

IO-Link Pressure Transmitter and Switch

IO-Link



Product description

The NAI 8273 IO-Link pressure transmitter is designed as a smart sensor and provides application-relevant information in addition to the process data. The process data contains the pressure value and the media temperature, which is measured directly at the exceptionally long-term stable thin-film-on-steel pressure sensor cell. The small sensor dimension combined with the pressure and temperature value of the media make the NAI 8273 the ideal choice in various applications. For the use of the conventional switching outputs, the polarity NPN and PNP is configurable.

Applications

- Machine tools
- Hydraulics
- Pneumatics
- Process technology

Features

- Pressure measuring accuracy 0.3 %, 0.5 %
- Media and device temperature measurement
- COM3, min. process cycle time 1 ms
- 2 Switching outputs PNP/NPN configurable
- Optional: 5-fold overpressure resistance

EMC: 2014/30/EU

S.I. 2016 No. 1091: IEC 61131-9 (IO-Link)

RoHS/Reach compliant

S.I. 2016 No. 1091: IEC 61131-9 (IO-Link)

Technical Data

Measuring principle	Thin-film-on-steel
Measuring range	-0.2 ... 0.2 to 0 ... 700 bar
Output signal	IO-Link 1.1, COM3, min. process cycle time 1 ms, Smart Sensor Profile ED2, 2 Switching outputs PNP/NPN, Push-Pull configurable
Media temperature	-40°C ... +125°C
Ambient temperature	-40°C ... +105°C

Additional information

Data sheet	www.trafag.com/H72621
Instructions	www.trafag.com/H73621
Interface description	www.trafag.com/H73664
Accessories	www.trafag.com/en/H72258
Video	https://youtu.be/4JGD4aJJ08I

Ordering information/Type code

							8273	XX	XX	XX	XX	XX	
Measuring range ¹⁾	Pressure measurement range [bar]	Over pressure [bar]	Burst pressure [bar]	Pressure measurement range [psi] ³⁾	Over pressure [psi]	Burst pressure [psi]							
-0.2 ... 0.2 ²⁾	1.2	1.2	25	-2.9 ... 2.9	17.4	362	A8						
-0.4 ... 0 ²⁾	1.2	1.2	25	-5.8 ... 0	17.4	17.4	D3						
-0.4 ... 0.4 ²⁾	1.6	1.6	25	-5.8 ... 5.8	23.2	362	A9						
-1 ... 0 ²⁾	2	2	25	-14.5 ... 0	29	362	D4						
-1 ... 1 ²⁾	6	6	50	-14.5 ... 14.5	87	362	B1						
-1 ... 1.6 ²⁾	7.8	7.8	50	-14.5 ... 23.2	113	725	B3						
-1 ... 4	12	12	50	14.5 ... 58	174	870	B6						
-1 ... 6	18	18	100	-14.5 ... 87	261	1450	B7						
-1 ... 10	30	30	200	-14.5 ... 145	435	2900	B8						
-1 ... 16	48	48	200	-14.5 ... 232	696	2900	B9						
-1 ... 25	75	75	300	-14.5 ... 362	1087	4351	C0						
0 ... 0.2 ²⁾	1.2	1.2	25	0 ... 2.9	17.4	362	68						
0 ... 0.4 ²⁾	1.2	1.2	25	0 ... 5.8	17.4	362	69						
0 ... 1 ²⁾	2	2	25	0 ... 14.5	29	362	71						
0 ... 2.5	7.5	7.5	50	0 ... 36.2	109	870	75						
0 ... 10	30	30	200	0 ... 145	435	2900	78						
0 ... 40	120	120	300	0 ... 580	1740	4351	81						
0 ... 60	180	180	400	0 ... 870	2610	5801	82						
0 ... 100	300	300	500	0 ... 1450	4351	7252	83						
0 ... 160	480	480	750	0 ... 2320	6962	10878	85						
0 ... 250	750	750	1000	0 ... 3626	10878	14504	74						
0 ... 400	1000	1000	2000	0 ... 5801	14504	29007	84						
0 ... 600	1500	1500	2500	0 ... 8702	21755	36259	86						
0 ... 700	1500	1500	2500	0 ... 10152	21755	36259	87						
0 ... 1000	1500	1500	2500	0 ... 14503	21755	36259	88						
Option 5P:	Fivefold overpressure												
0 ... 2.5	12.5	12.5	60	0 ... 36.2	181	870	55						
0 ... 4	20	20	100	0 ... 58	290	1450	56						
0 ... 6	30	30	200	0 ... 87	435	2900	57						
0 ... 10	50	50	200	0 ... 145	725	2900	58						
0 ... 16	80	80	300	0 ... 232	1160	4351	59						
0 ... 25	125	125	300	0 ... 362	1813	4351	60						
0 ... 40	200	200	400	0 ... 580	2900	5801	61						
0 ... 60	300	300	500	0 ... 870	4351	7252	62						
0 ... 100	500	500	750	0 ... 1450	7252	10878	63						
0 ... 160	800	800	1000	0 ... 2320	11603	14504	65						
Sensor	Relative pressure, accuracy: 0.5 % ⁴⁾								25				
	Relative pressure, accuracy: 0.3 % ⁵⁾								23				

		8273	XX	XX	XX	XX	XX	XX	
Process connections	G1/4" male, Seal: DIN 3869							17	
	G1/4" male, with integrated damping Ø 0.5 mm, Seal: DIN 3869 ⁶⁾							15	
	G1/4" male (Manometer) EN 837							53	
	G1/8" male DIN 3852-E ⁷⁾							54	
	1/4" NPT male							30	
	1/8" NPT male ⁸⁾							43	
	3/8"-24UNF-2A male, SAE J1926-2 (Heavy Duty) ⁹⁾							68	
	7/16"-20UNF female, SAE J512 with valve opener ¹⁰⁾							24	
	7/16"-20UNF female, SAE J512 without valve opener ¹⁰⁾							44	
	7/16"-20UNF male, DIN 3866 ¹⁰⁾							18	
	7/16"-20UNF-2A male, SAE J1926-2 (Heavy Duty) ⁹⁾							69	
	9/16"-18UNF-2A male, SAE J1926-2 (Heavy Duty) ⁹⁾							67	
	R1/4" male, DIN 3858							19	
	R1/4" male, DIN 2999 ¹¹⁾							20	
	R1/8" male, DIN 3858 ⁷⁾							16	
	M10x1 male, DIN EN ISO 6149-2 ¹²⁾							32	
	M12x1 male							64	
	M12x1.25 male							65	
	M12x1.5 male, DIN EN ISO 9974-2							49	
	M14x1.5 male DIN EN ISO 6149-2 ¹¹⁾							31	
Electrical connection	Male electrical connector M12x1, 4-pole, Mat. PA, IEC 61076-2-101							32	
Output signal	IO-Link							50	
Accessories	Female electrical plug M12x1, 5-pole ¹³⁾							33	
	Pressure peak damping element Ø 1.0 mm							40	
	Pressure peak damping element Ø 0.4 mm							44	
	Seal FPM, -18°C ... +125°C							61	
	Seal EPDM, -40°C ... +125°C							63	
	Seal NBR, -25°C ... +100°C							83	
	Standard electrical connection: Pin 1 L+, Pin 2 Out 2 I/Q, Pin 3 L-, Pin 4 Out 1 C/Q (for male electrical connector 32, M12x1, 4-pole)								0L
	Parameterization according to customer specification (refer to the interface description)								ZC
	Parameterization standard (refer to the interface description)								ZS
	Multiple packaging ¹⁴⁾								VM
Enhanced condensation protection ¹⁵⁾								CP	

⁰¹⁾ Customized pressure ranges upon request

⁰²⁾ Only for relative pressure, accuracy: 0.3% (Code 23)

⁰³⁾ Pressure values in [psi] are given for information and correspond to the pressure values in [bar]

⁰⁴⁾ IO-Link process data includes the device temperature

⁰⁵⁾ IO-Link process data includes the media temperature, device temperature via ISDU

⁰⁶⁾ For measuring ranges ≥ 2.5 bar

⁰⁷⁾ max. allowable pressure range 160 bar (2320 psi) at 480 bar (6961 psi) overpressure

⁰⁸⁾ max. allowable pressure range 400 bar (5800 psi) at 600 bar (8700 psi) overpressure

⁰⁹⁾ Measuring range max. 630 bar according to SAE J1926-2 (Heavy Duty)

¹⁰⁾ max. allowable pressure range 60 bar (870 psi) at 180 bar (2610 psi) overpressure

¹¹⁾ Upon request, whereas minimum order quantities may apply

¹²⁾ max. allowable pressure range 250 bar (3626 psi) at 750 bar (10878 psi) overpressure

¹³⁾ For electrical connection 32

¹⁴⁾ The order quantity must be a multiple of 50

¹⁵⁾ Only in combination with accuracy of 0.3% (Sensor 23)

Compatibility matrix pressure connection and accessories

Code	Pressure connection	Damping		Seal		
		Ø 1.0 mm (Code 40)	Ø 0.4 mm (Code 44)	FKM (Code 61)	EPDM (Code 63)	NBR (Code 83)
17	G1/4" male, Seal: DIN 3869	✓	✓	✓	✓	✓
15	G1/4" male, with integrated damping Ø 0.5 mm, Seal: DIN 3869			✓	✓	✓
53	G1/4" male (Manometer) EN 837					
54	G1/8" male DIN 3852-E	✓	✓	✓	✓	
30	1/4" NPT male	✓	✓			
43	1/8" NPT male	✓	✓			
68	3/8"-24UNF-2A male, SAE J1926-2 (Heavy Duty)	✓	✓	✓	✓	
24	7/16"-20UNF female, SAE J512 with valve opener					
44	7/16"-20UNF female, SAE J512 without valve opener					
18	7/16"-20UNF male, DIN 3866					
69	7/16"-20UNF-2A male, SAE J1926-2 (Heavy Duty)	✓	✓	✓	✓	
67	9/16"-18UNF-2A male, SAE J1926-2 (Heavy Duty)	✓	✓	✓	✓	
19	R1/4" male, DIN 3858	✓	✓			
20	R1/4" male, DIN 2999	✓	✓			
16	R1/8" male, DIN 3858	✓	✓			
32	M10x1 male, DIN EN ISO 6149-2	✓	✓	✓		
64	M12x1 male	✓	✓			
65	M12x1.25 male	✓	✓			
49	M12x1.5 male, DIN EN ISO 9974-2	✓	✓	✓		
31	M14x1.5 male DIN EN ISO 6149-2	✓	✓	✓		

Parameters

Name	Standard setting (Accessory ZS)	Value range	Customer adjustment (Accessory ZC)
Switching output OUT1			
Source of measured value	Pressure		Pressure
Switching output polarity	PNP	PNP, NPN	
Switch point SP1 ¹⁾	0.75 %	[bar], > SP2, 1 ... 100 % nominal pressure	
Switch point SP2 ²⁾	0.25 %	[bar], < SP1, 0 ... 99 % nominal pressure Hysteresis SP1 - SP2 ≥ 1 % nominal pressure	
Switching output logic	0 = High active	0 = High active (normally open) 1 = Low active (normally closed)	
Function mode	3 = Two Point Mode	0 = Deactivated 1 = Single Point Mode 2 = Window Mode 3 = Two Point Mode	
Hysteresis ³⁾	0	[bar], Hysteresis ≥ 1 % nominal pressure	
Activation Delay	0	0 ... 65535 [ms]	
Deactivation Delay	0	0 ... 65535 [ms]	
Error behaviour	0	0 = Tri-State 1 = NPN/PNP: Open / Push-Pull: High 2 = NPN/PNP: Closed / Push-Pull: Low 3 = Last valid state	
Switching output OUT2			
Source of measured value	P = Pressure	P = Pressure, T = Temperature	
Switching output polarity	PNP	PNP, NPN	
Switch point SP1 ¹⁾	0.75 %	> SP2 [bar] 0 ... 100 % nominal pressure [°C] -40 ... 125°C	
Switch point SP2 ²⁾	0.25 %	< SP1 [bar] 0 ... 99 % nominal pressure Hysteresis SP1 - SP2 ≥ 1 % nominal pressure [°C] -40 ... 125°C, Hysteresis SP1 - SP2 ≥ 1°C	
Switching output logic	0 = High active	0 = High active (normally open) 1 = Low active (normally closed)	
Function mode	3 = Two Point Mode	0 = Deactivated 1 = Single Point Mode 2 = Window Mode 3 = Two Point Mode	
Hysteresis ³⁾	0	[bar], Hysteresis ≥ 1 % nominal pressure [°C] ≥ 1°C	
Activation Delay	0	0 ... 65535 [ms]	
Deactivation Delay	0	0 ... 65535 [ms]	
Error behaviour	0	0 = Tri-State 1 = NPN/PNP: Open / Push-Pull: High 2 = NPN/PNP: Closed / Push-Pull: Low 3 = Last valid state	
Signal processing			
Pressure measurement signal damping for switching outputs	0	0 = Deactivated 0; 1 ... 65536 [ms], time constant "tau"	

¹⁾ Applicable for all functions modes

²⁾ Applicable for functions modes "Two Point Mode" and "Window Mode"

³⁾ Applicable for functions modes "Single Point Mode" and "Window Mode"

Specifications

Electrical data	Output / supply voltage	Switching output PNP/NPN: 24 (9 ... 32) VDC IO-Link: 24 (18 ... 30) VDC
	Power-on delay time	IO-Link readiness: 300ms Data readiness: ca. 700ms
	Inverse-polarity protection, short-circuit strength @ 25°C during 5 min.	IO-Link/Out 1 or Out 2: to Us = 32 VDC
	Current consumption / power consumption ¹⁾	< 0.5 W
	Resistance of insulation	> 100 MΩ, 50 VDC
	Dielectric strength	50 VAC, 50 Hz
	Environmental conditions	Media temperature
Ambient temperature		-40°C ... +105°C
Storage temperature		-20°C ... +40°C
Protection ²⁾		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 (EN60068-2-27)
EMC protection	Emission	EN/IEC 61000-6-3
	Immunity	EN/IEC 61000-6-2 IEC 61131-9
Mechanical data	Sensor (wetted parts)	1.4542 (AISI630)
	Pressure connection (wetted parts)	1.4542 (AISI630)
	Housing	1.4301 (AISI304)
	Sealing	See ordering information
	Male electrical connector	See ordering information
	Weight	~ 50 g
	Mounting torque	25 Nm

¹⁾ Without load on the switching outputs

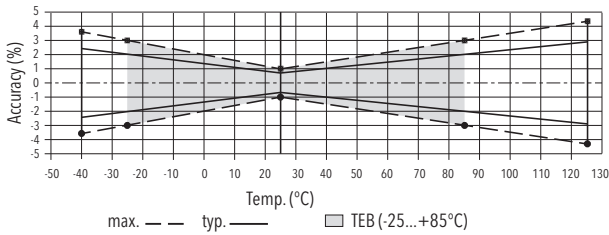
²⁾ See electrical connection

Pressure measuring accuracy

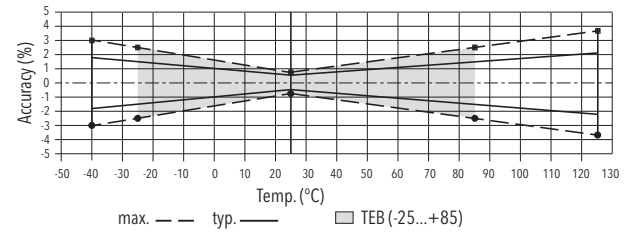
		Accuracy class 0.3 % Ordering code 23			Accuracy class 0.5 % Ordering code 25
		≥ 0.2 ≤ 0.6	> 0.6 < 2.0	≥ 2.0	≥ 2.5
Measuring range	[bar]				
	[psi]	≥ 2.9 ≤ 8.7	> 8.7 < 29	≥ 29	≥ 36.2
TEB @ -25 ... +85°C	[% FS typ.]	± 2.0	± 1.5	± 1.0	± 1.75
Accuracy @ +25°C	[% FS typ.]	± 0.8	± 0.6	± 0.3	± 0.5
NLH @ +25°C (BSL)	[% FS typ.]	± 0.2	± 0.2	± 0.2	± 0.2
TC zero point and span	[% FS/K typ.]	± 0.02	± 0.02	± 0.01	± 0.03
Long term stability 1 year @ +25°C	[% FS typ.]	± 0.3	± 0.2	± 0.1	± 0.1
Mounting dependency with 180° rotation (vibration and shock)	[mbar]	0.5	0.5	0.5	0.5

Accuracy class 0.3 %

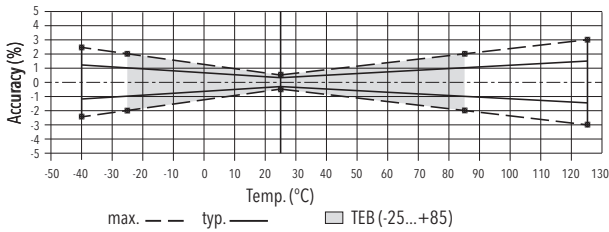
$\geq 0.2 \text{ bar} \dots \leq 0.6 \text{ bar}$



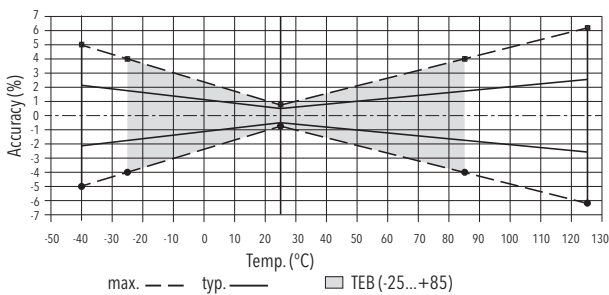
$> 0.6 \text{ bar} \dots < 2.0 \text{ bar}$



$\geq 2.0 \text{ bar}$



Accuracy class 0.5 %



Temperature measurement

Media temperature ¹⁾	@ Media temperature	Accuracy
Accuracy [typ.]	-40°C ... -20°C	$\pm (5K + 0.14 \times T_{\text{ambient}} - T_{\text{media}})$
	> -20°C ... 0°C	$\pm (3K + 0.14 \times T_{\text{ambient}} - T_{\text{media}})$
	> 0°C ... +25°C	$\pm (2K + 0.14 \times T_{\text{ambient}} - T_{\text{media}})$
	> +25°C ... +85°C	$\pm (3K + 0.14 \times T_{\text{ambient}} - T_{\text{media}})$
	> +85°C ... +125°C	$\pm (6K + 0.14 \times T_{\text{ambient}} - T_{\text{media}})$
Temperature range	-40°C ... +125°C	
Device temperature		
Accuracy	@ 0°C ... +80°C	$\pm 1.5^\circ\text{C}$
Temperature range	-40°C ... +125°C	
Example: ambient temperature 15°C, media temperature 20°C: Accuracy $\pm (2K + 0.14 \times (15-20) ^\circ\text{C}) = \pm (2K + 0.14 \times 5K) = \pm 2.7K$		

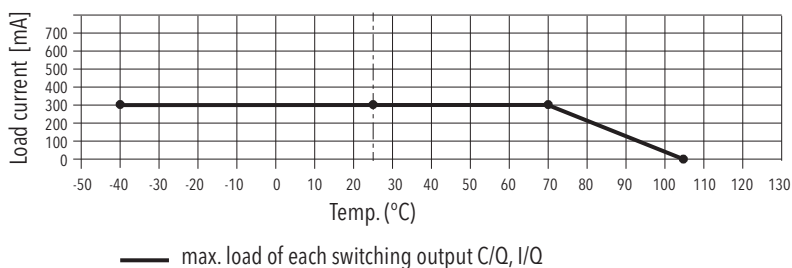
¹⁾ Media temperature measurement is only available with pressure accuracy of 0.3 % (code 23)

Switching output

Accuracy	Refer to table "Pressure measurement accuracy"	
Number of outputs	2 outputs for switching operation (SIO mode; SIO = standard IO)	Out1, Out2
Source of measured value	Pressure and temperature (Out1 and Out2)	
Output polarity	PNP, NPN, configurable	
Output function	Function modes: Single Point Mode, Two Point Mode, Window Mode; normally closed (NC), normally open (NO); switch-on/switch-off delay; Damping; configurable via IO-Link interface	
Switching current	-40°C ... +70°C Ambient temperature > +70°C ... +105°C Ambient temperature	max. 300 mA each switching output refer to the graphic "Switching current"
Switching resistance	$\leq 11\Omega$	
Current limiting	Integrated	
Lifetime	> 100 x 10 ⁶ cycles	
Switching frequency	< 300 Hz	
Response time	1.6 ms	

Switching current

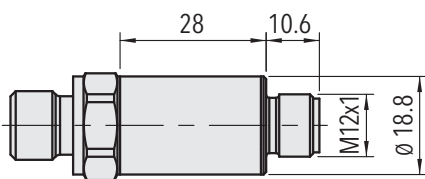
Load depending on ambient temperature



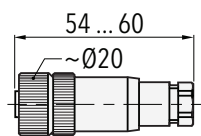
Interface description

Communication interface	SDCI Standard IEC 61131-9 (IO-Link)
Transmission type	COM3 (230,4 kBaud)
IO-Link revision	V1.1
Profiles / function classes	Identification and Diagnosis (0x4000), Measurement Data Channel (0x800A) Measuring and Switching Sensor (DMSS), SSP4.1.2
SIO mode	Yes
Required master port class	Class A
Minimum process cycle time	1 ms
Resolution pressure measurand	Refer to the interface description
Resolution temperature measurand	0.01K
IO-Link process data (cyclical)	
Pressure [Pa]	16 bit
Switching signal for pressure	2 bit
Temperatur [°C]	16 bit Device temperature with 0.5 % pressure accuracy Media temperature with 0.3 % pressure accuracy
Switching signal for temperature	2 bit
Device status	4 bit
IO-Link functions (acyclical)	Application specific tag; media temperature, device temperature; operating hours counter; min./max. pressure value; min./max. temperature value; pressure overload counter; temperature overload counter
IODD download	https://ioddfinder.io-link.com

Dimensions

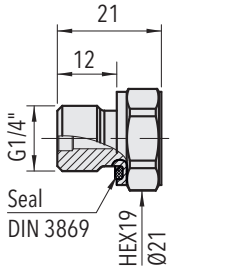


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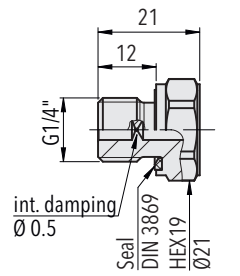


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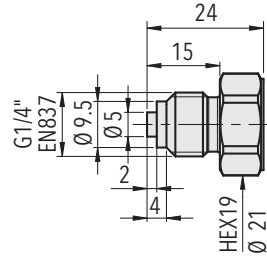
Dimensions



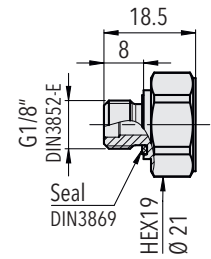
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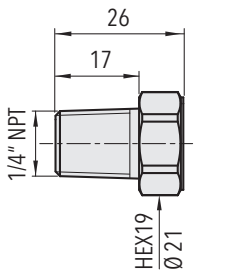
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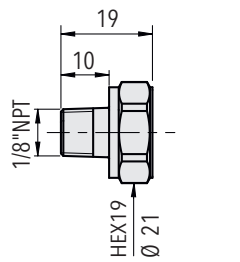
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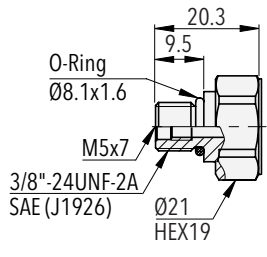
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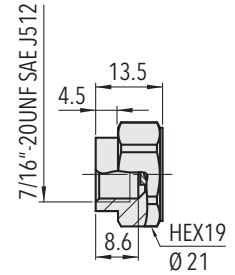
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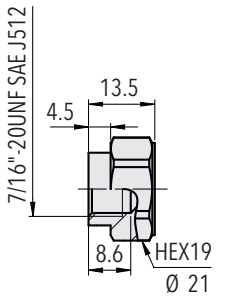
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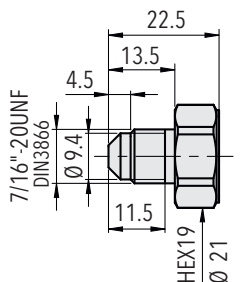
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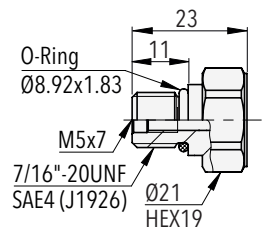
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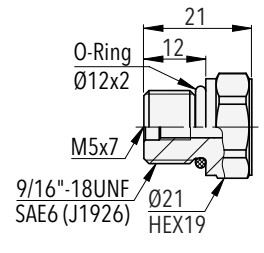
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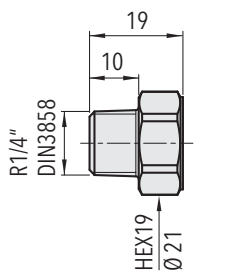
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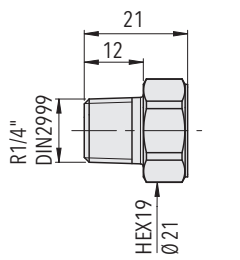
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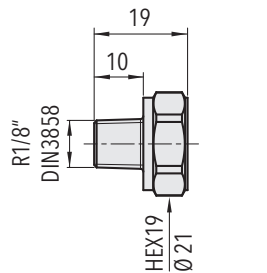
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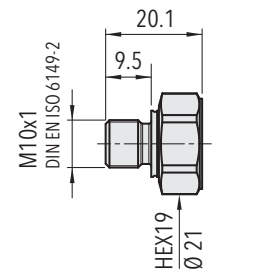
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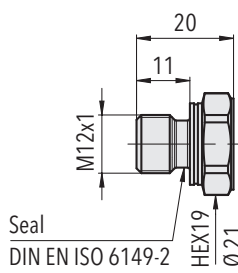
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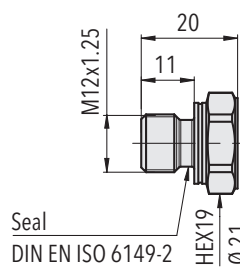
8273.XX.XX16.XX.XX.XX



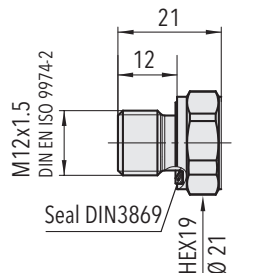
8273.XX.XX32.XX.XX.XX



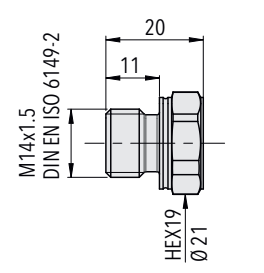
8273.XX.XX64.XX.XX.XX



8273.XX.XX65.XX.XX.XX



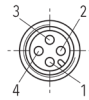
8273.XX.XX49.XX.XX.XX



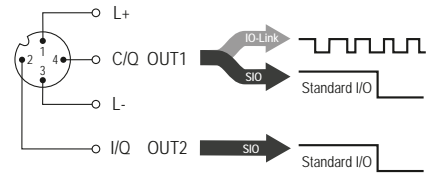
8273.XX.XX31.XX.XX.XX

Electrical connection

M12x1, 4-pole

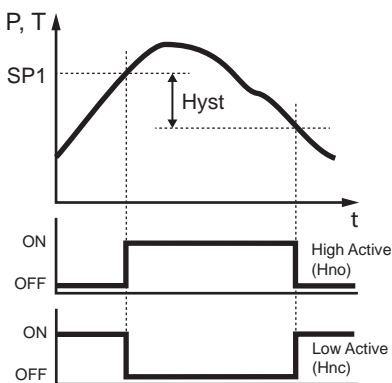


Electrical connection type code	32
IP protection	IP65, IP67 ^{1) 2)}
Pin assignment type code	OL
Output signal 8273.xx.xxxx.xx.50	
	<p>1 L+ (pos. supply)</p> <p>2 Out 2: I/Q</p> <p>4 Out 1: C/Q</p> <p>3 L- (neg. supply)</p>
<p>¹⁾ Provided female electrical plug is mounted according to instructions</p> <p>²⁾ Ventilation via male electric plug/cable end</p>	

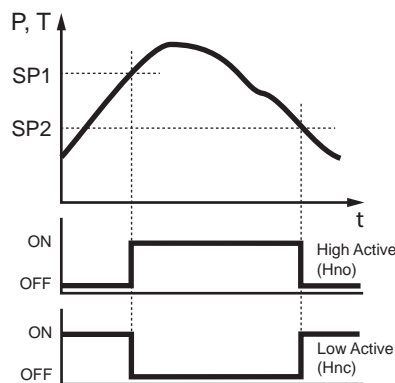


Functions switching output

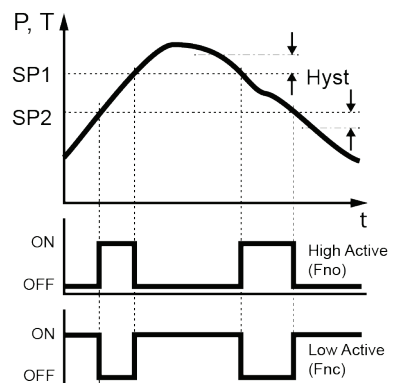
Single point mode



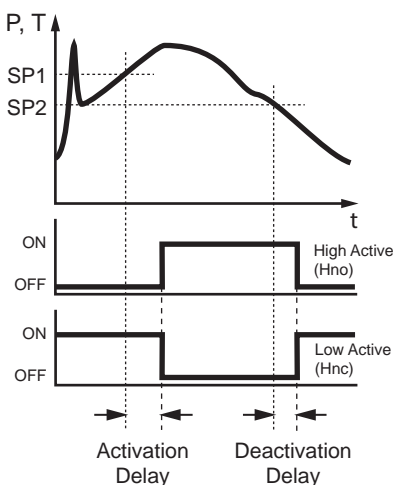
Two point mode



Window mode

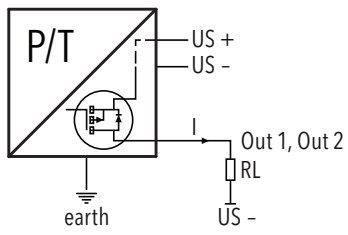


Delay

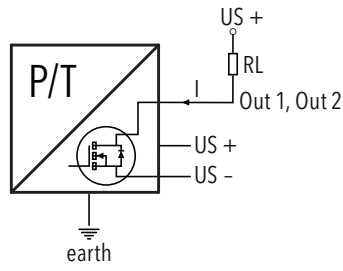


Switching output polarity

PNP



NPN



Connection of loads to switching output

Reliable quality

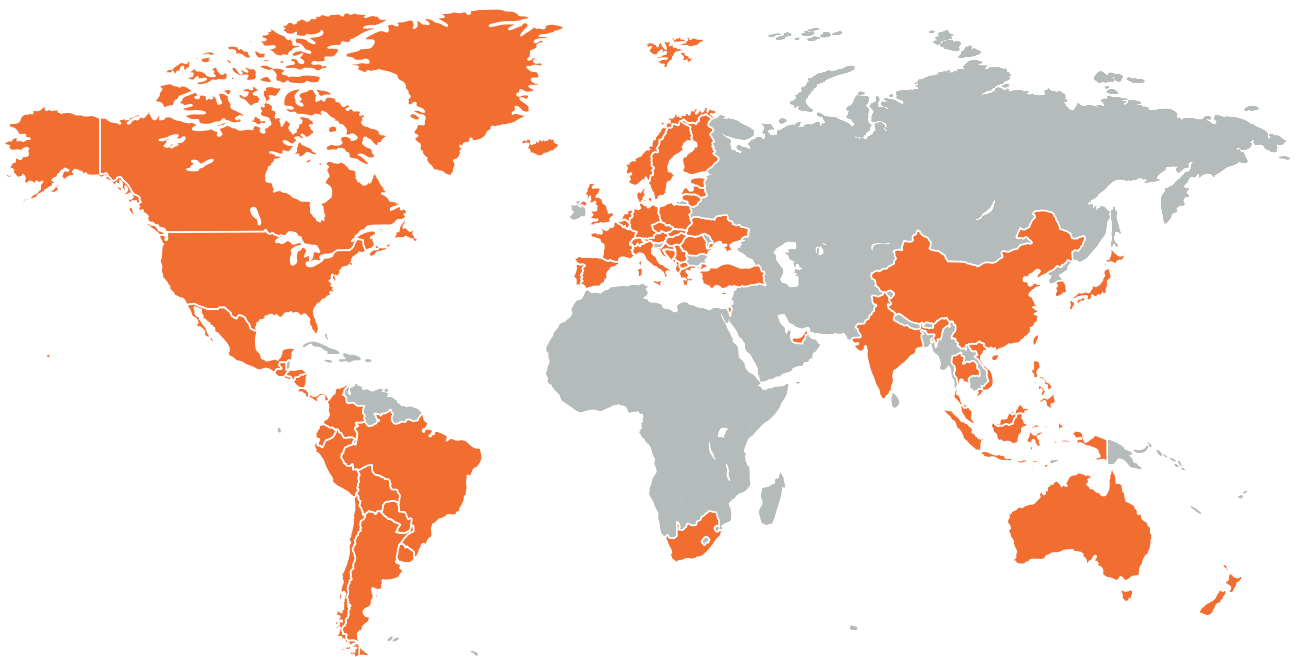
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