-in, 1 test connection, 4 P-out	Al, PEEK, FPM
DVB22	1 P-in, 2 test connection, 2 P-out	Al, PEEK, FPM	DVB35	1 P-in, 1 test connection, 5 P-out	Al, PEEK, FPM
DVB23	1 P-in, 3 test connection, 3 P-out	Al, PEEK, FPM			







THP...

Hand pump

Features

- For testing of pressure transmitters and pressure switches

Technical Data	
Connection	G1/4" female

Standard products (extra short lead time)		
Product No	**Range [bar]**	
THP30	-0.85 ... +25	
THP700	0 ... 700	Resolution 0.2 bar

V6/V7

Stop valve

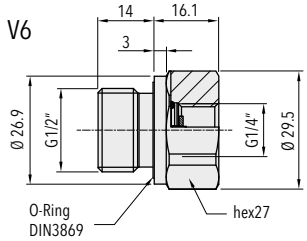
Features

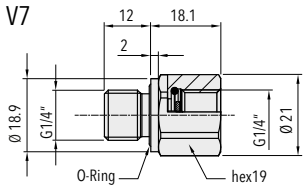
- Allows replacement of instruments without interruption of process (max. 40 bar)

Technical Data	
Material	1.4305 / FKM
Pressure	max. 600 bar
Media temperature	-25°C ... +125 °C

i Data sheet www.trafag.com/H72258

Standard products (extra short lead time)		
Product No		**Connection**
V6	For water, air, light-crude, heavy oil	G1/2" male - G1/4" female
V7	For water, air, light-crude, heavy oil	G1/4" male - G1/4" female





A../D..

Adapters with manometer pressure ports

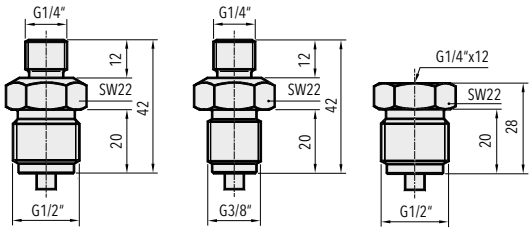
Features

- Pressure adapters with different thread combinations and materials for individual applications

Technical Data	
Material	1.4435 (AISI316L) / Brass
Connection	G1/4"m - G1/2"m, G1/4"m - G3/8"m, G1/4"f - G1/2"m

Data sheet www.trafag.com/H72258

Standard products (extra short lead time)		
Product No		**Material**
A1	G1/4" male - G3/8" male manometer	Brass
A2	G1/4" male - G1/2" male manometer	Brass
D1	G1/4" male - G3/8" male manometer	1.4435 (AISI316L)
D2	G1/4" male - G1/2" male manometer	1.4435 (AISI316L)
D4	G1/4" female - G1/2" male manometer	1.4435 (AISI316L)



A2/D2 A1/D1 D4

K.../F...

Snubber

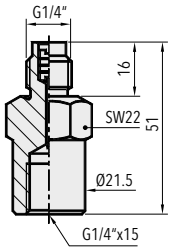
Features

- Integrated in an adapter
- K1/K2: Pressure peak damping element integrated in an adapter

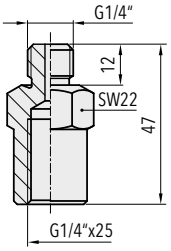
Technical Data	
Material	1.4435/316L, brass
Connection	G1/4" male - female, G1/8" male - female

Data sheet www.trafag.com/H72258

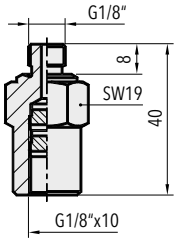
Standard products (extra short lead time)			
Product No		**Connection**	**Material**
F3	Snubber for heavy oil	G1/4" male - female	Brass
F4	Snubber for light oil	G1/4" male - female	Brass
F5	Snubber for water/air	G1/4" male - female	Brass
K1	Snubber for water/air/light oil	G1/4" male - female	1.4435 (AISI316L)
K2	Snubber for water/air/light oil	G1/8" male - female	1.4435 (AISI316L)
K3	Snubber for heavy oil	G1/4" male - female	1.4435 (AISI316L)
K4	Snubber for light oil	G1/4" male - female	1.4435 (AISI316L)
K5	Snubber for water/air	G1/4" male - female	1.4435 (AISI316L)



K3/K4/K5
F3/F4/F5



K1



K2

DAMP...

Pressure peak damping element

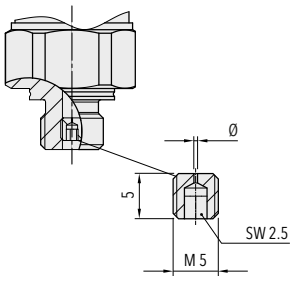
Features

- Retrofit kit with integrated M5 male thread
- Hole diameter 0.4 mm, 1.0 mm
- Set of 5 pcs.

Technical Data	
Material	1.4305 (AISI303)

Data sheet www.trafag.com/H72258

Standard products (extra short lead time)		
Product No		**Material**
DAMP1.0	With 1.0 mm hole, for heavy oil	1.4305 (AISI303)
DAMP0.4	With 0.4 mm hole, for water and light oil	1.4305 (AISI303)



Terminology for pressure measurement instruments

Relevant standards
DIN 16086, IEC 61298-2

Instrument types

Pressure sensors
Membranes with elements applied whose physical properties change when the membranes deform (strain gauges with changing resistance, for example).

Pressure transmitters
Transmitters for converting the pressure to be measured into a defined or standardised analogue and/or digital output signal.

Pressure transducers
Pressure sensors that have a process connection and electrical connection (e.g. connector) but do not convert pressure into a standardised electrical signal like a pressure transmitter.

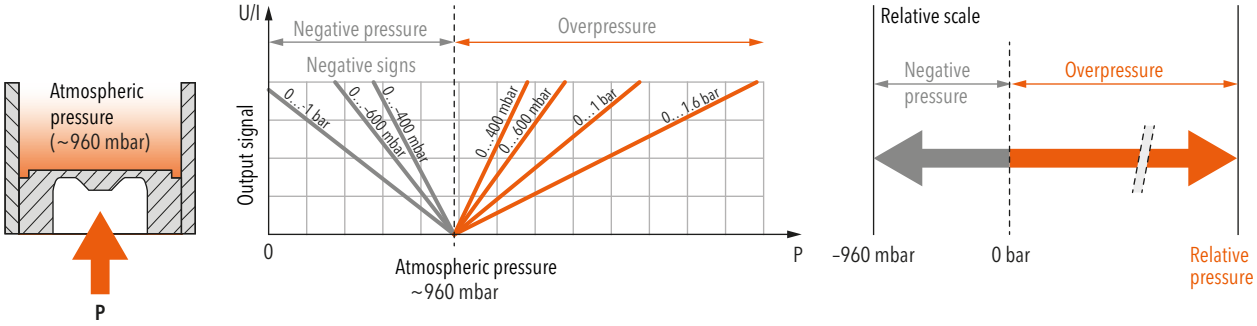
Types of pressure measurement

Differential pressure measurement
The measurement of differential pressure of two different pressures. The measuring instrument has two pressure connections.

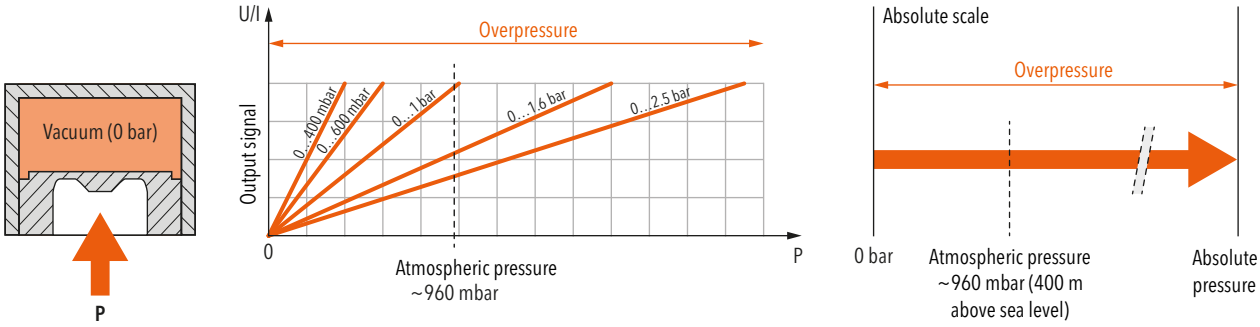
Absolute pressure measurement
The measuring result is always the deviation to the absolute zero (vacuum).
e.g. 4 mA = 0 bar (= vacuum); zero point (ZP): 0 bar

Relative pressure measurement DIN 16086: overpressure
The measuring result is always the deviation to the current, absolute atmospheric pressure.
e.g. 4 mA = 960 mbar (= atmospheric pressure); zero point (ZP): 0 bar

Relative pressure measurement



Absolute pressure measurement



Terminology for pressure measurement instruments

Main features

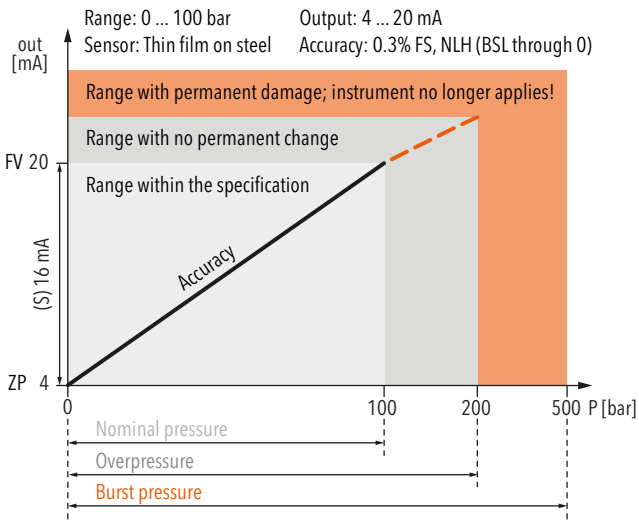
Nominal pressure measuring range
Range between the upper and lower limits of the size measured (operating pressure). The specified accuracy remains within this range.

Measuring span
Algebraic difference between the upper and lower limit values of a certain measuring range.

Overpressure Max. working pressure
Highest pressure specified by manufacturer for which the pressure transformer is designed at maximum temperature. The pressure transformer can be loaded up to this pressure without the guaranteed metrological properties having changed after going back into the measuring range. However, there is no longer a clear link between pressure and output signal in the range between nominal pressure and overpressure.

Burst pressure
Pressure value (static) at which the measuring instrument suffers permanent damage. The instrument can withstand pressures up to this value without bursting and will not leak any measuring medium.

Example



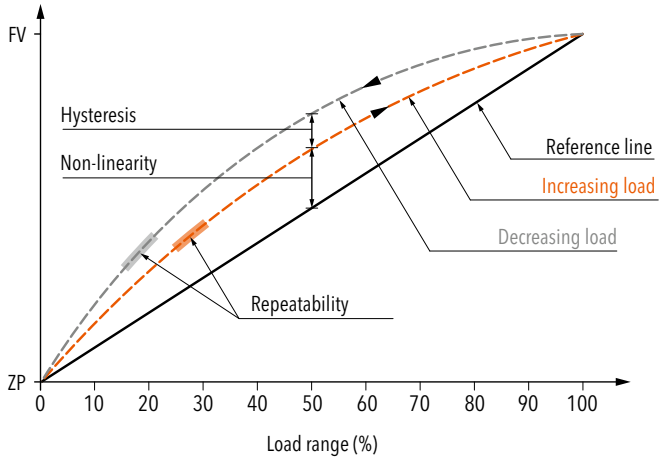
Accuracy

Typ. accuracy
(Typical) Mostly corresponds to the 1-sigma value of the normal distribution, i.e. approx. 68.3%. Generally, well over 75% of all Trafag instruments meet this typical measured value.

Max. accuracy
(maximum) 100% of all instruments meet this maximum measured value.

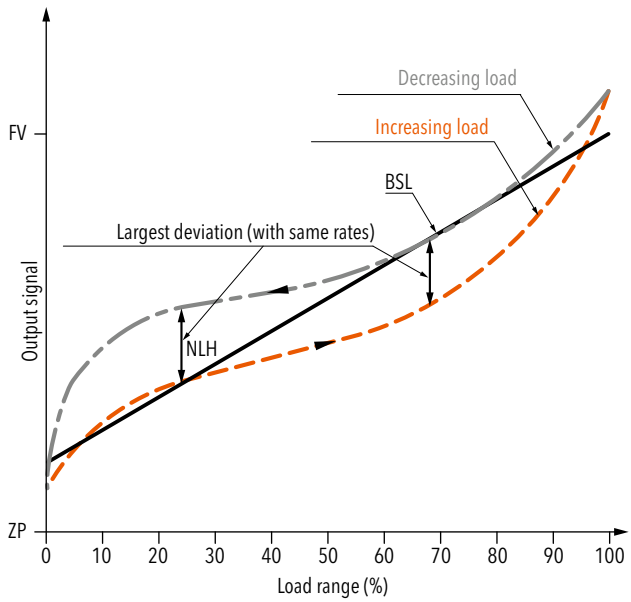
Non-linearity
The largest deviation from the effective characteristic line of an ideal reference line. The reference line can be defined as a limit point adjustment, a BSL or a BSL through 0.

Specifications: Non-linearity, Hysteresis



BSL Best Straight Line
The reference line according to the BSL or the minimum value adjustment is placed in such a way that the maximum positive and negative deviations are as small as possible.

Specifications: Accuracy NLH (BSL)

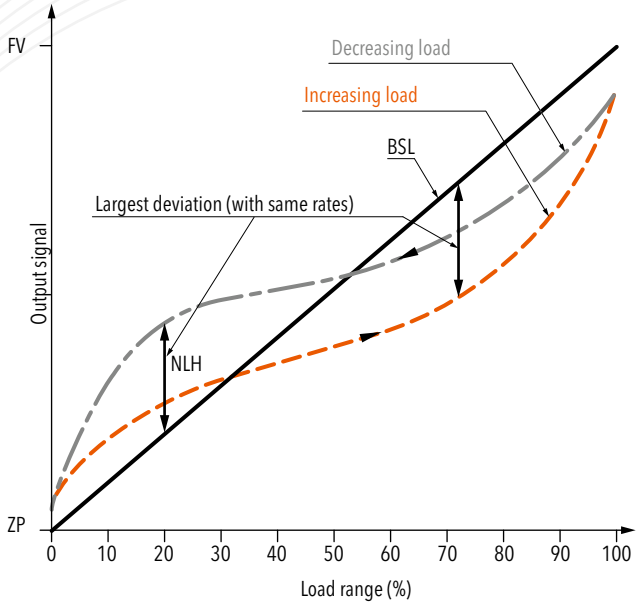


trafag sensors controls

Terminology for pressure measurement instruments

BSL through zero
As an additional requirement for the minimum value adjustment, the BSL through zero (also BSL/0) must go straight through zero or the origin.

Specifications: Accuracy NLH (BSL through zero)



Non-linearity according to limit point adjustment
The reference line runs through the origin and end point of the characteristic line. Non-linearity indicates the greatest deviations from this line.

Hysteresis
Property of an instrument for yielding different output values in relation to its input values, which are dependent on the effective direction in which the input values are created (acc. to IEC 61298-2).

Pressure hysteresis
The difference that occurs at the same pressure between measurements in the direction of increasing and then decreasing pressure.

Temperature hysteresis
Maximum change of the zero point and output span for the pressure signal after specified temperature cycle over the operating temperature range.

NLH non-linearity and hysteresis
Largest deviation from the ideal characteristic line (BSL, BSL/0 or limit point). In pressure measuring instruments, the non-linearity and pressure hysteresis are given together at a constant temperature.

Accuracy DIN 16086: Measurement deviation
The accuracy denoted in the standard DIN 16086 with measurement deviation (at 25°C reference temperature) includes all deviations as a result of non-linearity, hysteresis, non-repeatability, zero point (start of measuring range) errors and span (end of measuring range) errors. Zero point errors and span errors also include the measuring uncertainty of the configuration ensemble.

Repeatability DIN 16086: Non-repeatability
Deviation of the output signals with same input signals under identical (established) application conditions.

Temperature coefficient TC
Change of measured value for zero point and span as a result of changes in temperature.

Long-term stability Long-term drift
The change of accuracy due to aging under certain reference conditions during a certain period of time, typically 1 year.

TEB Total error band
Total error (root from sum of the square of the deviations) due to measurement deviations (accuracy) and temperature influence (temperature coefficient TC). The temperature influence is usually given in the information from Trafag across a range larger than that given in the standard (-10 ... +60 °C). Whilst DIN 16086 also continues to add to the long-term stability over a year, the information from Trafag is subject to ex-works conditions for obvious reasons.

Scale accuracy
For pressostats: Deviation arising from the manual switch point adjustment with the help of the display (scale).

Electrical Data

Output signal
Electrical signal that emits the value of the measurement size for further processing

Rise time Step response
The time it takes for an output signal after a severe pressure change to increase from 10% to 90% of its final value that results from the change in pressure.

Zero point ZP
Output signal in the pressureless state (P_{min}), e.g. 4 mA at 0 bar (P_{min}).

Terminology for pressure measurement instruments

Final value FV
Output value of the largest pressure value in the nominal pressure range (P_{max}), e.g. 20 mA at 100 bar (P_{max}).

Span S
Final value (FV) – zero point (ZP) = span (S)
e.g. span (S) = (FV) 20 mA - (ZP) 4 mA = 16 mA

Switching differential Pressostats
Range within which the micro-switch in pressostats switches on and off
Example:
X...X = adjustable value
X - X = non-adjustable value; runs proportional to the nominal pressure
X = fixed value

Limiter Pressostats
Pressostat with manual micro-switch reset.

Environmental conditions

Media temperature
Permissible temperature range of the measuring media.

Operating temperature Ambient temperature
Temperature range in which the measuring instrument adheres to its specifications. As the electronics in certain instruments are more sensitive to temperature than the sensor element, the maximum ambient temperature for the instrument is lower than the permissible media temperature.

Storage temperature
Temperature range in which the measuring instrument can be stored or transported without permanently changing the measuring characteristics.

Protection
Humidity and dust shield according to IP classes in accordance with EN 60529.

EMC Protection

EMC Electromagnetic compatibility
Instrument property for functioning in an environment with electromagnetic interference and for not unduly influencing this environment (to which other equipment also belongs).

Immission
Immunity to external electromagnetic disturbances.

Emission
Interference emission from electromagnetic disturbances.

Surge
Immunity to unipolar surge voltages that can occur due to surges as a result of switching operation and lighting.

Burst
Immunity to recurring, rapid, transient electrical disturbances.

Fluid resistance guide

CODES: S - SATISFACTORY F - FAIR U - UNSATISFACTORY T - TEST FOR SPECIFIC APPLICATION

RESILIENT MATERIALS												PLASTICS													METALS								
BUNA 'N' (NBR)	ETHYLENE PROPYLENE (EPDM)	HYPALON	NEOPRENE (CR)	URETHANE	SILICONE	VITON (FKM/FPM)	BUTYL	FLUOROSILICONE	HYTREL	CELCON	DELRIN	LEXAN	NYLON	POLYSULFONE	PVC	TEFLON	POLYPROPYLENE	POLYETHYLENE	POLYPHENYLENE SULFIDE	POLYCARBONATE	ULTEM	ST. ST. DIN 1.4435/1.4404	STEEL	ST. ST. AISI430	ST. ST. DIN 1.4301/1.4305/1.4542	SILVER	49 - NICKEL-IRON	MONEL	LEAD	IRON	INCONEL	COPPER	BRONZE	BRASS	ALUMINUM	
U	S	T	U	U	U	U	F	U	F	S	T	U	U	U	U	S	U	U	S	U		S	U	F	F	S		S	S	S	T	U	U	U	S	Acetaldehyde
S	S		F	U	F	F	F	F					S	U		S	S	S	S	U		S	U	S	S	S		U	S	F		U	U	U	U	Acetamide
U	S		U	U	U	U	T	U	U	S					U	S								S	S			S		S	S	S	S	F	F	Acetate, Amyl
T	S		T	U	T	T	T	U	U	T	T	S	S	S	T	S	F	T	S	S	S	S	U	F	S	F		F		U	U	U	U	U	F	Acetic acid, 10%
T	F		F	U	S	U	F	U	U	U	U	S	U	T	U	S	F	T	S	T	T	F	U	F	F	S	U	S	F	U	U	U	U	U	S	Acetic acid, Glacial
U	F	T	T	U	U	U	F	U	U	F	U		U	U	U	S	T	U	S	U		T	U	U	T	S		S	U	T	S	U	U	U	S	Acetic anhydride
U	S	U	U	U	U	U	F	U	U	F	F	U	S	U	U	S	S	T	S	U	U	S	S	F	F	S		S	F	S	S	S	S	S	F	Acetone
S	S	T	F		U	S	T	U	T		S	T	S	U	S	S	U	F	S	U		S	S	S	S	U		S	U	S		U	U	T	S	Acetylene gas
U	U		U		U	S	U						U			S						U	U	U	U			U	U	U					F	Acetylene tetra-chloride
U		S	U			S																S	T	T	T	T									S	Acrylic acid
U	S	S	F	U	U	S	F	T	T		S		S	S	S	S		T	S					F	S	S		S				S	S	F		Alcohol amyl
F	S	S	F	T	F	F	F	T	T	S	S		S		S	S		T			S		S	F	F	S		F	F	F	S	F	F	F	T	Alcohol ethyl (Ethanol)
S	S	S	F	U	S	U	F	S	T	S	S		S	U	S	S	S	S			S	S	S	F	S	S		S	F	S	S	S	S	S	T	Alcohol methyl (Methanol)
U	U	U	U	U	U	S	U	T					S			S								S	S							S		S		Alkazine
S			S	S	S								S			S											S				S	S	S	S	Alumina
S	S	S	S	S	S	S	F	T	F	F	S	S	S	S	S	S	S	S	S	T		U	U	U	U	F		F	U	U	S	T	T	U	U	Aluminum chloride
S	S	S	S	S	S	S	F	T		U	U		S	S	S	S	S	F	S			U	T	U	U	F		F	F	T		T	F		S	Aluminum uoride
S	S	S	S	S	S	S	T	T		F			S	T	S	S	S	S		U		F	F	F	F	S		F		F		F	F	F	F	Aluminum hydroxide
S	S		S	S	T	S	F						S		S	S	S	F		T		F	U	U	T	F		T	F	U		T	T	T	F	Aluminum potassium sulfate
F																S							U	T	T			F			F			U	F	Aluminum potassium 10%
F	F		F	S	T	F	F									S						T	U	U	U	T		U	F	U	U	T	T	U	U	Aluminum sodium sulfate
S	S	S	S	S	S	S	F	T	T	F	S	S	U	S	S	S	S	F	S	S		T	U	U	T	F		T	F	U	T	T	T	T	U	Aluminum sulfate (Alum)
F	T	U	S	U	U	U	F	U	U	U	U		S	F	T	S	F	T	S	U		S	S	S	S	T	S	U	F	S	S	T	U	U	F	Ammonia
S	F		S	S	S				F	T	T	S	S	S	S		F					F	F	F	F	F		S	F	F	F	U	U	U	F	Ammonium bicarbonate
S	T		T			U	T			F			T		S	S	F	F				F	U	U	U	F		F		U		U	U	U	U	Ammonium bromide
U	S		S		U	S	F			S	S		T	S	S	S	S	F	S			T	F	F	F	S		F		F	T	U	U	U	F	Ammonium carbonate
S	S		S	S	U	S	F	U	F	F	S	S	S	S	S	S	S	T	S	S		U	U	U	U	F		U	T	U	S	U	U	U	U	Ammonium chloride
T	S	S	S	U	S	F	T	T	U	S	U	U	S	S	S	S	S	S	S	U	T	S	U	S	S	U		U			S	U	U	U	F	Ammonium hydroxide
S			S			S							S			S	S						U		F										Ammonium monophosphate
S	S	S	S	T	U	F	S	U	F	F	S	S	S	S	S	S	S	S	S	U		S	T	F	S	S		U	U	F	S	U	U	U	T	Ammonium n trate
S		S	S	S	S	S	U						S			S							F	F	F			U		F	S	U	U	U	F	Ammonium nitrate hydroxide 25%
F	S			U	U	S	S									S	S	T				S	U	S	T	U	S	U			S	F	F	U	U	Ammonium persulfates 5%
S	S	S	S	S	S	S	F	U	F	F	F	S	S	S	S	S	S	S	S	S		T	S	F	S	F		F	F	T	S	U	F	U	T	Ammonium phosphate
S	S	S	S		S				F	F	U	U	S	S	S	S	S	S	S				T	U	T	S		F	F	T	F	U	U	U	U	Ammonium sulfate
S			S	S									S			S							U	U	T	F		U	F	U		U	U	U	U	Ammonium sulfite
S			S		T											S							T	S	S			S	S	S		F		T	F	Ammonium triphosphate
U	S	U	U	U	U	U	T	U	U	F	U	U	T	U	U	U	U	U	S	U		S	F	F	F	S		S			S	U	S	S	S	Amyl acetate
U	F	F	F	U	U	U	F	F	U	T	T	S	S	U	U	S						S		F	F	S		S	S	S		T	T	T	U	Aniline dyes
U	F	T	U	U	U	F	U	T								S	U	U	U	U		U	U	U	U	T		F			U	T	U	U	U	Aniline hydrochloride
F	F		F			S																														Animal fat
T			T										S		S	S							U	U	U			F			F			U	U	Antimony trichloride
S			S		S					S						S												S								Antioxidents
F	T		S		F	F			S	S			S				S					S	F	S	S	S	S	S	T	T	T	T	T	T	T	Argon gas
T	U		U		U	S				S			S		U	S							S	S	S	S	S	S	S	S		S	S	S		Aromatic hydrocarbons
S	S	S	S	T	S	S	F	S					S	S		S	S	F	S	T		F	T	F	T	U		U	F	U	U	T	T	T	U	Arsenuc acid
S	U		S		S	U	U									S						U	T		U	F		S				U			T	Arsenic trichloride
F	U	U	F	S	U	S	U	F	S	S	S	F	F		S	S	S	F				S	S	F	S			S		S	S	S	S	F	S	Asphalt
S	S	S	S	S	S	S	F	S	F	S	S	S	S	S	S	S	S	F	S	S		U	T	S	S	S		S			S	F	F	U	U	Barium chloride 5%
S	S	S	S	U	S	S	F	S	F				S	S		S	S	F	S	U		T	T	S	S	S		S			S	U	U	U	U	Barium hydroxide
F	F		S		T	S	T	S			S	S		S	S	S	S	F		U		F	T	S	S	S		T			F	U	U	U	F	Barium nitrate
U	S	S	S	S	S	S	F	S		S			U	S	S	S	S	F				F	U	F	S	U		S				U	U	U	U	Barium sulphide
S	S		F	U	S	S	S	S	F	S	S	S	S		S	S	S	S	S	S		S	S	F	S			S		S	S	S	F	F	S	Beer
S	S	S	S	S	S	S					S	S	S		S	S	F	F				S	S	F	S		S	S		S	S	S	S	F	S	Beet sugar liquid
U	U	U	U	U	T	F	U	F	U	F	T	U	S	U	U	S	U	U	S	U		F	S	S	S	S		F	F	S	S	S	S	S	S	Benzene benzol (Benzene)
U	S	U	U	U	U	U	F	U	F				T	U	U	S	U	U	S	U		T	F	F	F	U		F			F	T	T	T	T	Benzaldehyde
U	U	T	U	U	U	F	U	F	U	F	T		F	U	S	S	T	F	S	S		F	F	F	F	S		F	U	U	S	T	T	F	T	Benzoic acid
S	F	F	S	U	S	S	F	T	T				U		S	S	S					T	T	T	F			F	U	T		U	U	U	U	Black sulfate liquor
T	U	U	T	U	T	T	U	T	T		S	S	T		S	S							S		T			T	U	S		U				Blast furnace gas
S	S		S		S	S							S			S								U	T			U				F	F	U	U	Bleaching powder, wet
U	T		T		T	U				S		S		S	U	S						S	U	S	S			S			S				T	Blood
F	S	F	T	U	S	S				F	F	U	S	S	S	S	S	S					S	S	S	S		S		S	S	F	S	F	U	Borax
S	S	S	T	U	S	S	F	T	F	U	U		T		S	S	S	S	S	T		F	U	F	T	S	S	T	F	U	S	T	T	T	T	Boric acid
U	S		F	U	U	U	F	U		T											U			S	S	S						S	S	S		Brake fluid (non-petroleum)
S	S	S	S		S	S				S	S	S	S	S	S	S		T						U				S		F	S	F	F	U		Brine
U	U	U	U	U	U	F	U	T	U	U	U	U	U	U	U	S	U	U	U	U		U	U	U	U	S		T	T	U	F	T	T	T	U	Bromine, dry
U	U	U	U	U	U	F	U	T	U	U	U	U	U	U	U	S	U	U	U	U		U	U	U	U	F		U	U	U	U	U	U	U	U	Bromine, wet
S	S	T	T	S	U	S				S			S	U		S	U	U	S	U		S	S	S	S	T		S		S		S	S	S	T	Butadiene (gas)

Due to the numerous different application possibilities Trafag cannot accept any guarantee for the correctness of these recommendations. We therefore suggest that for a particular application you carry out tests to verify the fluid resistance.

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Fluid resistance guide

CODES: S - SATISFACTORY F - FAIR U - UNSATISFACTORY T - TEST FOR SPECIFIC APPLICATION

	RESILIENT MATERIALS															PLASTICS												METALS								
	BUNA N' (NBR)	ETHYLENE PROPYLENE (EPDM)	HYPALON	NEOPRENE (CR)	URETHANE	SILICONE	VITON (FKM/FPM)	BUTYL	FLUOROSILICONE	HYTREL	CELCON	DELRIN	LEXAN	NYLON	POLYSULFONE	PVC	TEFLON	POLYPROPYLENE	POLYETHYLENE	POLYPHENYLENE SULFIDE	POLYCARBONATE	ULTEM	ST. ST. DIN 1.4435/1.4404	STEEL	ST. ST. AISI430	ST. ST. DIN 1.4301/1.4305/1.4542	SILVER	49 NICKEL-IRON	MONEL	LEAD	IRON	INCONEL	COPPER	BRONZE	BRASS	ALUMINUM
Butane	F	U	F	F		T	S	U	S	F	S	S	U	S		T	S	U	U	S	U		S	S	S	S	S		S	S	S	T	S	S	S	S
Butanol	S	F	S	F	U	F	S	F	T	T				S	S		S					S	S	S	S	S	F		S				S	S	S	S
Buttermilk	S	S	S	F	S	T	S		T		S			S			S	S	S		S		S	U	S	F			S		U	S	U	U	U	S
Butyl acetate	U	T	U	U	U	U	U	U	U	U	F	F	U	S	U	U	S	U	U	S	U		S	S	F	F	S		F	F	F		F	F	F	S
Butyl alcohol	S	F	S	S	F	T	S				S			S			S	S	T					S		F			S		S		S	S	S	S
Butyl stearate	T	U	U	U		U	S	U	T	U							S						F	F	F		F						F	F	F	F
Butyric acid	U	F	U	U		S	F	T	T	T	U	U		U	U		S	T		S	U		F	T	U	U	S		T	U	U	S	T	T	U	T
Calcium acetate	F	S	U	F	U	U	U	F	U														T	T	F	T	F						F	F	F	U
Calcium bisulfite	S	U	S	S		S	F	U	T	U	U	U	U	U	S	S	S	S	S	S	U		T	U	U	F	F		U	F	U	U	T	F	U	U
Calcium carbide																	S	S						S		F			F		S		U			U
Calcium carbonate	S	S	S	S	U	S	S	T	T		S	S		S		S	S	S	S		U		F	F	F	S	S		F	U	F	T	F	S	F	S
Calcium chlorate	F	S		F			S	F			F	S		U		S	S	S	S				F	F	F	F	T		T		F	T	T	U	T	T
Calcium chloride	F	S	S	S	S	S	S	F	T	F	F	S	S	U	S	S	S	S	S	S	U		T	S	T	F	S	S	T	U	T	S	T	F	T	U
Calcium uoride																	S						T	T		F	S						F	F	U	T
Calcium hydroxide	S	T	S	T	U	S	S	T	T	T	S	S	S	S	S	S	S	S	S		U		F	F	F	F	S	S	F	U	F	S	F	F	U	U
Calcium hypochlorite	U	S	S	U	U	S	F	T	F	T	F	F		T	S	S	S	S	S	S	U		U	U	U	U	T		U	U	U	U	U	U	U	U
Calcium nitrate	S	S	S	S	U	F	S	T	T		S			T	S	S		S	S	S	T		T	T	F	T	F						F	F	F	T
Calcium sulfate	S	S	S	U	S	S	S	T			S			S	S	S	S	S		S	S		T	T	F	F	S		F	F	F		U	F	U	F
Calcium sulphide	S	S	S	S	S	F													U					F	F	F	U						U	U	U	T
Calgon	S	T	S	S	U	S	S	F	T		S	S		S			S						F	U	F	S			S		U			U		
Caliche liquid	S			S			S										S							S												
Cane sugar syrups	S	S	S	S	U	S					S	S	S		S	S	S	S							F	S			S				S	S	F	F
Carbolic acid (Phenol)	U	F	U	U		U	F				U			S			S							T	F	S	S		F	F	T		F	S	F	T
Carbon bisulfide	U	U	U	U	S		S				S	S	S	S	S	U	S	U						S	F	F	F		F	F	F	S	F	F	F	F
Carbon dioxide dry	S	T	T	T	S	U	T	T	T	F	S	S		U	S	S	S	S	S	S	T		S	S	S	S	S		S	S	S	S	S	S	S	S
Carbon disulfide	U	U	U	U	U	U	S	U	T	U	F	F	U	U	U	U	S	U	U	S	U		T	S	S	S	F		F			S	U	F	U	S
Carbon monoxide	F	S		T		S	S	T	F	F	S	T		T		S	S	S	S	S			S	S	F	S	F		S	S	S	S	S	S	S	S
Carbon tetrachloride	U	U	U	U	U	U	S	U	U	U	F	F	U	U	U	T	S	U	U	T	U	S	F	T	F	F	F		F	T	U	S	T	F	T	U
Carbonated water	S			S		S	S							S			S								S	S			S				T	F	F	F
Carbonic acid	T	S	S	S	T	S	S	F	T	U	S			F	S		S	S	S	S	F		S	U	F	F	F		S	U	U	S	T	T	F	F
Castor oil	S	F	S	S	F	S					S	S	S	S	S	S	S	S						S	T	S			S		S	S	S	S	S	S
Cellosolve (see Ethyle acetate)												S																								
Cellulube	U	S	U	U	U	T	T										S							S	S	S	S	S	S	S	S		F	S	S	F
China wood oil (Tung)	S	U	T	F	T	T	S					F	S	S		S	S							S	T	S			S		S		F	T	F	S
Chlordane	U	U		U	U	U	S	U	T	U													T	T		T	T						T		T	T
Chlorides, organic	F			S										U			S								S	S			T		U					U
Chloric acid	U										U	U					S	U	T	U			U	U	U	U	U		U			U			U	U
Chlorinated water	F	F			S		F							U			S	F							U	U									U	
Chlorinated solvents	U	U	U	U	U	U	S	U	T	U			U	U	U	T	S	U					T	F		F	T						T	S	T	U
Chlorine anhydrous liquid	U			U		F	S				U	U	U	U	U	T	S	T							F	U			S	F	U		T	T	U	
Chlorine, gas	U	U	U	U	U	U	F	U	T		U	U	U	U	U	U	S	U	U	U	U		T	T	U	U	F		T	F	T	T	T	T	U	U
Chlorine, dioxide	U	U	U	U	U	U	T	U	T		U						S	U					U	U		U	S						U	U	U	T
Chlorine trifluoride	U	U	U	U	U	U	U	U	U		U	U	U		U	U	F						T	S	T	T			S				T	T		T
Chloroacetic acid	U	F	T	U	U	U	S	T	U	U	U	U		S	U		S	S	U	S	U		T	U	U	U	U		F			F	U	F	U	U
Chlorobenzene	U	U	U	U	U	U	S	U	T	U	S	S	U	T	U	U	S	U	U	S	U		T	T	T	F	F		F		T	T	F	F	F	S
Chloroform	U	U	U	U	U	T	T	U	U	U	F	F	S	S	U	U	S	U	U	U	U	F	T	T	F	S	S		S	F	T	T	T	F	T	U
Chlorosulfonic, acid, diluted	U	U	U	U	U	U	U	U	U	U	U	U		U	U		S	U	U	U	U		U	U	U	T			F			F	U		U	F
Chlorothene (trichloroethane)	U			U	U		T	U	T														T	T	T	T	F						T	U	T	T
Chlorox	U	F	U	F		S	S					U		S		T	S							U	U	U			F		U		U	U	U	U
Choline chloride	F					S	T				U						S												S					U	U	
Chrome plating solution	U	F	U	U	U	F	F				U																									
Chromic acid	U	U	F	U	U	T	U	T	T	U	U	U		U	U	T	S	T	T	T	T		T	U	U	T	U		U	F	F	F	U	U	U	U
Chromium-potassium sulfate	S	S		F	T	T	S	F						S			S	S					T	U	U	F			T	F	U		T		T	U
Chromium sulfate (basic)														S			S							U	F	F			T	F	U		F		F	
Cider	S	S		S	U	S	S	U	T	T	S			T			S	S					S	U	S	S			S				S	S	U	F
Citric acid	S	S	S	S	S	S	S	S	T	F	S			S	T	S	S	S	F	S	T	T	T	U	T	T	T		T	U	U	F	U	U	U	T
Coal tar	T	U		U	U	U	T	U	T	U				U			S						S			S			S							S
Cocoanut oil	S	F	U	U	U	U	S	F	T		S			T			S	T					F	F	S	S			S		S			T		T
Cod liver oil	T	S	U	F	S	F	S	F	T		S			T			S	T			T			U			U		S		U		U	U	U	S
Coffee	S	T		S	U	S	S	T	T		S			S			S	T			T		S		S	S			S				S	S	S	S
Coke oven gas	T	U	U	T	U	T	F	U	T			S	T	T		S	S	T					T	S	S	S	S		S	U	S		T	T	U	S
Cooking oil		T					S				S														S	S							S		S	
Copper acetate	T	S	U	F	U	U	U	T	U								S						T	U	F	F	S		F		U		F	T	U	U
Copper ammonium acetate	U	S		U	U	U	U		U		S	S	U			U	S						T	S	S	S	U				S		U	U	U	U
Copper chloride	S	S	F	F	S	S	S	F	T	T	U	U	U	U	S	S	S	S	S	S	T		T	U	U	U			U	U	U	U	U	U	U	U
Copper cyanide (elect. pl. sol.)	S	S	S	S	S	S	S	T	T		S			T	S		F	S	S	S	U		T	S	S	S	S		F		S	U	U	U	U	U
Copper nitrate	S	S		S	T	S	S	F			S	S	S	S	S	S	S	S	S	S	U		F	U	F	F	F		U		U	U	U	U	U	U
Copper sulfate	S	S	S	S	S	S	S	F	T	F	S	S	S	F	S	S	S	S	S	S	T		F	U	F	F	F		T	F	U	U	U	U	U	U
Copper sulfate (elect. pl. sol.)	S	S	S	S	S	S					S	S	S	S	S	S	S		S					U	F	F			F	F	U		U			U

Fluid resistance guide

CODES: S - SATISFACTORY F - FAIR U - UNSATISFACTORY T - TEST FOR SPECIFIC APPLICATION

	RESILIENT MATERIALS												PLASTICS													METALS								
	BUNA 'N' (NBR)	ETHYLENE PROPYLENE (EPDM)	HYPALON (CR)	NEOPRENE	URETHANE	SILICONE	VITON (FKM/FPM)	BUTYL	FLUOROSILICONE	HYTREL	CELCON	DELRIN	LEXAN	NYLON	POLYSULFONE	PVC	TEFLON	POLYPROPYLENE	POLYETHYLENE	POLYPHENYLENE SULFIDE	POLYCARBONATE	ULTEM	ST. ST. DIN 1.4433/1.4404	STEEL	ST. ST. AISI430	ST. ST. DIN 1.4301/1.4305/1.4542	SILVER	49 - NICKEL-IRON	MONEL	LEAD	IRON	INCONEL	COPPER	BRONZE	BRASS	ALUMINUM	
	S	U	F	F	T	S	S	F	T	S	F	F		T	S	S	S	S			U		S	S		S	S		S	S	S		S	U	F	S	Corn oil
	S	T		S	T	S	T		T		S						S							S	F	S	S	F	T	S	S		S	S	F	F	Corn starch slurrys
	S	T	S	U	T	S	F	U	T	T	S	S		S	S	S	S	S	S	S				S	S	S			S	S	S	S	T	S	U	S	Cottonseed oil
	U	U	U	U	T	U	S	U	T	U	U	U		U	U	T	S	U	U	S	U		F	S	F	S			F	U	F	S	F	S	F	S	Creosote
	U	U	U	U	U	U	F	U		U	U	U		U			S	U	U		U		T	U	F	S	F		F	U	F		F	F	U	F	Cresylic acids (alkyl phenols)
	F					S																		U	U	U			U			U			U	U	Cupric chlorides 5%
	U	S	U	U	U	T	S	U	U	T	F	F	U	T	F	U	S	F	U	S	U		T	U		T	T		T			T	T	T	T	F	Dibutyl phthalate
	S	U		U	U	U	S	U	T	T	S			S	S		S	S	U	S	S		S	S	S	S	S	S	S	S	S	S	S	S	S	S	Diesel fuel
	U	U			U	U	S				S			S			S		U				S	S	S	S	S	S	S	S	S	S	S	S	S	F	Diesel oil, light
	U	U	U	U	S	U	U				F													F	F	F			F		F		F	F	F	F	Diethyl ether
	U	U		U	U	U	F	U	U	U	T	T		U			S	T	U		U		F	U	T	F	T		S			F	T		U		Dichlorethane
																	S						F	U		F			S	F	F		F	F	F	F	Difluoroethane(dow chem. # 200)
	F			S		S					S			S		S	S	S							S	S	S		S		U					S	Distilled water
	F	U		T	S	U	S	U	T	F	S			S			S						S	S	S	S	S	S	S	S	S	S	S	S	S	S	D.T.E. Lubricating oil
	U	U	U	U	U	U	S	U	S	T	S	T		U	U		S	U		S	T		S	S	S	S					U			T	T	T	Dowtherm A or E
	T			S	F					T	S	S	T	S		U	S						S	S	S	S	S	S	S		S	S	S	S	S	T	Enamel
	S	U		F	S	S	S	U	T					S			S						S	S	S	S	S	S	S	S	S	S	S	S	S	S	Esso # 90 line
	S	U	F	F	U	U	S	U	T		S	S	U	S		U	S	U					S	S	S	S	S		S		S		S	S	S	S	Ethane
	U	U	U	T	U	U	U				S			S		U	S	U						S	F	S	S		F	F	F	S	F	S	F	S	Ether
	U	T	U	U	U	U	U	T	U		F	F	U	S	U	U	S	S	U	S	U	U	S	S	F	S	S		F		T	T	F	S	F	T	Ethyl acetate
	U	U	U	U	U	U	F	U	F		F	F		S	U		S	U	U		U		F	T	F	F	S						F	F	F	T	Ethyl benzene
	S	F	F	F	F	F	U	T	U	T	S	S	U	S		T	S						F	T	F	F	S						F	F	F	F	Ethyl cellulose
	S	S	U	U	U	U	S	T	T	U	S	S	U	S	U	U	S	U	U	S	U		T	T	T	T	S		F		F	T	T	T	T	T	Ethyl chloride
	U	U	U	F			S				T													F	F	F	U						U	U	U	F	Ethyl metcaptan
	U	S		S	U	T	U	T	U		S			S			S	T					U	F					T				F	F	F		Ethyl sulfate
	S	U		U	T	U	S	T	T		S			S		F	S						S	S	S	S	S		S		S		S	S	S	S	Ethylene
											S					U		U	U					T			F		F	F	T		T	T	T	T	Ethylene bromide
		T	T	U	U	T	T				S				U		S			S				T	T	T	F		F		T		T	F	F	T	Ethylene chloride
	U	U	U	U	U	U	S	U	U		S			S			S	T					T	U	T	T	F		T		U		T	T	T	U	Ethylene dibromide
	U	U	U	U	U	U	T	U	U	U	T	T		S	U	U	S	U	U	S	U		F	T	T	F	S		F	F	T	T	U	F	F	F	Ethylene dichloride
	S	S	S	F	U	T	S	S	S	T	S	S		S	S	S	S	S	S	S			F	S	F	S	S		F	F	F	S	F	F	F	F	Ethylene glycol
	U	T	U	U	U	U	U	T	U	T	S	S		S	S	U	S	U	U	U	U		F	S	S	F	T		S		F		T	T	T	U	Ethylene oxide
	F																							T	F	S	S		F	F	T		F	S	F	U	Embalming fluid
																																					Ethanol (see alcohol-ethyl)
	S	T	U	U		T	S				S			S		S	S	T						U	S	S	S		T	U	U	S	U	U	U	S	Fatty acids
	S	S	F	F	S	F	S	F	T	F	F	S	S	U	S	S	S	S	S	S	S		U	U	U	U	U		U	U	T	U	U	U	U	U	Ferric chloride
	T	S	S	S	S	U	S	T	T		F			T	S	S	S	S	S	S	T		S	U	F	S	U		U		U	U	U	U	U	U	Ferric nitrate
	S	F		S	T	S	S	F	T	T	F	F		S	S	S	S	S	S	S	T		T	U	T	T	T		T	F	U	F	U	U	U	U	Ferric sulfate
				T			T										S							U			U			F	U		U	U	U	F	Ferrous ammonium sulfate
	S	S		S	T	S	S	F		T	F	F	S	U	S	S	S	S	S	S	U		U	U	U	U	F		U	U	U	U	T	U	T	U	Ferrous chloride
	S	S		S	T	S	S	F	T	T	F	F	S	S	S	S	S	S	S	S	T		F	U	S	S	U		T	T	U	F	T	T	U	S	Ferrous sulfate
	S	U		F	S	T	S		T					S			S	S	S		T		S	S	S	S			S		S		S	S		U	Fish oil
	S	S	S	S	U	T	S	U	T	U					S		S	S	F	S			T		S	S			T			T		T		T	Fluoboric acid
	U	T	T	U	U	U	T	U		U	U	U		U	U		T	U	U	U	U		T	U	F	F	S		S	F		F	T	T	T	F	Fluorine
	S	S	S	S	U	S	U	T	U	F	U	U			S		S	S	T	S			T	U	T	T	T		S			T	T	U	U	U	Fluosilic acid
	S	S	T	T	U	S	U	T	U	U	S	T	U	S	T		S	S	T	T	S		S	T	F	S	S		F	U	T	S	F	F	F	S	Formaldehyde
	U	F	S	S	U	S	U	F	U	U	U	U	S	U	F	T	S	S	U	S	T	T	F	U	U	T			F	U	U	F	T	U	T	U	Formic acid
	F	U	S	F	U	U	U	U	F	T	S			S	U	T	S	U	U	U	U		S	U	S	S	S		F		U	T	S	S	S	S	Freon 11
	S	U	S	S	S	U	T	U	U	T	S			S	U	S	S	U	U	U	U		S	U	S	S	S		F		U	S	S	S	S	S	Freon 12
	S	U	S	S	U	U	U	U	U		S			S	U		S	U	U	U	U		S	U	S	S	S		F		U	S	S	S	S	S	Freon 13
	U	U	T	T		U	U	U			S			S	U	U	S	U	U	U	U		S	U	S	S	S		F		U	S	S	S	S	S	Freon 21
	U	T	T	T	U	U	U	U	U	U	S			S	U	U	S	U	U	U	U		S	U	S	S	S		F		U	S	S	S	S	S	Freon 22
	U	T		F			U	T			S			S	U		S	U	U	U	U		S	U	S	S	S		F		U	S	S	S	S	S	Freon 31
	S	T	S	S				T			S			S	U		S	U	U	U	U		S	U	S	S	S		F		U	S	S	S	S	S	Freon 32
	F	U	F	T	F	U	T	U			S			S	U		S	U	U	U	U		S	U	S	S	S		F		U	S	S	S	S	S	Freon 112
	S	U	S	S		U	U	U	U	S	S			S	U		S	U	U	U	U		S	U	S	S	S		F		U	S	S	S	S	S	Freon 113
	S	U	S	S	T	U	F	U	F	T	S			S	U		S	U	U	U	U		S	U	S	S	S		F		U	S	S	S	S	S	Freon 114
	S	S		S		U	T	T			S			S	U		S	U	U	U	U		S	U	S	S	S		F		U	S	S	S	S	S	Freon 115
	S			S							S			S			S							U	S	S	S				U		S	S	S	S	Freon 218
	U			S			U				S			S	U		S	U	U	T	U		S	U	S	S	S		T		U	T	S	S	S	S	Freon 502
	S	S		S	U	U	S	S	U	U	F	F		U	U		S	U	U	U	U		S	T	S	S	S		F			S	S	S	S	T	Freon 503
	S													S											S	S							S		S		Freon 13B1
	S			S							S			S			S							U	S	S	S				U		S	S	S	S	Freon 6316
	S			S							S			S			S							U	S	S	S				U		S	S	S	S	Freon 6318
	S	U	S	S	T	U	S	U	U	S	S	S		U	T		S	T	U		T	S	S	T	S	S	S		F			S	S	S	S	T	Freon TF (solvent)
	T	T	S	T	S	U	S	T			S	S					S	T	U		T		U	U	S	T						S	S	S	S	T	Freon TWD 602 (solvent)
	F		F	T			S	T			S	S					S	T	U		T		S	T	F	F			F			F	S	F	S	F	Freon TE 35

Fluid resistance guide

CODES: S - SATISFACTORY F - FAIR U - UNSATISFACTORY T - TEST FOR SPECIFIC APPLICATION

	RESILIENT MATERIALS											PLASTICS												METALS									
	BUNA 'N' (NBR)	ETHYLENE PROPYLENE (EPDM)	HYPALON	NEOPRENE (CR)	URETHANE	SILICONE	VITON (FKM/FPM)	BUTYL	FLUOROSILICONE	HYTREL	CELCON	DELRIN	LEXAN	NYLON	POLYSULFONE	PVC	TEFLON	POLYPROPYLENE	POLYETHYLENE	POLYPHENYLENE SULFIDE	POLYCARBONATE	ULTEM	ST. ST. DIN 1.4435/1.4404	STEEL	ST. ST. AISI430	ST. ST. DIN 1.4301/1.4305/1.4542	SILVER	49 - NICKEL-IRON	MONEL	LEAD	IRON	INCONEL	COPPER	BRONZE	BRASS	ALUMINUM	
																																					Freon TM
T	T		T	T	U	S	T			S	S			U		S	T	U		U		S	T	F	T			F			F	F		S	U	Freon TMC (solvent)
F	U		U	U	U	U	U	T	T	F	F			U		S	U	U	U	U		S	T	S	S	S		F			S	S	S	S	T	Freon MF (solvent)
F	U		U	T	U	S	U			F	F			U		S	U	U	U	U		S	T	S	S	S		F			S	S	S	S	T	Freon BF (solvent)
S	S	S	S	S	S	S		S	T	T	T	S	S		S	S	S	S	S			S	U	F	F			S		U		F	F	U	T	Fruit juices
T	U		U	T	U	S	U	T	T	S	S	S	S	F	S	S			S				T	S	S	S		S	S	T	S	T	S	S	S	Fuel oils
U	F	U	U	U	U	U	S	U	T	F	F	S	U	U	U	S	U	U	S	U		S	S	S	S	F		F	T	T	F	F	S	F	S	Furfural
T			S				S			F	F			U		S	U	U	U	U		S	T	S	S			F			S	S	S	S	T	Freon 123
U	S		S	U	U	U	U	U	F	F			T	U		S	U	U	U	U		S	T	S	S			F			S	S	S	S	T	Freon 134A
S	U	T	U	U	U	F	U	T	F	U	U		S	F	S	S	T	U	S	T		S	U	F	S	S		F			S	F	S	F	S	Gallic acid
T	U	U	U	T	U	S	U	S	T	S	F	S	S	T	S	S	U	U	S	T	S	S	S	S	S	S		S	S	T	S	T	S	S	F	Gasoline
S	S	S	S	U	S	S	T	T		S	S		S	S	S	S	S	S	S			S	U	S	S			S		U		S	S	F	S	Gelatin
S	S	S	S	U	S	S	F	T	F	S	S	S	S	S	S	S	S	S		T		S	S	S	S			S		S		S	S	F	S	Glucose, edible
S	S	S	S	U	S					S	S	S	S	S	S	S							S	T	S			S		S		S	S	F	S	Glue (non acid)
S	S	S	S	U	S	S	F	T	T	S	S	S	S	S	S	S	S	S	S	S		S	S	S	S	S		S	F	F	S	F	S	S	S	Glycerine (Glycerol)
S	U		U	S	U	S	U	T	T	S	S		S			S	T					S	S	S	S	S		S		S		S	S	S	S	Grease, petroleum base
S			S	S	S	S							S			S						S	S	S	S	S	S	S	F	S		S	S	S	U	Goulac (core binder)
S	S		S	T	T	S	F	T	U				U	S		S						F	T	U	F			F	U	T		U	U	U	U	Green sulfate liquid
S	S	S	S	U	S					S								S						S	S	S						S	S	S		Glycol solution
U	U		U	U		F		U	U	U	U		U	U		S	U	U	U	U		S	U	S	S	S						S		F	U	Halon 1011
F			U			U												U																S		Halon 1202
T						S		T										U				S	S	S	S							S	S	S	S	Halon 2402
T			S	T	F	F	S	U		S	S		S			T		U				S	T	T	S						S	S		S	T	Halon 1301
T			U			F		U					S									U	S	S	S							S	S	S	S	Halon 1211
S	U	F	F	F	U	S	U	T	T	S	S		S	U		S	U	U	S	U		S	S	S	S	S		S				S	S	S	S	Heptane (liquid)
F	U	S	F	S	U	S	U	T	T	S	S		T	S		S	U	U	S	U	S	S	S	S	S	S		S		F		F	F	S	F	Hexane
S	U	S	T	F	U	S		T	S	S	S		T	S		S	T	U	S	T		S	S	S	S	S	S	S	S	S		S	S	S	S	Hydraulic oil
F	S		F	U	U	U	S	U	U	F		S	S		S	S	U					S	U	F	S	U		U	U	U		U	U	U	S	Hydrazine
U	S	S	U	U	U	F	T	U		U	U	S	U	S		S	S	T	U	U		U	U	U	U			U			U	U	U	U	U	Hydrobromic acid
T	U	T	U	T	U	F						U	U	U	U	S								F	F	F		S				S	S	S	S	Hydrocarbons (chlorinated)
T	F	T	T	U	U	T	T	T	U	U	U	S	U	S	S	F	T	T	T	T	T	U	U	U	U	T		U	U	U	F	U	U	U	U	Hydrochloric acid (aerated)
T	F	T	U	U	U	T	T	T	U	U	U	S	U	S	S	F	T	T	T	T	T	U	U	U	U	F		U	U	U	T	U	U	U	U	Hydrochloric acid (air free)
S	S	S	S	U	U	S	F	T	U	U	U	S	U	S	S	S	S	S				F	U	S	S	T		F		U	T	U	U	S		Hydrocyanic acid
T	T	S	U	T	U	S	U	U	U	U	U	S	U	S		S	T	T	T	T		T	T	U	U	F		U	U	U	U	U	U	U	U	Hydrofluoric acid (aerated)
U	T		U	T	U	S	U	U	U	U	U	S	U	S		S	T	T	T	T		T	T	U	U	S		F	T	U	U	T	T	U	U	Hydrofluoric acid (air free)
S	S	S	S		U					U	U	S		S	S								U	U	U			S			S			U	U	Hydrofluosilicic acid
S	S	S	S	S	T	S	S	U	F	U	U	S	S	U	S	S	S	S	S	S		S	S	S	S	S		T	S	S		S	S	S	S	Hydrogen 377
U	T		U	U	U	S	F	U		U	U			T		S	F		T	U		T	T	U	U	U		U	U		U	U	U	U	U	Hydrogen bromide¢ anhydrous)
U	S		T		S	T	T	U		U	U		U			S	S	S				S	T	U	T	F		T	F	T	S	T	T	T	U	Hydrogen chloride(anhydrous)
T	F		U	U	U	S	U	U		U						F	T	T					F	F	F	F		S			S	T	T	T	U	Hydrogen ßoride
U	T	U	U	T	T	T	T	T	U	T	U		U	T	S	S	T	T	T	T		T	T	T	T	U		T	U	T	F	U	U	U	F	Hydrogen peroxide
T	S	T	F	U	T	U	F	U	T	U	U	S	U	S	S	S	S	S	S	T		T	T	T	T	U		T	F	T	S	U	U	U	F	Hydrogen sulfide
T		S	T	S		S							F		S	S							S	S	T			S		U					T	Ink (non aniline)
U	F	F	U	U	U	S	T	T	T	U	U		S	S	U	S	T	U	U			T	T	T	T	U		T	U	U	S	T	T	U	U	Iodine
																							U	U	U			T	F	U		T			U	Iron potassium sulfate
T	U		F	T	U	F	U	T		S			S			S						S	S	S	F	S	S	S	S	S	S	S	S	S	S	Isobutane
S	U	S	F	S	U	S	U	S	S	S	F	S	T		S	S	T	T	S	T		S	S	S	S	S	S	S	S	S	S	S	S	S	S	Isooctane
U	F	U	U	U	U	U	F	U	U	S			T	U		S	T	T		U		F	S	T	F	U		T				U		T	T	Isopropyl acetate
F	S	S	F	U	S	S	F	T	T	S	S		S	F		S	S	F	S	S	S	F		S	S	S		S			F	S	S	S	S	Isopropyl alcohol (Isopropanol)
F	U		U	U	U	S	U	T					U					U																		JP-1, JP-A, JP-A1
F	U		U	U	U	S	U	T					U					U																		JP-2
F	U		U	U	U	S	U	T		T	T		U	S		S	T	U	S	T		S	S	S	S			S			S	S	S	S	S	JP-3
T	U	U	U	U	T	S	U	T	S	F	F	S	S	S	S	S	T	U	S	T	S	S	S	S	S	S	S	S	S	F	S	F	S	F	S	JP-4
S	U		U	T	U	S	U	T		F	F			S		S	T	U	S	T		S	S	S	S			S			S	S	S	S	S	JP-5
T	U		U	U	U	S	U	T										U				S	S	S				S				S	S	S		JP-6
																		U																		JP-7
T	U		U	U	U	S	U	T										U				S	S	S	S			S				S	S	S		JP-8
S	U	U	F	F	U	S	U	T	F	S	S	S	S	F	S	S	U	U	S	T	S	S	S	S	S	S		S	S	S	S	S	S	S	S	Kerosene
S	T	S	S	S	T	S		T					S		S	S						S	U	S	S			S		U			U		U	Ketchup
T			U		U		U	S										U																		JP-B
T	U		U		U	S	U	U										U																		JP-X
U	U	U	U	U	U	U	U	U	U	S			S			S	U	T		U		S	T	F	F	S		S		T		S	S	S	S	Lacquers & Lacquer solvents
T	T	T	T	U	S	F	T	T	U	U	U		T	S	T	S	S	T	S	F		U	U	T	T	F		T	U	U	S	T	U	U	U	Lactic acid
S	F	U	U	U	F	S	U	T	T	F	F		S			F	T	T		S		S	T	F	F	S		F	U			U	U	T	U	Lard
S	S	T	S	U	U	U	F	U		F	S	U	S	S	S	S	S	S	S			F	U	F	F	F		S			F	U	U	U	U	Lead acetate
U	S														S	S								S	S											Light water (fire ext.)

Fluid resistance guide

CODES: S - SATISFACTORY F - FAIR U - UNSATISFACTORY T - TEST FOR SPECIFIC APPLICATION

RESILIENT MATERIALS												PLASTICS													METALS								
BUNA 'N' (NBR)	ETHYLENE PROPYLENE (EPDM)	HYPALON	NEOPRENE (CR)	URETHANE	SILICONE	VITON (FKM/FPM)	BUTYL	FLUOROSILICONE	HYTREL	CELCON	DELRIN	LEXAN	NYLON	POLYSULFONE	PVC	TEFLON	POLYPROPYLENE	POLYETHYLENE	POLYPHENYLENE SULFIDE	POLYCARBONATE	ULTEM	ST. ST. DIN 1.4435/1.4404	STEEL	ST. ST. AISI430	ST. ST. DIN 1.4301/1.4305/1.4542	SILVER	49 - NICKEL IRON	MONEL	LEAD	IRON	INCONEL	COPPER	BRONZE	BRASS	ALUMINUM	
S	S		S		S	S						S			S							F	F	S		S				S	S	S	F	Lime slurry
S	S	T	S	T	S	S	F	T				S			S	S	S				S	S	F	S			S		S		U	U	U	U	Lime sulfur
	S	U	U	U	T	U				S																									Lindol (TCP)
S	U	F	U	S	S	S	F	T	T	S	S		S	T	S	S	S	U	S	S		S	S	S	S	S		S		S		U	S	S	S	Linseed oil
F	U	U	U	U	U	S	U	T	T	S	S		F			S	U		S			S	S	S	S	S		T				S	S	S	S	Liquid petroleum gas (LPG)
S	S		F	U	T	S		T							S	F							F	S	S				S			F	F	F		Lithium bromide
S	F		S	T		S	T			S			S		S	S	S	S		F		S	F	F	F	T		F	U	F		F	F	F	U	Magnesium carbonate 437
S	S	S	S	S	S	S	F	T	T	S	S	S	T	S	S	S	S	S	S	S		T	U	U	T	F		F	U	T	S	U	U	U	U	Magnesium chloride
S	S	S	S	U	S	S	F		U	S	S	U	S	S	S	S	S	S	S	F		S	S	S	S	T		S	U	F	S	F	S	F	U	Magnesium hydroxide
S	T		S		S	T										S						S	S	S	S	S		S					S	S	S	Magnesium oxide
S	S	S	S	U	S	S	F	T	T	S			S	S	S	S	S	S	S	F		F	S	F	S	F		S	F	F	F	T	T	T	F	Magnesium sulfate
S	S	S	S		S	S	S	S		S			S									S	U	T	T	S		U	F	U		U	U	U	F	Magnesium sulfite
S	S	S	S	S	S	S	S						S			S						S	F	S	S			S		U		F	F	U	S	Malt beverages
S	S		F	T	U	S	F			F	F	S		S	S	S	T			T			U			F		F		U	F	F				Manganese sulfate
S		S	S	S	S	S				S			S			S							F	S	S			S		U		F	F	U	S	Margarine
S	U	S	S	U	S	S				S			S			S	S					S	F	S	F			S		U		F	F	U	U	Mayonnaise
S	S	S	S	T	T	S	F	T		F	F	S	U	S	S	S	S	S		S		U	U	U	U	U		U	U	U	U	U	U	U	U	Mercuric chloride
F	T		F			T	F			S					S	S	S	S				F	U	U	F			U			F	U	U	U	U	Mercuric cyanide
S	S	S	S	T	S	S	T	U	T	U	U	F	S	S	S	S	S	S				S	S	S	S	U		U	U	S	S	U	U	U	U	Mercury
S		S	S		S	S							S			S								T	U			F		U		U	U	U	U	Mercury salts
U	T					U										S							T	F	F			U		F		U	U	U	F	Methallylamine
T				S	U								U		U	S							T	F	U	F		F		S	S	F	S	S	U	Methallyl chloride
S	U	T	F	U	U	S	U	U	T	S			F		S	S	T	U				S	S	S	S	S		S	S	S		S	S	S	S	Methane
																																			Methanol (see alcohol-methyl)
U	F	U	F	U	U	U	T	U	U	F	F		F	U	U	S	T					S	S		T	T				S		F			T	Methyl acetate
U	U	U	U	U	U	F	U	T	U	F	F	F	S	U	U	S	U	U	T	U		T	T	T	T	F		F		S	T	F	S	T	U	Methyl chloride
U	F	U	U	U	U	U	F	U	T	F	T		S	U	U	S	U	U	S	U	U	S	S	F	F	F		S	S	S		S	S	S	S	Methyl ethyl ketone (MEK)
U	U	U	U	U	U	F	U	F	U	S			U	U	U	S	T	U	S	U	U	F	T	T	T	S		F	T	F	T	T	U	S	U	Methylene chloride
S													S			S								S	S	S						S		S		MIL-F-5516
S													S			S								S	S	S						S		S		MIL-F-5572
S													S			S								S	S	S						S		S		MIL-F-5624
S						S																		S	S	S						S		S		MIL-F-25558
S	U		S	S		S							S			S								S	S	S						S		S		MIL-H-5606
S	U		S	S		S																	S	S	S	S						S		S	S	MIL-L-7808
S	S	S	S	U	S	S	U	T	F	S	F	S	S	U	S	S	F	S		S		S	S	S	S	U		U		S	S	U	U	U	S	Milk 474
S			S		S	U				U	T	S	S	S	S	S								U	F		F	S	T	U		U	U	U	F	Mine water (acid)
S	U		F	F	S	S	U	T	T	S			S	S	S	S	U	U	S	F		S	S	S	S	S		S	S	S	S	S		S	S	Mineral oil, USP
F	U		U		U	S				S							U							S	S	S						S		S	S	Mineral spirits
										U			U			S								F	F	U		U	U			U	U	U	U	Mixed acids (H_2SO_4 & HNO_3)
S	T	S	S	T	S	S	F	T	T	S	S	S	S		S	S	S	S	S			S	S	S	S	S		S		S	S	S	S	F	S	Molasses
S	U	S	T	T		S			T	S			T	S	S	S	U	U	S	S	S	S	S	S	S	S		S			S	S	S	S	S	Motor oil - sae #10, etc.
F	U	U	U	U	U	S	U	T	T	S		F	S	T	T	S	U	U	S			S	S	S	S	S		F		T	S	F	F	F	S	Naphtha
U	U	U	U	T	U	S	U	T	T	S			S		U	S	F	U	S			S	S	S	S	S		F	F	F		F	F	F	F	Naphthlene
F	U	U	U		U	S	U	T		U						S						T	T	F	T	S		T		T		F	U	F	F	Naphthenic acid
S	U	S	S	U	U	S	U	U	T	S			S		S	S	S	U				S	S	S	S	S		S		S		F		S	S	Natural gas
S	S	S	F	U	S	S	F	T	U	F	F	S	U	S	S	S	S	S	S	S		T	U	U	T			T	F	U	F	U	U	U	U	Nickel chloride
S	S		S		S	S	F			F			S		S	S	S	S	T	S		T	T	F	F			T			U	U	U	U	U	Nickel nitrate
S	S	S	S	U	S	U	F	T	U	F	F	S	U	S	S	S	S	S	S			F	U	T	F			T	F	U	F	T	T	T	U	Nickel sulfate
U	T	T	U	U	U	U	T	U	U	U	U	S	U	U	T	S	T	T	T		T		U	T	S	U		U	U	U	F	U	U	U	T	Nitric acid with 40% H_2O 493
U	T	U	U	U	U	F	T	T	U	U	U	S	U	U		S	T	T	S	U	T	S	U	T	T	U		U		U	T	U	U	U	U	Nitric acid vapors
U	U	U	U	U	U	U	U	U	U	U	U	S	U	U		S	S	U	T	U		T	U	T	T	U		U		U	F	U	U	U	T	Nitric acid (red Buming)
										U	U		U	U									U	U	U			U	U	U		U	U	U	U	Nitric + HCL acids
													U										S	S	S					S		S				Nitriding gases
U	F	U	U	U	U	U	T	U	U	S	S	U	S	U	U	S	S		S	U		T	S	S	S	S		F	U	F		T	F	F	T	Nitrobenzene
U	T	U	U	U	U	U			U	F			U			S							F	F	F	U	U	U	U	U		U	U	U	S	Nitrogen tetroxide-dry
		S	S				T			U												T	S	F	F	T		F	U	S	S	F	F	F	S	Nitroglycerine
U	T	S				T				U			U			S	U	U				T	U	U	U			U	U		F	U	U	U	U	Nitrous acid
F	F	U	F	S	F	U	T	T		S			S			S	U	U				T	S	F	F	U		U			U	F	F	F	T	Nitrous oxide
																							S	S	S		S					S	S	S	S	Nyval (Mobil)
S	S		S	S	S	S	F	T	F	S	S		S	S		S	S	S	S			S	S	S	S	S					S	S	S	S	S	Nitrogen
S	U	U	S	S	U	S																	S	S	S	S						S	S	S	S	Oronite 8200
											S																	S								Oakite
F	U	U	T	T	T	S	U	S	T	F			S	S	S	S	F	U	F	F		T	F	F	S	S		F	U	F	T	T	T	T	T	Oleic acid
U		U	U							U			S		U	S	U						S	S			F								F	Oleum
S	F	U	S	S	S	S	T	T		S			T	U		S	S	T		S		S		S	S			S		S	S	T		S	S	Olive oil 514

Fluid resistance guide

CODES: S - SATISFACTORY F - FAIR U - UNSATISFACTORY T - TEST FOR SPECIFIC APPLICATION

RESILIENT MATERIALS											PLASTICS													METALS									
BUNA N' (NBR)	ETHYLENE-PROPYLENE (EPDM)	HYPALON	NEOPRENE (CR)	URETHANE	SILICONE	VITON (FKM/FPM)	BUTYL	FLUOROSILICONE	HYTREL	CELCON	DELRIN	LEXAN	NYLON	POLYSULFONE	PVC	TEFLON	POLYPROPYLENE	POLYETHYLENE	POLYPHENYLENE SULFIDE	POLYCARBONATE	ULTEM	ST. ST. DIN 1.4435/1.4404	STEEL	ST. ST. AISI430	ST. ST. DIN 1.4301/1.4305/1.4542	SILVER	49 - NICKEL-IRON	MONEL	LEAD	IRON	INCONEL	COPPER	BRONZE	BRASS	ALUMINUM	
T	U		T	S	U	S	U	T	S														S	S	S	S						F	S	S	S	Oronite hydraulic fluid
F	S	T	F	T	F	U	F	T	U	U			S	S		S	S	T	S	T		T	U	T	T	F		T	U	U	S	T	F	T	T	Oxalic acid
										U													T	T	T			T	F	T		T	T	T	F	Oxidizing gases
U	T	T	S	T	T	S	F	T	F	U	U	T	T	T	T	T	U	U	S	T		S	S	S	S	F		S		S		S	S	S	S	Oxygen
U	S	S	T	S	S	T	F	S	U	U	U		U	T	T	S	U	U		T		F	U	F	F	F									F	Ozone
F			F	F		U	U						S	T	S	F						S	S		S			S					S	T	T	Paint, oil base
T			T		T								S			S												S								Paint vechicles (except soya)
S	U		U	T	T	S	U	T														S	S	S	S			S					S	T	S	Palm oil
F	F	U	U	T	U	F	T	T	T				U	S		S	F	T				S	S	S	S	T		F				F	F	U	S	Palmitic acid
S	U		U	F	T	S	U			F	F	S	S	S	S	S	T	U		T		S	S	S	S			S			S	S	S	S	S	Paraffin
S			S	F	T	S				F						S		U				S		S	S			S				S	S	S	S	Paraffin oil
S			S		F			F								S												T							S	Pencillin solution
F	U	F	S	U	U	S	U	U		S						S		U		S		F	F	F	F	S	F	S				F	F	F	S	Pentane
U	F	T	F	U	U	F	T	S	U	U	U		U	U		S	T	U	S	U		T	U	T	T			U		U		U	U	U	T	Perchloric acid
U	U	U	U	U	U	S	U	T	U	F	F		T	U	U	S	U	U	T	U	U	F	F	F	F	S		F	T	F	S	F	F	F	T	Perchloroethylene 539
S	U	T	T	T	T	S				S													S	S		S		S		S		S	S	S	S	Petroleum oils
				S																																Petroleum residue from distillation
U	U	U	U	U	T	F	F	T	U	U	U	S	U	U	T	S	U		S	U	U	T	U	F	S	S		F	F	T	T	F	S	F	T	Phenol
	S		F	F	F	F				U	U		T	U	U	S							S	S	S	S	S	S	S	S		F	S	S	F	Phosphate ester non-inflammable oils
T	F	S	T	T	U	S	F	T	U	U	U	S	U	S	S	S	S	T	S	T	T	T	U	U	T	F		U	T	U	S	U	U	U	T	Phosphoric acid (aerated)
T	F	S	T	T	T	S	F	T	U	U	U	S	U	S	S	S	S	T	S	F	T		U	U	T	F		T	T	U	T	T	T	T	U	Phosphoric acid (air free)
U										U					S	S	T					T	F		S			S	S	F		T	T	T	S	Phosphorous
	F		T			S				U	U	S	U			S	S						U	U	T			U	U	U		U	U	U	U	Phosphoric acid vapors
	T	U	U	U	U	U				U																										Pickling solution
F	F	S	S	T	T	U	U	T	U	U	T	F	S	S	S	S	T	T				F	U	F	S	S		U	T	U	U	U	U	U	U	Picric acid
F	U	U	U	S	U	S	U	S					S			S						S			S			S		S			U		S	Pine oil
S	S	U	F	U	U	U	F	U		F			T			S	T	T				F	S	F	F	S		F		S		F	F	F	U	Potassium acetate
S	S		S		S	S				S			S		S	S							U		S			F	U	U		F				Potassium aluminum sulfate
S	S		F	U	F	S	T	T		F			T		S	S	S	S				F	F	F	S			F	U	F		F	F	F	U	Potassium bicarbonate
S	S		S		S	S	T			S			T		S							T	U		U	S		U	F	U	U	F	U	U	F	Potassium bisulfate
S	S		S	U	S	S	T	T		T			T	S	S	S	S	S	S	T		F	U	U	F	U		F	F	U	S	F	F	F	U	Potassium bromide
S	S		S	U	S	S	F	T	U	F	F	U	U	S	S	S	S	S	S		T	T	F	F	S	F		F	U	T	S	U	U	U	U	Potassium carbonate
T	S		S	S	S	S	F			U	F	F	S	S	S	S	S	S	S			F	F	F	S	F		U			S	T	U	U	U	Potassium chlorate
S	S	S	S	S	S	S	F	T	T	S	F	F	U	F	S	S	S	S	S	T		F	T	T	T	U		F	U	T	F	F	F	T	U	Potassium chloride
S	S		T	T	S	S	T			U			S		S	S	S	S				F	T	F	F	F		F	F	F	S	F	S	F	F	Potassium chromates
S	S	S	S	S	S	S	S	S	T	U	U	F	S	F	S	S	S	S	S			F	S	S	S	U		F	U	T	F	U	U	U	U	Potassium cyanide
	S	S	S	S	S	S	F	T	T	U			T	S	S	S	S	S	S	T		T	F	F	F	S		F	F	F	S	F	F	F	F	Potassium dichromate
U	T		T			S	T			S			T		S	S	S	S				T	U	U	F	U		F	F	U	T	F	F	F	S	Potassium ferricyanide
S	S	S	F	U	T	T	F	U		S	F	F	F	F	S	S	T	F	T	U	S	T	T	F	S	F		F	U	T	S	T	T	U	U	Potassium hydroxide
F	S		F	T		U	U						T			S	U	U	S			T	T	U	U	U		U			U	U	U	U	U	Potassium hypochlorite
S	S	S	S	S	S	S	S	S	T	F	F	F	S	F	S	F	S	S	S	S		T	F	F	F	T		F	F	F	T	F	F	F	F	Potassium nitrate
U	S	S	S	U	S	S				U	S		U	S		S	S	S	S	S		F	F	S	S	U		F	U	F	F	F	F	F	F	Potassium permanganate
										U												F	T	T	F	U		F	U	U		U	U	U	U	Potassium peroxide
S	S		U	T		S	T			S			T			S	S	S				T	T	S	S	U		U	U	U		U	U	U	U	Potassium persulfate
S	S	F	S	S	S	S	S	S	T	S	F	F	S	S	S	S	S	S	S	T		T	S	S	S	F		F	F	U	S	F	F	U	S	Potassium sulfate
S	S		S	S	S	S	S						S			S	S	S	S				F	U	F	F	U		U		S	U	U	U	U	Potassium sulfide
F	S	F	S	S	S	S	F	T					T			S	S	S				T	T	U	T	S		U	F	U		F	F	U	U	Potassium sulfite
S	S	S	U	U	U	S	T	T	T	S			S			S						S		F	S	S		S				F	F	F	S	Prestone anti-freeze
S	U	F	F	S	F	S				F	F	F			S	S							S												S	Producer gas
S	U	S	U	U	U	S	U	T	T	S	S		S	U	S	S	U	U		U		S	S	S	S	S		S	S	S	S	S	S	S	S	Propane
U	S		U	U	T	U	T			U						F						T	T		F	S		T	U	U		T	T	T	T	Propionic acid
S	S	S	S		S	S				S					S		S						S	S	S	S		S		S		S	S	S	T	Propyl alcohol
U	U		U	U	U	S	U	T							U	S	U	U				T	T	S	T			S				S	S	F	U	Propylene dichloride
U	U		F	T	U	S	U	T					T			S	T		S			S	S	S	S	S	S	U	S	F	U	U	U	U	U	Pyranol (dielectric)
U	T	U	U	U	F	S	T	U	U				T			S		U		U		S	S	S	S	S	S	S	S	S		F	S	S	F	Pydraul (mansanto)
U	F	T	U	U	U	U	F	U	U	F	F	U	S	U	U	S		T	S			T	T	F	F			F	F	U		T	F	F	F	Pyridine
		T				U				U						S							F	F	F			S			F			F	F	Pyrogallic acid
F	S	U	U	U	U											S																S				Pyrogard (mobil) 5%
	F	U	U	U						U													T		F			T		U		T			F	Pyroligneous acid
																												(see Sodium thiosulfate)								Photo solution
U						F										S							S	S	S	S						S		S	S	Propylene
S	S		U	T	T	S	U	T		S				U		S	S	F		T	S	F	T	S	S	S		F			F	S	F	S	F	Propylene glycol
F			S			S							F			S							T	F	F			S		T	S	F	F	F	F	Rosin emulsion
F	T		F	U	T	T	F			F						S						T	T	F	F			F	F	T		F	F	F	F	Sacchrin solution
F	S		U		S	S				U			S		S	S	S	F		F		F	U	F	F	S		F	F	U	F	F	F	F	T	Salicylic acid
S	S	S	F	U	S	S	S	T	T	S	T	S	S	S	S	S	S	S				T	U	U	T			T			T	F	F	U	U	Sewage
T	S	S	U	U		U				F	F	U	S		U	S	T	T				S	S	S	S			S		S		S	S	S	S	Shellac

Fluid resistance guide

CODES: S - SATISFACTORY F - FAIR U - UNSATISFACTORY T - TEST FOR SPECIFIC APPLICATION

RESILIENT MATERIALS												PLASTICS													METALS								
BUNA 'N' (NBR)	ETHYLENE PROPYLENE (EPDM)	HYPALON	NEOPRENE (CR)	URETHANE	SILICONE	VITON (FKM/FPM)	BUTYL	FLUOROSILICONE	HYTREL	CELCON	DELRIN	LEXAN	NYLON	POLYSULFONE	PVC	TEFLON	POLYPROPYLENE	POLYETHYLENE	POLYPHENYLENE SULFIDE	POLYCARBONATE	ULTEM	ST. ST. DIN 1.4435/1.4404	STEEL	ST. ST. AISI430	ST. ST. DIN 1.4301/1.4305/1.4542	SILVER	49 - NICKEL - IRON	MONEL	LEAD	IRON	INCONEL	COPPER	BRONZE	BRASS	ALUMINUM	
S	S	S	S	S	U	S	S	S	T	S	S	S	T	S	S	S	S		T	S		S	S	S	S	S						S	S	S	S	Silicone oil
					S	S										S						T	U	T	S			F			T	U	U	U	U	Silver bromide
																S	F	F		S		U	U	U	U			F			T	T	T	U	U	Silver chloride 602
U	S	S	U	S	S	S	F	T		F	F	F	S	F	S	S	S	S	S	S		T	U	F	S			U	U	U	S	U	U	U	U	Silver nitrate
S		S		S	S	S				S	S	T	S	S	S	S	S						S	S	S			T	S	S		S	S	F	F	Soap (molten)
U	F	U	U	U	T	U	T	U	U					T				U			T	S	S	S	S	S						U	U	U	S	Skydrol
F	S					U				U	U	U			U	U						S	S	S	S			S			S	U	U	U	S	Sodium
F	S	U	F	U	U	U	T	U		S			S	S	S	S	S	S	S	F		T	U	F	S	F		T	T	T	S	F	F	F	S	Sodium acetate
S			S		S	S	T						S			S						S	T	F	S	T		S	U	S		S	F	U	U	Sodium aluminate
S	S	S	S	T	S	S	F	T	T	F	U	U	S	S	S	S	S	S	S	S		T	T	F	F	T		F	F	T	T	F	F	T	U	Sodium bicarbonate
													S		S	S							F	F	F							U	U	U	F	Sodium bichromate
S	F		S	T	S	S	F	T	U	F	F	S	U	S	S	S	S	S	S	T		T	T	T	T	F	S	T	F	U	F	T	T	U	U	Sodium bisulfate
S			S		S	S					S	S		S	S		S	S						U	S		S									Sodium bisulfate 10%
S	S		S	T	S	S	F	T	T	U	U		S		S	S	S	S		T		T	U	T	T	F	S	F	F	U	T	F	F	U	T	Sodium bisulfite
S	S	S	S	T	S	S	F	T	T	S			S	S		S	F	S	S	T		F	T	F	F	T		F			T	F	T	T	U	Sodium borate
S	T		T			T	T			S			F		S	F	S	S				T	U	U	T	U		F		U	F	T	T	T	S	Sodium bromide
S	S		S	T	S	S	F	T	T	S	S	U	S	S	S	S	S	S	S	S		T	F	F	F	S		F	T	F	S	F	F	U	U	Sodium carbonate (soda ash)
S	S	S	S	S	S	S	F	T	T	S	T		S	S	S	S	S	S	S	F		T	T	T	T	F		F	F	T	S	F	F	T	T	Sodium chloride
S			T		S	S	T			U			S	S		S	S		S	S		F	F	F	F	F		F		F		T	F	F	F	Sodium chromate
																S						T	T	F	F	U		F		U	F	U	T		U	Sodium citrate
S	S	S	S	S	S	S	F	T	T	F	F	S	S	S	S	S	S	S	S			T	F	S	F	U		T	U	F	F	U	U	U	U	Sodium cyanide
T	T	S	T	T	S	T	T	U					T		S	S	S	S	T			F	U	F	F			T			T	U	U	U	T	Sodium dichromate
S	S		T			S	T			S			T		S	F	S	S				T	F	F	F	U				F		U	U	U	T	Sodium ferricyanide
S	S		S	T	S	S	T			S			S		S	S	S	S				T	T	U	U	S		S		F	T	T	S	F	F	Sodium fluoride
T	S	S	T	S	S	T	T	T	U	S	U	F	S	S	S	S	F	F	T	T	T	T	T	F	F	S	S	T	U	T	S	U	T	T	U	Sodium hydroxide (caustic soda)
U	F	T	U	U	T	S	T	T	T	U	U		U	S	T	S	F	F	S	T		T	U	U	U	F		U	U	U	T	U	U	U	U	Sodium hypochlorite
																S							U	U	F			S			F	U	U	U	U	Sodium hyposulfite
S	S	F	F	T	T	S	T	T		F	F	S	T	F	F	S	T	T				S	U	F	F	S		T				F	F	U	U	Sodium metaphosphate
S	S		S	T	S	S	F			F	F	S	F	S	S	F						S	F	F	F	S		F		F	S	F	F	F	T	Sodium metasilicate 563
F	S	S	F	T	U	S	F		T	S	F	S	S	F	S	S	S	S	S			T	T	F	T	F		F	U	F	S	T	T	U	F	Sodium nitrate
S	S		T		S	S	T			S			S		S	S	S	S				F	F	F	F	T		S		F		F	F	F	F	Sodium nitrite
F	S	F	F	T	S	S	F	T	T	F	F	S	T	F	S	S	S	T				F	F	F	F	U		F	U	F	S	F	T	U	U	Sodium perborate
T	S	S	T	U	U	S	S	T	T	U	U		T		S	S	F	F		S		S	U	T	F	U		F	U	F	S	U	U	U	U	Sodium peroxide
																						S	U	S	S	S				S		T	T		U	Sodium phenolate
S	S	S	F	S	U	S	T	T	T	F	F	S	U	S	S	F	S	S				F	F	F	F	S		F		F	T	F	F	F	U	Sodium phosphate
F	S	S	U	S	T	S	T	T	T				T			S	S	S				F	F	F	F	F		F	U	F	S	F	T	T	U	Sodium phosphate (tri-basic)
T				T		T	T						T									F	F	F	F			F		F	S				U	Sodium plumbite
S			S		S		S			S			S			S						F	F		F			F								Sodium resinate 642
																						F	U	F	F	T		F		F		T		T	T	Sodium salicylate
S	S	S	S	F	S	S	T		T	S	S	S	S	S	S	S	S	S	S			S	T	F	F	F		F	U	F	S	F	F	F	U	Sodium silicate
S	S	S	S	S	S	S	F	T	T	S	S	S	S	S	S	S	S	S	S	S		T	T	T	T	S		F	F	F	F	F	F	T	S	Sodium sulfate
F	S	S	S	S	S	S	T	T	T	S	S	S	S	S	S	S	S	S	S	U		T	T	U	S	U		F	F	U	S	U	U	U	U	Sodium sulÞde
S	S	S	S	S	S					S	S	S	S	S	S	S							F	T	F			F	F	U	T	T	F	U	F	Sodium sulÞte
S	T		S	T	S	S	F		T	U	U		S	S		S	F	S	S	T		F	F	T	F			F		F	F	F	T	T	U	Sodium tetraborate
F	S		T	T	F	S	F	T	T		T		S																					U		Sodium thiophosphate (aeroßoat)
F	S	S	S	S	S	S	F			T	T	S	S	U	S	S	S	F	S	S		S	U	T	F	U		F			F	U	U	U	F	Sodium thiosulfate
S			S	S	S	S							S			S																				Solvac (socony)
S	U	F	F	F	U	S	U	T					S			S																				Sovasol #1
S	U	F	F	F	U	S	U	T					S			S																				Sovasol #2
S	U	F	F	F	U	S	U	T					S			S																				Sovasol #3
S	U	F	F	F	U	S	U	T					S			S																				Sovasol #73
S	U	F	F	F	U	S	U	T					S			S																				Sovasol #74
S	S	U	U	T	T	S	F	T	T	F		S	U	S	S	S	S	S	S			T	T	U	U	T		T			U	U	U	U	U	Stannic chloride
F	U	S	S	U	F	T	F	T	T	F			U			S	S	F	T	T		T	T	U	U			T	U	T	F	U	U	U	U	Stannous chloride
S	F	S	S	T	S	S			T	F	F	S	S	S	S	S	S	F	S			S	S	F	S	S		S		T		S	T		S	Starch
U	T	U	U	U	U	T	T	U	U	U	U	U	U	T	U	T	U	U	T	U		S	F	S	S	F		F		F	S	F	S	F	T	Steam
S	S		S	U	U	U		U		T																		F						S		Steam condensate 663
F	F		S	T	S	T	T	U	T	F			S	U	S	S	S	S		F		T	T	T	S	S	F	U	U		U	U	U	U	U	Stearic acid
S	U	U	F	S	U	S								S	U		S		S					S	S								S	S		Stoddards solvent
	F			T						F	F	S		S	S	T						F	U	F	F	F		F		U		F	F	F	F	Stronitium nitrate
U	U	T	U	U	U	T				S						S							S	S	S			S				F	F	F		Styrene 666
T	T					T				U			T			S	T					F	F		U	F						F	F	F	T	Succinic acid
																																				Sul (dil)
T	F		F		T	S	T	T	U				U			S	T	S				F	U	F	T		S	S		S		U	U	U	U	Sulfate liquor
U	S		U	T	S	S	T	T	F	S			S		S	S	S	S	S	T		T	T	F	F	U		T	U	T	S	U	U	T	S	Sulfur
U	U	U	U	U	U	S	U	T	U	U	U		U	T	S	S	U	U		U		T	U	T	T	U		U	F	U	F	U	U	U	U	Sulfur chloride
U	S		F	U	F	S	F	F	U	F			U	U	U	S	T	T	S	T		T	T	T	T	T		T	F	T	U	T	T	T	F	Sulfur dioxide

Back to overview

Fluid resistance guide

CODES: S - SATISFACTORY F - FAIR U - UNSATISFACTORY T - TEST FOR SPECIFIC APPLICATION

RESILIENT MATERIALS													PLASTICS												METALS								
BUNA 'N' (NBR)	ETHYLENE PROPYLENE (EPDM)	HYPALON	NEOPRENE (CR)	URETHANE	SILICONE	VITON (FKM/FPM)	BUTYL	FLUOROSILICONE	HYTREL	CELCON	DELRIN	LEXAN	NYLON	POLYSULFONE	PVC	TEFLON	POLYPROPYLENE	POLYETHYLENE	POLYPHENYLENE SULFIDE	POLYCARBONATE	ULTEM	ST. ST. DIN 1.4435/1.4404	STEEL	ST. ST. AISI430	ST. ST. DIN 1.4301/1.4305/1.4542	SILVER	49. NICKEL-IRON	MONEL	LEAD	IRON	INCONEL	COPPER	BRONZE	BRASS	ALUMINUM	
T	S		F	S	U	U	T	T	T		S		T			S							T	T	S	T					S	S		S		Sulfur hexaßuoride
	U					S											T					F	F	F	F	U		F		F		F	F	F	F	Sulfur oils
U	F	U	U	T	F	S	U	T	U	U			S			S	U	U				T	T	T	T	U		F	F	T		T	T	T	F	Sulfur trioxide dry
T	T	T	U	U	U	S	T	U	T	U	U	S	U	U	T	S	T	T	T	T	T	T	T	T	T	T		U	U	U	U	U	U	U	U	Sulfuric acid
T	F	S	T	U	U	S	F		U	U	U	S	U	U	S	S	S	S	S			T	U	U	U	F		U	F	U	U	U	U	U	T	Sulfurous acid
S	T	S	S		T					F	F	S	S	F	F	S									S			S		F		F		F	S	Soybean oil
T	U		U	T	T	S				S	S		S	T	U	S	T	T	S			S	S	S	S	S						S		S	S	(Synthetic lubricant -diester type)
S			S		S					S			S			S												S								Talc slurry
S	U	F	U	T	U	S	U	T							S	F	S	F				T	U	U	T			F		U	T	U		U	U	Tall oil
S	F		S		S	S				F	F	T	S		S	S												S		S						Tallow, molten
T	S		T	F	S	S	T	F	T	U			S	S	S	S	S	S	S	U		T	T	F	F	S		F		F	F	T	T	T	T	Tannic acid 686
T	U	U	T		U	F				F	F	F	S		S	S							S	F	S			S		S	S	S	S	F	S	Tar
																																				Water (see types below)
S	S		S	T	S	S		T					S			S								S	S			S				F	F	F	F	Carbonated
T	S	S	F			S	F			S	S		S	S	S	S	S	S	S		T	S	U	S	S	S		S	U	U	S	T	T	T	S	Distilled, demineralized, deionized
S	S	S	T	T	S	S	T	S	T	S	S		S	S	S	S	S	S	S	S		S	T	S	S	S		S		U	S	S	S	F	F	Fresh
T	S		U	U	U	U		T		S			T			S						S	T	S	S	S		S			S	F	F	T	F	Boiler feed
S	S		T	U	S	T				S			T			S							T	S	S	S						F	F	T	F	Return condensate
T	T		T	U	T	S	F									S		S	S			F	T	F	F	S		S	S	U	S	S	S	U	U	Brackish
S	S	S	S	U	F	S	F	T	T	S	S	F	S	S	S	S	S	S	S			U	U	U	T	S	U	S	S	U	F	F	S	U	U	Sea
			S							S				S	S													S							S	Wax molten
T	T	T	U	U	S	T		T		S	S	F	S	S	S	S	S	U				S	U	F	F			S		U		S	T	F	U	Whiskey and wines
T	T	T	T	U	S	T	F	T	T	S	S	F	S	S	S	S	S	S		T		S	U	S	S			U			S	F	F	F	T	Wine
S	S		U	U	T	S	F	T					T			S						S	S	S	S							U	T	T	S	Xanthates
			S							S			S			F								S	S										X-ray development solution
U	U	U	U	U	U	U				S	S	U	S	S	U	S	U	U					S	S	F		S	S		S		S	S	S	F	Xlol (dry & no alkalies)
U	U	U	U	T	U	F	U	T	U	S	S	U	S	U	T	S	U	U	S	U	U	S	F	S	S	S		S			S	S	S	S	S	Xylene
T	S	S	T	T	S	S	F	T	T	F	S	F	U	S	S	S	S	S	S	S	T	T	T	U	U	F		T	T	T	F	U	U	U	U	Zinc chloride
S	S	S	S	T	S	S	F	T	U		S	F	U	S	S	S	S	S		S		T	U	T	F	S		T	F	U	F	T	T	U	U	Zinc sulfate
T	U	S	T	T	S	F	F	T	T	U			S	S	S	S	S	F	S	T		T	U	T	T	S		T	U	U	S	T	T	U	T	Tartaric acid
		S																																		Tetrabutyl titrate
	U	U	U	U	U																		T	S	S	S						S	S	S	T	Tetrachloroethylene
U	U	U	U	U	U	U	T	U	U	S			T	U		S	U	S	S	U		S													F	Tetrahydrofuran
										U	U					S			S			T	U	U	T			U	U	U		U	U	U	U	Tetraphosphoric acid
										U												U	U	U	U					U		U	U	U		Tin ammonium chloride
S	T									U	S	U			U	S							S		U			T		U						Tin tetrachloride
S																F						T	U	T	F			T	F	U		T	T	U	U	Titanium sulfate
U	U	U	U	U	U	S	U	T								S	U	U		S		T	T	T	T			T				T	T	U	U	Titanium tetrachloride
U	U	U	U	T	U	S	U	T	U	F	F		S	U	U	S	U	U	S	U	U	S	S	S	S	S		S	S	S	S	S	S	S	S	Toluene (Toluol)
S										S													S	S	S	S						S		S	S	Transmission fluid (type A)
U	U	U	U	U	U	U	T	U	U	F	F	F	F		U	S	F	U				S	S		S											Tributyl phosphate
U	F	U	U	U	T	U	T	U	U	U			U			S	F	U	S	T		U	U	U	U			T	U	U	T	U	U	U	U	Trichloroacetic acid
U	U	U	U	U	U	F	U	U	U	S	F	U	U	U	U	S	U	U	S	U		T	T	F	F			F	U	T	S	T	T	T	F	Trichloroethylene
S			S	S		S	U									S						S	T		S	T		S		S		F	S	S		Trichloropropane
U	S	U	U	U	U	S	F	T	U				T			S	F	T	S			S	S	S	S							S	S	S	U	Tricresyl phosphate
			F							T						S							U	U	U			U	U	U		U	U	U	U	Trifluoroacetic acid
S			S		S					S			S			S	S						S	F	F	F		F	U	S		T			U	Trisodium phosphate
S	U	T	S	U	U	T	U	T	T				S			S	S					S	F		S			T			T	T	T	T	S	Tung oil
						S																														Turco # 2976
		T																																		Turco oil # 15
S	U	U	T	U	U	F	U	T	T	S			S	U		S	U	U	T	U		S	F	F	F	S		F	F	F	S	F	F	F	F	Turpentine
U	S		U		U	U							S			S							S		S			S		U		U	U	U	S	Udmh (Hydrazine)
F	F	S	S	T	S	F	F		T	S	T	F	S	F	S	S	S	S	S	U		T	T	F	F	S		T	S	F		T	S	T	F	Urea
					T	T										S						T	S		T		T	S				T	T	T	S	Uranium hexafluoride
																								S	S											Vanadium pentoxide
F	U	U	U	U	U	T	U	T					S	U	U	S	T	U				S	T	T	S			S		T	S	S	T	F	S	Varnish
S			S			S										S						F		F	F	F						F	F	F		Varsol #1 & #2 (mineral spirits)
F	S	S	U	T	S	S	F	T		F	F	S	S	S	S	S						S	S	F	S			F			S			U	S	Vegetable oils
T	S	S	T	U	S	S	T	U	T		F	T	T	S		S	S	S	S	S		S	U	F	F	S		S		T	S	F	F	U	T	Vinegar
	T	U	S	S			U			S						S						T	T	T	T	S		F	U	T	T	U	U	U	T	Vinyl chloride

Conversion of pressure units

	bar	mbar	Pa N/m²	kPa kN/m²	MPa MN/m²	at kp/cm²	atm	mmWS mmCE	mWS mCE	Torr mm Hg	psi lbf/in²
1 bar	1	1000	10^5	100	0.1	1.02	0.987	$1.02 \cdot 10^4$	10.2	750	14.5
1 mbar	0.001	1	100	0.1	10^{-4}	$1.02 \cdot 10^{-3}$	$0.987 \cdot 10^{-3}$	10.2	0.0102	0.75	0.0145
1 Pa 1 N/m²	10^{-5}	0.01	1	0.001	10^{-6}	$1.02 \cdot 10^{-5}$	$0.987 \cdot 10^{-5}$	0.102	$1.02 \cdot 10^{-4}$	0.0075	$1.45 \cdot 10^{-4}$
1 kPa 1 kN/m²	0.01	10	1000	1	0.001	0.0102	$9.87 \cdot 10^{-3}$	102	0.102	7.5	0.145
1 MPa 1 MN/m²	10	10^4	10^6	1000	1	10.2	9.87	$1.02 \cdot 10^5$	102	7500	145
1 at 1 kp/cm²	0.981	981	$0.981 \cdot 10^5$	98.1	0.0981	1	0.968	10^4	10	736	14.22
1 atm	1.013	1013	$1.013 \cdot 10^5$	101.3	0.1013	1.033	1	$1.033 \cdot 10^4$	10.332	760	14.696
1 mmWS 1mmCE	$0.981 \cdot 10^{-4}$	0.098	9.807	$9.81 \cdot 10^{-3}$	$9.81 \cdot 10^{-6}$	10^{-4}	$0.968 \cdot 10^{-4}$	1	0.001	0.0736	$1.422 \cdot 10^{-3}$
1 mWS 1mCE	0.0981	98.07	9807	9.81	$9.81 \cdot 10^{-3}$	0.1	0.0968	1000	1	73.6	1.422
1 Torr 1 mmHg	$1.133 \cdot 10^{-3}$	1.333	133.323	0.133	$1.333 \cdot 10^{-4}$	$1.36 \cdot 10^{-3}$	$1.316 \cdot 10^{-3}$	13.595	$1.359 \cdot 10^{-2}$	1	$1.934 \cdot 10^{-2}$
1 psi 1 lbf/in²	$6.895 \cdot 10^{-2}$	68.95	6895	6.895	$6.895 \cdot 10^{-3}$	$7.031 \cdot 10^{-2}$	0.06805	703.1	0.7031	51.7	1

Conversion of temperature units

[°F] to [°C] Formula: °C = 5/9·(°F –32)					
°F	°C	°F	°C	°F	°C
–100	–73.3	105	40.6	315	157.2
–95	–70.6	110	43.3	320	160.0
–90	–67.8	115	46.1	325	162.8
–85	–65.0	120	48.9	330	165.6
–80	–62.2	125	51.7	335	168.3
–75	–59.4	130	54.4	340	171.1
–70	–56.7	135	57.2	345	173.9
–65	–53.9	140	60.0	350	176.7
–60	–51.1	145	62.8	355	179.4
–55	–48.3	150	65.6	360	182.2
–50	–45.6	155	68.3	365	185.0
–45	–42.8	160	71.1	370	187.8
–40	–40.0	165	73.9	375	190.6
–35	–37.2	170	76.7	380	193.3
–30	–34.4	175	79.4	385	196.1
–25	–31.7	180	82.2	390	198.9
–20	–28.9	185	85.0	395	201.7
–15	–26.1	190	87.8	400	204.4
–10	–23.3	195	90.6	405	207.2
–5	–20.6	200	93.3	410	210.0
0	–17.8	205	96.1	415	212.8
5	–15.0	210	98.9	420	215.6
10	–12.2	215	101.7	425	218.3
15	–9.4	220	104.4	430	221.1
20	–6.7	225	107.2	435	223.9
25	–3.9	230	110.0	440	226.7
30	–1.1	235	112.8	445	229.4
32	0	240	115.6	450	232.2
35	1.7	245	118.3	455	235.0
40	4.4	250	121.1	460	237.8
45	7.2	255	123.9	465	240.6
50	10.0	260	126.7	470	243.3
55	12.8	265	129.4	475	246.1
60	15.6	270	132.2	480	248.9
65	18.3	275	135.0	485	251.7
70	21.1	280	137.8	490	254.4
75	23.9	285	140.6	495	257.2
80	26.7	290	143.3	500	260.0
85	29.4	295	146.1	505	262.8
90	32.2	300	148.9	510	265.6
95	35.0	305	151.7	515	268.3
100	37.8	310	154.4	520	271.1

[°C] to [°F] Formula: °F = 9/5·(°C +32)					
°C	°F	°C	°F	°C	°F
–100	–148	105	221	315	599
–95	–139	110	230	320	608
–90	–130	115	239	325	617
–85	–121	120	248	330	626
–80	–112	125	257	335	635
–75	–103	130	266	340	644
–70	–94	135	275	345	653
–65	–85	140	284	350	662
–60	–76	145	293	355	671
–55	–67	150	302	360	680
–50	–58	155	311	365	689
–45	–49	160	320	370	698
–40	–40	165	329	375	707
–35	–31	170	338	380	716
–30	–22	175	347	385	725
–25	–13	180	356	390	734
–20	–4	185	365	395	743
–15	5	190	374	400	752
–10	14	195	383	405	761
–5	23	200	392	410	770
0	32	205	401	415	779
5	41	210	410	420	788
10	50	215	419	425	797
15	59	220	428	430	806
20	68	225	437	435	815
25	77	230	446	440	824
30	86	235	455	445	833
32	89.6	240	464	450	842
35	95	245	473	455	851
40	104	250	482	460	860
45	113	255	491	465	869
50	122	260	500	470	878
55	131	265	509	475	887
60	140	270	518	480	896
65	149	275	527	485	905
70	158	280	536	490	914
75	167	285	545	495	923
80	176	290	554	500	932
85	185	295	563	505	941
90	194	300	572	510	950
95	203	305	581	515	959
100	212	310	590	520	968

Trafag international

Europe

Headquarters, Switzerland
Trafag AG
Industriestrasse 11
CH - 8608 Bubikon
Tel. +41 44 922 32 32
www.trafag.com
e-mail: trafag@trafag.com

Albania
Bosnia-Herzegovina, Macedonia, Montenegro, Serbia, Slovenia
Axo-Texcomp Services SA
P.O. Box 88
CH - 1164 Buchillon
Tel. +41 21 807 22 01
mbucher@axotex.ch

Austria
Trafag GmbH
Konrad-Doppelmayr-Strasse 17
AT - 6922 Wolfurt
Tel. +43 5574 20866
www.trafag.at
e-mail: trafagat@trafag.com

Belgium
Marktechnical B.V.B.A.
Boxtelstraat 11
BE - 2320 Hoogstraten
Tel. +32 3 311 8864
www.marktechnical.be
e-mail: info@marktechnical.be

Croatia
Albania, Bosnia-Herzegovina, Macedonia, Montenegro, Serbia, Slovenia
VARGA ELEKTRONIK d.o.o.
Draškovićeva 12
Draškovec
HR - 40323 Prelog
Tel. +385 40 643 189
www.varga-elektronik.hr
e-mail: info@varga-elektronik.hr

Cyprus
ACTech Ltd.
60 Mesologiou Str, 185-45
GR - Piraeus
Tel. +30 210 4630 825
www.actech.gr
e-mail: actech1@otenet.gr

Czech Republic
Trafag spol. s r.o.
Vilémovská 2129
CZ - 347 01 Tachov
Tel. +420 374 723 250
www.trafag.cz
e-mail: prodej@trafag.com

Denmark
OEM Automatic Klitsø A/S
Engholm Parkvej 4
DK - 3450 Allerød
Tel. +45 70 10 64 00
www.oemklitso.dk
e-mail: info@oemklitso.dk

Estonia, Latvia
Wermundsen OÜ
Pärnu mnt. 142
EE - 11317 Tallinn
Tel. +372 601 4202
www.wermundsen.ee
e-mail: wermundsen@wermundsen.ee

Finland
Wexon OY
Turvekuja 6
FI - 00700 Helsinki
Tel. +358 9 290 440
www.wexon.com
e-mail: wexon@wexon.fi

France
Trafag S.A.R.L.
2 Boulevard Westinghouse
FR - 93270 Sevran
Tel. +33 1 4863 0101
www.trafag.fr
e-mail: trafagfr@trafag.com

Germany
Trafag GmbH
Kelterstrasse 59
DE - 72669 Unterensingen
Tel. +49 7022 40590-0
www.trafag.de
e-mail: info@trafag.de

Great Britain
Trafag (UK) Ltd.
Unit 6 First Quarter
Blenheim Rd
GB - Epsom, KT19 9QN
Tel. +44 (0) 203 968 0020
www.trafag.co.uk
e-mail: enquiries@trafag.co.uk

Greece
ACTech Ltd.
60 Mesologiou Str, 185-45
GR - Piraeus
Tel. +30 210 4630 825
www.actech.gr
e-mail: actech1@otenet.gr

Hungary
OEM Automatic Kft.
Gyár u.2.
HU - 2040 Budaörs
Tel. +36 23 880 895
www.oemautomatic.hu
e-mail: info@oemautomatic.hu

Iceland
Samey ehf.
Lyngas 13
IS - 210 Gardabaer
Tel. +354 510 5200
www.samey.is
e-mail: sala@samey.is

Italy
Trafag Italia S.r.l.
c/o Tecnocity Altomilanese
Via Cremona, 1
IT - 20025 Legnano (MI)
Tel. +39 0 331 592 397
www.trafagitalia.com
e-mail: info@trafagitalia.com

Lithuania
UAB Auregis
Savanorių pr. 271
Mituvos g. 2
LT - Kaunas 50131
Tel. +370 37 313426
www.auregis.lt
e-mail: info@auregis.lt

Trafag international

Europe

Netherlands
Marktechnical B.V.
Lage Ham 172-178
P.O. Box 324 / 5100 AH Dongen
NL - 5102 AE Dongen
Tel. +31 162 31 42 85
www.marktechnical.nl
e-mail: info@marktechnical.nl

Norway
Stork AS
Brynsveien 100
NO - 1352 Kolsas
Tel. +47 67 17 64 00
www.stork.no
e-mail: stork@stork.no

Poland
POLTRAF Sp. z o. o.
ul.Bysewska 26C
PL - 80-298 Gdańsk
Tel. +48 58 557 52 07
Tel. +48 58 557 52 23
www.poltraf.com
e-mail: info@poltraf.com.pl

Portugal
Contimetra Instrumentos Industriais Lda.
Rua do Proletariado, 15-B
Portela de Carnaxide
PT - 2790-138 Carnaxide
Tel. +351 214 203 900
www.contimetra.com
e-mail: industria@contimetra.com

Romania
Synchro Comp s.r.l.
ID Sarbu street no. 13 Camin 3
RO - Craiova 200561 Dolj
Tel. +40 317 800 000
www.synchro.ro
e-mail: office@synchro.ro

Russia
POLTRAF CIS
Lyubotinsky pr. 5
RU - 196105 St.-Petersburg
Tel. +7 812 244 94 24
www.poltraf.ru
e-mail: info@poltraf.ru

Spain
Trafag España S.L.
Parque Tecnológico Bizkaia
Edificio 101 – E
ES - 48170 Zamudio (Bizkaia)
Tel. +34 94 641 40 63
www.trafag.es
e-mail: info@trafag.es

Sweden
Regal Components AB
Lefflersgatan 1
SE - 754 50 Uppsala
Tel. +46 18 657 000
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e-mail: info@regal.se

Switzerland
see 'Headquarters'
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e-mail: trafag@trafag.com

Turkey
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Ukraine
Soliton Ltd.
19, Akademika Tupoleva str
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www.soliton.com.ua
e-mail: soliton@soliton.com.ua

Trafag international

Asia

China

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www.etic.cn
e-mail: info@etic.cn

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e-mail: Lydia@rydm.net

India

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Plot no-248, Sector-7
IMT Manesar
IN - Gurgaon-122050,
Haryana
Tel. +91 124 404 47 20
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e-mail: trafagindia@trafag.com

Indonesia

General Industry:
Please contact our headquarters
Switzerland
Tel. +41 44 922 32 32
www.trafag.com
e-mail: trafag@trafag.com

Indonesia

SF_6 High Voltage Industry:
PT. HIGH VOLT TECHNOLOGY
Graha Mas Pemuda AD-7
Jln. Pemuda, Rawamangun
ID-Jakarta Timur, 13220
Tel. +62 21 4711898, 4711884
www.highvolt-technology.com
e-mail: sales@highvolt-technology.com

Israel

Timcon Technologies Systems Ltd
3, Josef Levi St.
Industrial Zone P.O.B. 1057
IL - Kiryat Bialik 27110
Tel. +972 4 8742605
www.timcon.co.il
e-mail: timcon@timcon.co.il

Japan

Trafag Japan Co., Ltd.
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Minato-ku
JP - Tokyo 105-0012
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e-mail: trafagjapan@trafag.com

Korea

Engines, Shipbuilding
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Gangseo-gu
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e-mail: hwa-jin@hwa-jin.com

Korea

General Industry:
GMS-Korea Co., Ltd
#101-308, Digital Empire II,
Shinwon-ro 88, Yeongtong-gu
KR - Suwon-city, Gyeonggi-do
Tel. +82 31 243 10 35
www.www.gms-korea.com
e-mail: sales@gms-korea.com

Malaysia

General Industry:
SENSING Process Instruments Sdn Bhd
30, Jalan 30/119A
Taman Taynton View, Cheras,
MY - 56000 Kuala Lumpur
Tel. +603 9235 1038
www.sensing.com.my
e-mail: info@sensing.com.my

Malaysia

SF_6 High Voltage Industry:
LIANEQUIP Sdn Bhd
C-37-3, Block C, 3rd Floor,
Jaya One, No 72A Jln Universiti
MY - 46200 Petaling Jaya, Selangor
Tel. +603 7956 7652
www.lianequip.com
e-mail: lianeq2014@gmail.com

Philippines

General Industry:
West Point Engineering Supplies
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Barangay Patubig
Marilao Bulacan
Philippines 3019
Tel. +63 44 797 2524
www.westpointengineering.com.ph
sales@westpointengineering.com.ph

Philippines

SF_6 High Voltage Industry:
KVAR CORPORATION
No. 7 Villanueva Drive cor.,
Commonwealth Ave.
Old Balara 1119 Quezon City
Metro Manila
Tel. +632 921 86 99
www.kvar.com.ph
e-mail: admin@kvar.com.ph

Trafag international

Asia

Singapore
General Industry:
Please contact our headquarters
Switzerland
Tel. +41 44 922 32 32
www.trafag.com
e-mail: trafag@trafag.com

Singapore
Shipbuilding:
Bond Instrumentation (S) Pte. Ltd.
8 Gul Street 3
SG - Singapore 629265
Tel. +65 68 651 800
www.bond.com.sg
e-mail: bondsales@bond.com.sg

Taiwan
Daybreak International (Taiwan) Corp.
3 F, No.124, Chung-Cheng Road,
Shihlin 11145
TW - Taipei
Tel. +886 2 8866 1234
www.daybreak.com.tw
e-mail: day111@ms23.hinet.net

Thailand
General Industry:
Themtech Co., Ltd.
127 Soi Srimuang-Anusorn
Sutthisarnvinijchai Rd., Dindaeng
TH - Bangkok 10400
Tel. +662 693 6629
www.primusthai.com
e-mail: sales@themtech.co.th

Thailand
SF_6 High Voltage Industry:
PACIFIC POWER TECHNOLOGY CO., LTD.
61/1 Soi Pattanakarn 54,
Pattanakarn Rd.,
Suanluang, Suanluang,
ID-Bangkok, 10250
Tel. +66 2320 0462-5
surasakpare@gmail.com

United Arab Emirates
Abdulla Bin Hamid Trading LLC
Po Box 30495
AE - Dubai
Tel. +971 4 2241464
www.accutech.ae
e-mail: sales@accutech.ae

Vietnam
GNN Co. Ltd
33 Hoa Hong 2, Ward 2
Nhu Nhuan Dist. HCMC
Tel. +84 8 3517 4923
www.gnnvietnam.com
e-mail: contact@gnnvietnam.com

America

USA
Trafag, Inc.
8848 Red Oak Boulevard, Suite I
US - Charlotte, NC 28217
Tel. +1 704 343 6339
www.trafag.us
e-mail: salesus@trafag.com

Canada
Indumart Inc.
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CA - Markham, L3R 1B5,
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e-mail: sales@indumart.com

South America

Brazil
Sense Eletrônica
Rua Tuiutí1237
BR - 03081-012 Tatuapé São Paulo SP
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e-mail: vendas@sense.com.br

Colombia
Surti Industria S.A.S
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Envigado - Antioquia
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www.surtiindustria.com.co
e-mail: surtiindustria@une.net.co

Africa

South Africa
ICS (Pty) Ltd.
Instrumentation & Control Systems
1 Claerhout Crescent
ZA - Sasolburg, 1947 RSA
Tel. +27 82 900 83 12
www.instcon.co.za
e-mail: info@instcon.co.za

Australia, Oceania

Australia
Dart Instruments Pty. Ltd.
250 Military Road
AU - Neutral Bay NSW 2089
Tel. +61 2 8456 7550
www.trafag.com.au
e-mail: sales@dartinstruments.com.au

New Zealand
Eurotec Limited
750C Great South Road
Penrose
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NZ - Panmure Auckland
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e-mail: sales@eurotec.co.

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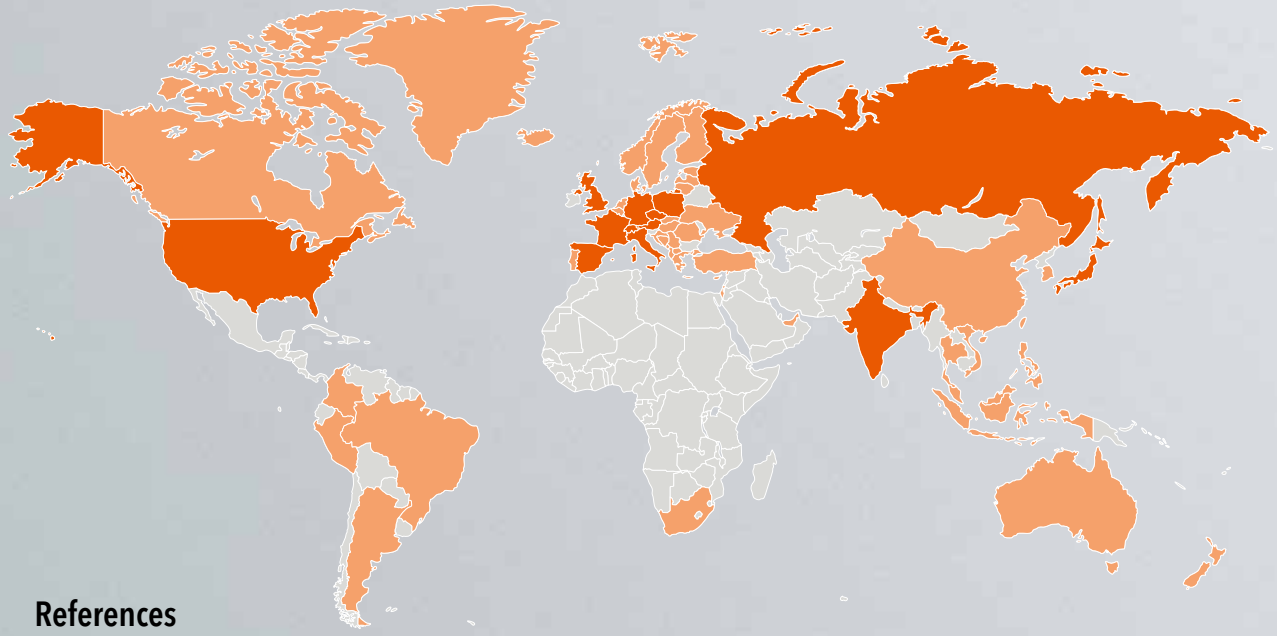

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Trafag sensors & controls
Switzerland

Industriestrasse 11
CH-8608 Bubikon

Tel. +41 44 922 32 32
Fax +41 44 922 32 33

www.trafag.com
trafag@trafag.com

trafag sensors controls