HYDROGEN PRESSURE TRANSMITTER

Swiss based Trafag is a leading international supplier of high quality sensors and monitoring instruments for measurement of pressure and temperature. The NHT 8250 Hydrogen pressure transmitter features a thin-film-on-steel sensor based on a special hydrogen-compatible high-performance alloy for best-in-class signal stability. The robust mechanical design with fully welded housing is built to last in harsh environments.

Applications

- H_2 fuelling stations
- Hydrogen compressors
- Fuel cells
- Vehicles with H_2 drive
- Hydrogen tanks

Features

- EC79/2009 certified by the KBA Kraftfahrt-Bundesamt
- Wetted materials made of hydrogen-compatible steel
- Completely welded sensor system without additional seals
- Excellent long-term stability
- Optional: Switching output 1 or 2 PNP

09/2022
Data sheet H72338c
Subject to change

Technical Data			
Measuring principle	Thin-film-on-steel	Accuracy @ 25°C typ.	± 0.5 % FS typ. ± 0.3 % FS typ.
Measuring range	0 ... 1 to 0 ... 600 bar 0 ... 15 to 0 ... 7500 psi	Media temperature	–40°C ... +85°C
Output signal	4 ... 20 mA, 0.5 ... 4.5 VDC, 0 ... 5 VDC, 1 ... 5 VDC, 1 ... 6 VDC, 0 ... 10 VDC, 0.1 ... 10.1 VDC, 0.5 ... 4.5 VDC ratiometric, Switching output: 1 or 2 PNP	Ambient temperature	–40°C ... +85°C (Cable PVC 22: -5°C ... +60°C) (Cable PUR 24: -40°C ... +70°C)
NLH @ 25°C (BSL) typ.	± 0.2 % FS typ.	Approval / conformity	EC79/2009: e1*79/2009*406/2010*00047*00

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Ordering information/type code

8250 . XX XX XX XX XX XX

Measuring range [1]

Pressure measurement range [bar]	Over pressure [bar]	Burst pressure [bar]	Code	Pressure measurement range [psi]	Over pressure [psi]	Burst pressure [psi]	Code
0 ... 1	2	25	**71**	0 ... 15	30	350	**G1**
0 ... 1.6	3.2	32	**73**	0 ... 30	60	700	**G5**
0 ... 2.5	5	50	**75**	0 ... 50	100	850	**G6**
0 ... 4	8	60	**76**	0 ... 100	200	1450	**G7**
0 ... 6	12	100	**77**	0 ... 150	300	2500	**G8**
0 ... 10	20	200	**78**	0 ... 200	400	2500	**GA**
0 ... 16	32	200	**79**	0 ... 250	500	2500	**G9**
0 ... 25	38	300	**80**	0 ... 300	600	4000	**HA**
0 ... 40	60	300	**81**	0 ... 400	600	4000	**H0**
0 ... 60	90	400	**82**	0 ... 500	750	4000	**H1**
0 ... 100	150	500	**83**	0 ... 1000	1500	5000	**H2**
0 ... 160	240	750	**85**	0 ... 1500	2250	7000	**H3**
0 ... 250	375	1000	**74**	0 ... 2000	3000	10000	**H5**
0 ... 400	600	1500	**84**	0 ... 3000	4500	14500	**G4**
0 ... 600	900	2000	**86**	0 ... 7500	11250	29000	**H6**

Sensor

Relative pressure, accuracy: 0.3 %	**33**
Relative pressure, accuracy: 0.5 %	**35**

Pressure connection

G1/4" male, seal: DIN 3869 (accessories 61/63/83)	**17**
1/4" NPT male	**30**
1/8" NPT male	**43**
7/16"-20UNF SAE4 male, seal: accessory 61/63	**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 connector MIL-C 26482, 6-pole, metal	**02**
Male electrical connector Deutsch DT04-3P, 3-pole	**D3**
Male electrical connector Deutsch DT04-4P, 4-pole	**D4**
Cable IP67, Mat. PVC [3]	**22**
Cable IP67, Mat. PUR [3]	**24**
Cable IP67, Mat. EPD Raychem FDR25 [3]	**08**

Output signal

Signal output	Load resistance	I (supply)	U (supply)	Code
4 ... 20 mA	See graphic		24 (9 ... 32) VDC	**19**
0.5 ... 4.5 VDC [6]	≥ 5.0 kΩ to Us-	≤ 20 mA	24 (9 ... 32) VDC	**20**
0 ... 5 VDC [6]	≥ 5.0 kΩ to Us-	≤ 20 mA	24 (9 ... 32) VDC	**14**
0.1 ... 4.1 VDC [6]	≥ 5.0 kΩ to Us-	≤ 20 mA	24 (9 ... 32) VDC	**28**
0.1 ... 5.1 VDC [6]	≥ 5.0 kΩ to Us-	≤ 20 mA	24 (9 ... 32) VDC	**29**
0.5 ... 5 VDC [6]	≥ 5.0 kΩ to Us-	≤ 20 mA	24 (9 ... 32) VDC	**22**
1 ... 5 VDC [6]	≥ 5.0 kΩ to Us-	≤ 20 mA	24 (9 ... 32) VDC	**25**
0.5 ... 5.5 VDC [6]	≥ 5.0 kΩ to Us-	≤ 20 mA	24 (9 ... 32) VDC	**24**
1 ... 6 VDC [6]	≥ 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 [6]	≥ 5.0 kΩ to Us-	≤ 10 mA	5 (4.75 ... 5.25) VDC	**23**
2 PNP transistors [4]		≤ 10 mA	24 (9 ... 32) VDC	**PS**
1 PNP transistor [4]		≤ 10 mA	24 (9 ... 32) VDC	**T1**

		8250 . XX XX XX XX XX XX
Accessories	Female electrical plug M12x1, 5-pole [2]	33
	Female electrical plug industrial standard (for electrical connection 01)	34
	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 connector 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 connector 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, 28, 29 and male electrical connector 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 connector 32, M12x1, 4-pole)	96
	Special electrical connection: Pin 1 +, Pin 3 -, Pin 4 Out (only for output signals 13, 14, 16, 17, 20, 22, 23, 24, 25, 26, 28, 29 and male electrical connector 32, M12x1, 4-pole)	G1
	Special electrical connection: Pin 1 +, Pin 2 -, Pin 4 Ground (only for output signal 19 and male electrical connector 01, industrial standard)	92
	Special electrical connection: Pin 1 +, Pin 2 -, Pin 4 Ground (only for output signal 19 and male electrical connector 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 connector 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, 28, 29 and male electrical connector 01, industrial standard)	E3
	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, 28, 29 and male electrical connector 01, industrial standard)	E9
	Special electrical connection: Pin 1 + , Pin 2 Ground, Pin 4 - (only for output signal 19 and male electrical connector 32, M12x1, 4-pole)	E6
	Special electrical connection: Pin A +, Pin C - (only for output signal 19 and male electrical connector 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, 28, 29 and male electrical connector Deutsch DT04-3P, 3-pole)	F1
	Special electrical connection: Pin A +, Pin C Out, Pin B/D -, Pin E Ground (Pin B and D are connected) (only for output signals 13, 14, 16, 17, 20, 22, 23, 24, 25, 26, 28, 29 and male electrical connector 02, MIL-C 26482)	F3
	Special electrical connection: Pin 1 +, Pin 2 - (only for output signal 19 and male electrical connector 32, M12x1, 4-pole)	F4
	Special electrical connection: Pin 1 +, Pin 3 - (only for output signal 19 and male electrical connector 32, M12x1, 4-pole)	F5
	Special electrical connection: Pin 1 +, Pin 2 -, Pin 3 -, Pin 4 Ground (only for output signals 19 and male electrical connector 32, M12x1, 4-pole)	G2
	Special electrical connection: Pin 1 +, Pin 2 Out, Pin 3 Ground, Pin 4 - (only for output signals 13, 14, 16, 17, 20, 22, 23, 24, 25, 26, 28, 29 and male electrical connector 32, M12x1, 4-pole)	F6
	Special electrical connection: Pin 1 +, Pin 2 Out, Pin 3 - (only for output signals 13, 14, 16, 17, 20, 22, 23, 24, 25, 26, 28, 29 and male electrical connector 32, M12x1, 4-pole)	F7
	Cable length 0.5 m	EM
	Cable length 1.0 m	1M
	Cable length 2.0 m	2M
	Parameterisation according to customer specification for output signal PS, T1 (see table "Parameters")	ZC
	Parameterisation standard for output signal PS, T1 (see table "Parameters")	ZS
	Multiple packaging [5]	VM

[1] Customized pressure ranges upon request
[2] For electrical connections 32 and 35
[3] Cable length see accessories
[4] Only with electrical connections 32, 22, 24, 08
[5] The order quantity must be a multiple of 50
[6] Only measuring ranges > 16 bar

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 Hysteresis ≥ 1 % FS	SP1	
Reset point RP1 (hysteresis mode) Lower switch point FL1 (window mode)	25 % Measuring range	< SP1, FH1 Hysteresis ≥ 1 % FS	RP1	
Switch point SP2 (hysteresis mode) Upper switch point FH2 (window mode)	75 % Measuring range	> RP2, FL2 Hysteresis ≥ 1 % FS	SP2	
Reset point RP2 (hysteresis mode) Lower switch point FL2 (window mode)	25 % Measuring range	< SP2, FH2 Hysteresis ≥ 1 % FS	RP2	
Switch point delay time SP1 / RP1 (hysteresis mode) Switch point delay time FH1 / FL1 (window mode)	0	0; 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; 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 parameterised quickly and easily with the Sensor Master Communicator (SMC) application, which is available for Windows (PC) and Android smartphone.

The Android app is available in the Google Play Store and the Windows app is available in the Microsoft Store. The apps are free of charge.

- Data sheet SMI Sensor Master Interface: www.trafag.com/H72618
- Instruction for the Sensor Master Communicator App (SMC) and the Sensor Master Interface (SMI): www.trafag.com/H73618

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 1 ... 5 VDC: 24 (9...32) VDC 1 ... 6 VDC: 24 (9...32) VDC 0 ... 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
	Power-on delay time pressure transmitters	100 ms
	Power-on delay time 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, 1...5 VDC, 1...6 VDC, 0...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 ... +85°C
	Ambient temperature	–40°C ... +85°C (Cable PVC 22: -5°C ... +60°C) (Cable PUR 24: -40°C ... +70°C)
	Protection [1)]	IP65, IP67
	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)	Nitrogen-strengthened austenitic steel, hydrogen compatible
	Pressure connection (wetted parts)	1.4404 (AISI316L)
	Housing	1.4301 (AISI304)
	Sealing	FPM/EPDM/NBR
	Male electrical connector	See ordering information
	Weight	appr. 50 g
	Mounting torque	25 Nm

[1)] See electrical connection

[2)] For electrical connections 32 and 35

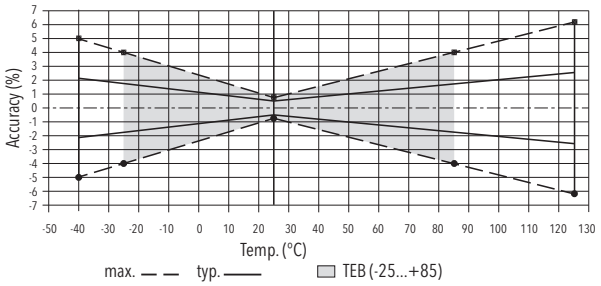
EC79/2009 Certificate	
Nominal working pressure (NWP) @15°C	0.08 … 70 MPa
Maximum allowable working pressure	0.1 … 100 MPa
Classification	Class 0, Class 1 und Class 2*
Pressure codes	71 … 88
Process connection	Code 17: Up to NWP 35 MPa
	Codes 30, 42, 43, 68: Up to NWP 70 MPa
Seal	Codes 61 and 63

* The transmitters of class 0 were tested, Because the most highly loaded case was tested the results can be applied to the whole product family with pressure ranges from 0.8bar to 700bar.

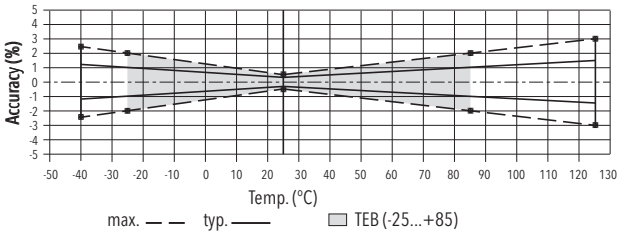
Analogue output				
			Sensor 35 accuracy 0.5 %	**Sensor 33 accuracy 0.3 %**
Accuracy	TEB @ -25 ... +85°C	[% FS typ.]	± 1.75	± 1.0
	Accuracy @ +25°C	[% FS typ.]	± 0.5	± 0.3
	NLH @ +25°C (BSL)	[% FS typ.]	± 0.2	± 0.2
	TC zero point and span	[% FS/K typ.]	± 0.03	± 0.01
	Long term stability 1 year @ +25°C	[% FS typ.]	± 0.75	± 0.75
Rise time	Typ. 1 ms / 10 ... 90 % nominal pressure			

Switching output				
			Sensor 35 accuracy 0.5 %	**Sensor 33 accuracy 0.3 %**
Accuracy	TEB @ -25 ... +85°C	[% FS typ.]	± 1.75	± 1.0
	Accuracy @ +25°C	[% FS typ.]	± 0.5	± 0.3
	Long term stability 1 year @ +25°C	[% FS typ.]	± 0.75	± 0.75
Setting 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	≤ 400 mA, total of both switching outputs			
Current limiting	integrated			
Lifetime	>100 x 10^6 cycles			
Delay time	0; 2^x [ms], x = 3, 4 ... 16			
Switching frequency	max. 60 Hz (at switching delay time = 0)			

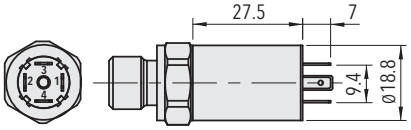
Measuring accuracy 0.5 %



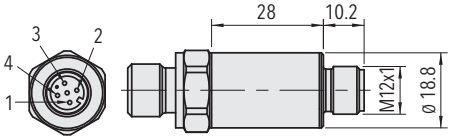
Measuring accuracy 0.3 %



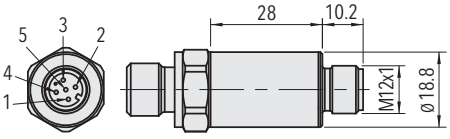
Dimensions



8250.XX.XXXX.**01**.XX.XX



8250.XX.XXXX.**32**.XX.XX



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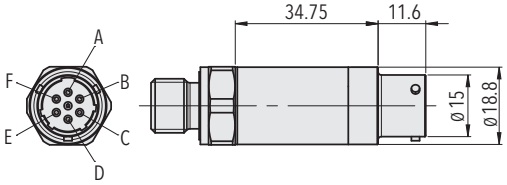
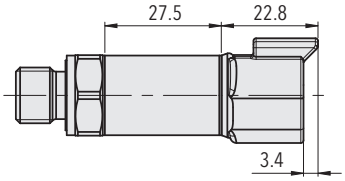
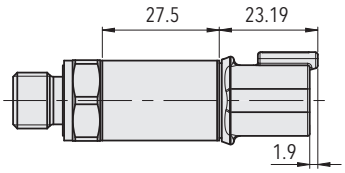


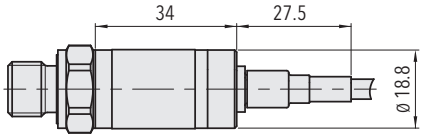
8250.XX.XXXX.**02**.XX.XX



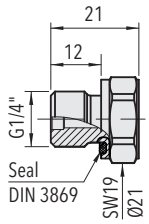
8250.XX.XXXX.**D3**.XX.XX



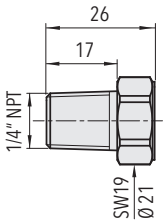
8250.XX.XXXX.**D4**.XX.XX



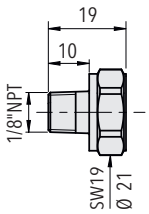
8250.XX.XXXX.**22/24/08**.XX.XX



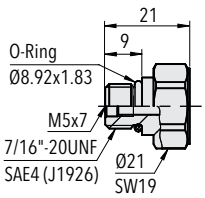
8250.XX.XX**17**.XX.XX.XX



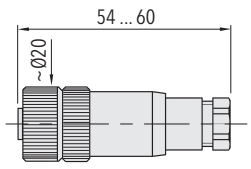
8250.XX.XX**30**.XX.XX.XX



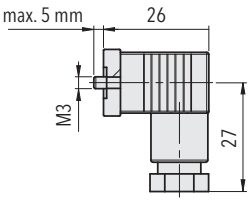
8250.XX.XX**43**.XX.XX.XX



8250.XX.XX**42**.XX.XX.XX



8250.XX.XXXX.XX.XX.**33**

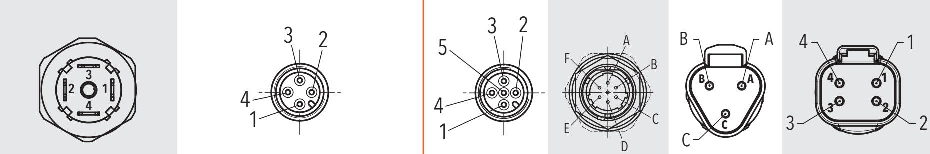


8250.XX.XXXX.XX.XX.**34**

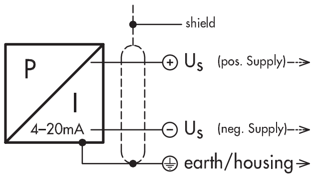
Electrical connection

Protection / electrical connection

	IP65 [1) 2)]	IP67 [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**

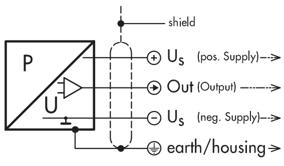


Output signal



8250.xx.xxxx.xx.**19**

Signal	01	01: 90	01: 92	32	32: E1	32: E6	32: F4	32: F5	32: G2	35	02	D3	D3: F0	D4
+ U_S (pos. Supply)	2	2	1	1	1	1	1	1	1	4	A	A	A	2
− U_S (neg. Supply)	1	4	2	3	2	4	2	3	2/3	1	B	B	C	1
earth/housing	4	3	4	4	4	2			4	5	E			3

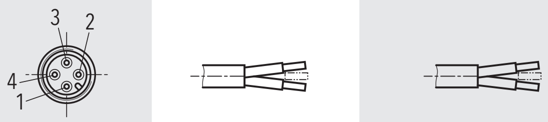


8250.xx.xxxx.xx.**13/14/16/17/20/22/23/24/25/26/28/29**

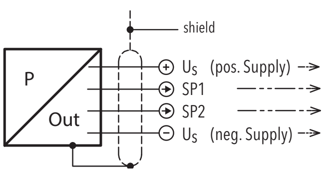
Signal	01	01: 91	01: E3	01: E9	32	32: 95	32: 96	32: E2	32: F6	32: F7	32: G1	35	02	02: F3	D3	D3: F1	D4
+ U_S (pos. Supply)	1	2	3	1	1	1	1	1	1	1	1	2	A	A	A	A	2
Out (Output)	2	1	1	3	2	3	4	3	2	2	4	4	B	C	C	B	4
− U_S (neg. Supply)	3	4	2	2	3	4	3	2	4	3	3	3	C/D	B/D	B	C	1
earth/housing	4	3	4	4	4	2	2	4	3			5	E	E			3

Protection / electrical connection

	IP67 *) **)	IP67**)	IP67**)
	M12x1 4-pole	Cable	Cable
	32	**22/24**	**08**



Output signal



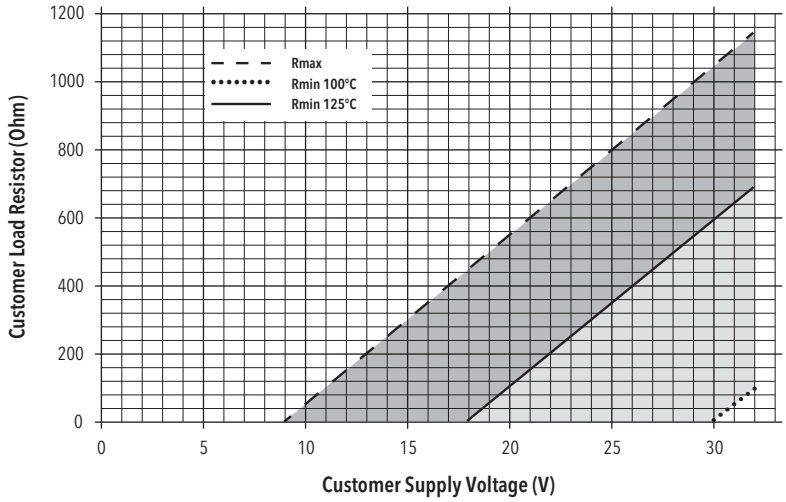
8250.xx.xxxx.xx.**PS/T1**

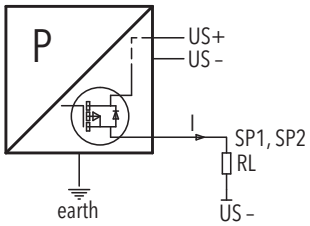
Signal	32: PS	32: T1	22/24: PS	22/24: T1	08: PS	08: T1
+ U_S (pos. Supply)	1	1	white	white	red	red
SP1	4	4	green	green	white	white
SP2	2	–	yellow	–	green	–
− U_S (neg. Supply)	3	3	brown	brown	black	black

*) Provided female electrical plug is mounted according to instructions

**) Ventilation via male electric plug/cable end

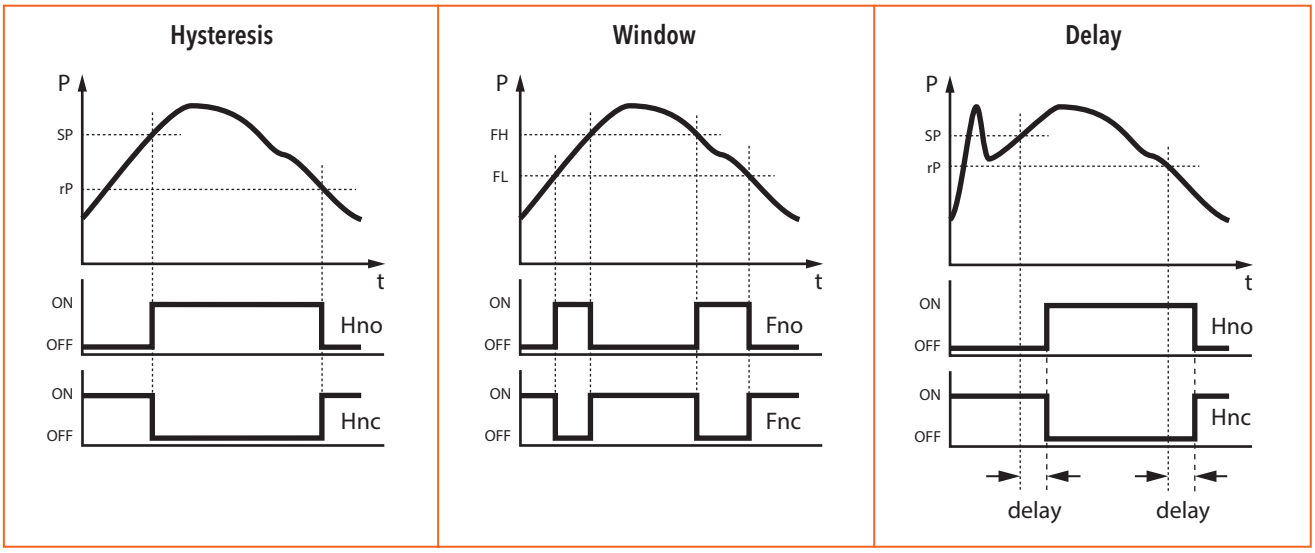
4...20mA: min./max resistor vs. supply voltage @ Pmax = 100%





Connection of loads to switching contacts

Functions switching output



Additional information		
Documents	Data sheet	www.trafag.com/H72338
	Instructions	www.trafag.com/H73303
	Flyer	www.trafag.com/H70606