2-channel speed sensor
GEL 2475
Sensor with current output or voltage output (standstill voltage)

Technical information ***Version 03.10***

General

- Application approved speed sensor based on magnetic measurement principle
- Maintenance- and wear-free operation due to non-contact measurement of rotation
- Suitable for ferromagnetic target wheels
- Safe detection of slow rotation from 0 Hz without pulse loss and for high-speed rotation up to 25 kHz
- Two channels shifted by 90° provide the direction of rotation
- Robust and compact stainless steel housing suitable for harsh application
- Constant duty output signals
- Customized cable fittings

Features

- Modul target wheel 1.00 to 3.50
- Measuring range 0 Hz to 25 kHz
- Temperature range -40 to +120 °C
- Protection class IP 68
- Type testing according to EN 50155

Advantages

- Current output signals unsusceptible to electromagnetic disturbances
- Cable break monitoring by current output or voltage output with standstill voltage
- Maintenance-free due to significant measuring distance (air gap up to 3 mm)

Fields of application

- Rail vehicles
  - Traction control
  - Anti-slip
  - Anti-skid
- Automation
  - Measurement of speed and positions at gears, motors and roller

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Technical data

Signal pattern	D-	H-	S-	V-
Electrical data				
Supply voltage V_S (reverse polarity protected	10 to 30 V DC			
Current consumption per channel I_S (without load)	≤ 30 mA			
Output signal (short circuit proof)	square-wave signals			
Output signal high(1)	≥ V_S - 1.8 V		≥ V_S - 1.0 V	
Output signal level low(1)	≤ 1.5 V		≤ 1.0 V	
Output current per channel	≤ 20 mA			
Input frequency target wheel	0 to 25 kHz			
Output frequency	0 to 25 kHz			
Duty (depends on measuring scale and air gap)	50% ± 5%			
Phase shift	typ. 90°		–	typ. 90°
Slew rate (2 m cable)	≥ 10 V / µs			
Electromagnetic compatibility	rail vehicles(EN 50121-3-2) industrial applications (EN 61000-6-1 to 4)			
Insulation	500 V AC (EN 60439-1)			
Mechanical data				
Module m target wheel	1.00 / 1.25 / 1.50 / 1.75 / 2.00 / 2.25 / 2.50 / 3.50			
Permissible air gap (for module m)(2)	0.2 to 3.0 mm			
Width of target wheel	≥ 10 mm (smaller ones on request)			
Form of target wheel	involute gear as per DIN 867, rectangular gear 1:1 or slotted disk (on request)			
Material of target wheel	ferromagnetic steel			
Operating and ambient temperature	-40 °C to +120 °C			
Storage temperature	-40 °C to +120 °C			
Protection class	IP 68			
Vibration resistance	EN 61373 cat. 3			
Shock resistance	EN 61373 cat. 3			
Type test	EN 50155			
Housing material sensor	stainless steel			
Weight sensor (2 m cable)	650 g			
Electrical connection				
Cable	Cable halogen free and screened (specification on request), cable outlet straight			
Cable length	≤ 100 m			
Cable diameter	8.0 mm		8.2 mm	
Cable cross section	12 x 0.34 mm^2		6 x 1.0 mm^2	
Cable type	LK1076		LK1069	
Cable radius static / dynamic	24 mm / 41 mm			

(1) Output signal level depends on output current and temperature
(2) Please note the air gap table in this document.

Signal pattern	X-	DI	VI	DL
Electrical data				
Supply voltage V_S (reverse polarity protected	10 to 30 V DC	10 to 20 V DC		10 to 30 V DC
Current consumption per channel I_S (without load)	≤ 30 mA	–		< 12 mA
Output signal (short circuit proof)	square-wave signals			
Output signal high(1)	≥ V_S - 1.0 V	typ. 14 mA		≥ V_S - 1.8 V
Output signal level low(1)	≤ 1.0 V	typ. 7 mA		≤ 1.5 V
Output current per channel	≤ 20 mA	≤ 16 mA		≤ 10 mA
Input frequency target wheel	0 to 25 kHz			0.004 to 20 kHz
Output frequency	0 to 25 kHz			0.004 to 20 kHz
Duty (depends on measuring scale and air gap)	50% ± 5%			50% ± 10%
Phase shift	typ. 90°			
Slew rate (2 m cable)	≥ 10 V / µs	≥ 6 V / µs; R_B = 560 Ω		≥ 4 V / µs
Electromagnetic compatibility	rail vehicles(EN 50121-3-2) industrial applications (EN 61000-6-1 to 4)			
Insulation	500 V AC (EN 60439-1)			
Mechanical data				
Module m target wheel	1.00 / 1.25 / 1.50 / 1.75 / 2.00 / 2.25 / 2.50 / 3.50			
Permissible air gap (for module m)(2)	0.2 to 3.0 mm			
Width of target wheel	≥ 10 mm (smaller ones on request)			
Form of target wheel	involute gear as per DIN 867, rectangular gear 1:1 or slotted disk (on request)			
Material of target wheel	ferromagnetic steel			
Operating and ambient temperature	-40 °C to +120 °C			
Storage temperature	-40 °C to +120 °C			
Protection class	IP 68			
Vibration resistance	EN 61373 cat. 3			
Shock resistance	EN 61373 cat. 3			
Type test	EN 50155			
Housing material sensor	stainless steel			
Weight sensor (2 m cable)	650 g			
Electrical connection				
Cable	Cable halogen free and screened (specification on request), cable outlet straight			
Cable length	≤ 100 m			
Cable diameter	8.2 mm	8.3 mm		8.0 mm
Cable cross section	6 x 1.0 mm^2	4 x 1.0 mm^2		12 x 0.34 mm^2
Cable type	LK1069	LK10741		LK1076
Cable radius static / dynamic	24 mm / 41 mm	25 mm / 42 mm		24 mm / 41 mm

(1) Output signal level depends on output current and temperature
(2) Please note the air gap table in this document.

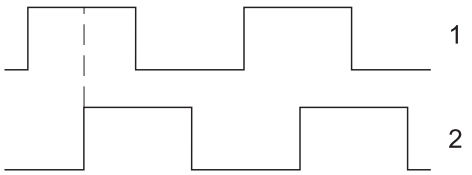
Technical data

Signal pattern	HL	DM	VM
Electrical data			
Supply voltage V_S (reverse polarity protected	10 to 30 V DC	10 to 20 V DC	
Current consumption per channel I_S (without load)	< 12 mA		
Output signal (short circuit proof)	square-wave signals		
Output signal high(1)	≥ V_S - 1.8 V		
Output signal level low(1)	≤ 1.5 V	≤ 1.5 V(2)	
Output current per channel	≤ 10 mA	≤ 15 mA	
Input frequency target wheel	0.004 to 20 kHz	0.001 to 8 kHz	
Output frequency	0.004 to 20 kHz	0.001 to 8 kHz	
Duty (depends on measuring scale and air gap)	50% ± 10%		
Phase shift	typ. 90°		
Slew rate (2 m cable)	≥ 4 V / µs		
Electromagnetic compatibility	rail vehicles(EN 50121-3-2) industrial applications (EN 61000-6-1 to 4)		
Insulation	500 V AC (EN 60439-1)		
Mechanical data			
Module m target wheel	1.00 / 1.25 / 1.50 / 1.75 / 2.00 / 2.25 / 2.50 / 3.50	2.00	
Permissible air gap (for module m)(3)	0.2 to 3.0 mm		
Width of target wheel	≥ 10 mm (smaller ones on request)		
Form of target wheel	involute gear as per DIN 867, rectangular gear 1:1 or slotted disk (on request)		
Material of target wheel	ferromagnetic steel		
Operating and ambient temperature	-40 °C to +120 °C	-40 °C to +85 °C	
Storage temperature	-40 °C to +120 °C		
Protection class	IP 68		
Vibration resistance	EN 61373 cat. 3		
Shock resistance	EN 61373 cat. 3		
Type test	EN 50155		
Housing material sensor	stainless steel		
Weight sensor (2 m cable)	650 g		
Electrical connection			
Cable	Cable halogen free and screened (specification on request), cable outlet straight		
Cable length	≤ 100 m		
Cable diameter	8.0 mm	6.3 mm	7.1 mm
Cable cross section	12 x 0.34 mm^2	2 x 3 x 0.5 mm^2	4 x 0.5 mm^2
Cable type	LK1076	LK1083/LK1084	LK1081
Cable radius static / dynamic	24 mm / 41 mm	19 mm / 32 mm	21 mm / 36 mm

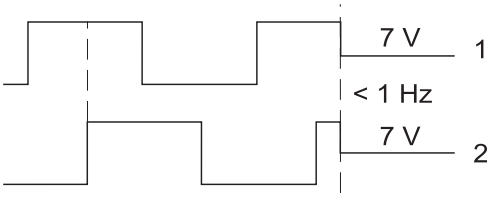
(1) Output signal level depends on output current and temperature
(2) 7 V ± 0.3 V at frequency < 1 Hz ± 0.3 Hz
(3) Please note the air gap table in this document.

Signal pattern

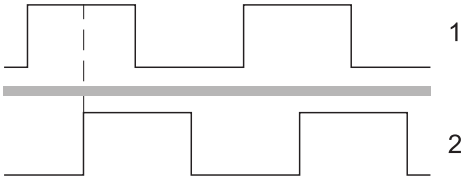
V- (V_S: 10 to 30 V DC)
VI (V_S: 10 to 20 V DC)



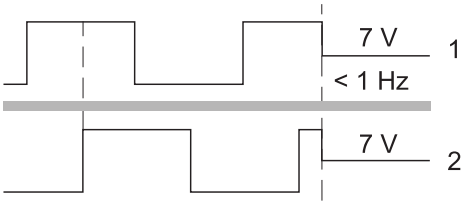
VM (V_S: 10 to 20 V DC)



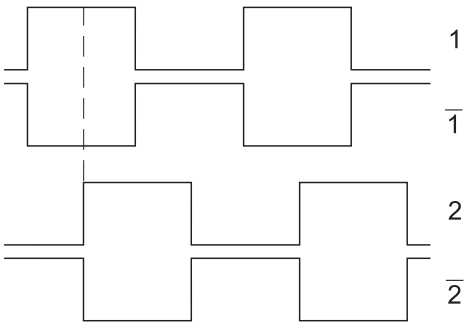
D-; DL (V_S: 2 x 10 to 30 V DC)
DI (V_S: 2 x 10 to 20 V DC)



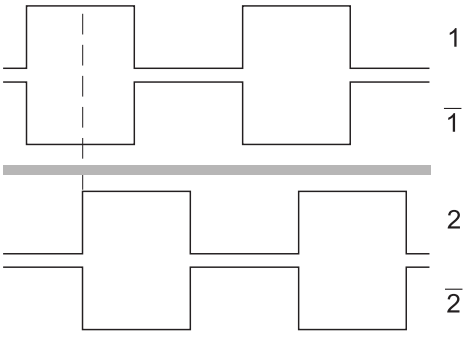
DM (V_S: 2 x 10 to 20 V DC)



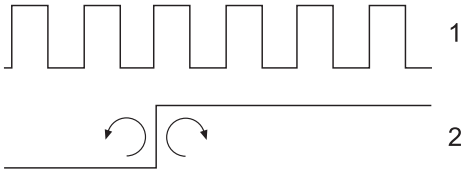
X- (V_S: 10 to 30 V DC)



H-; HL (V_S: 2 x 10 to 30 V DC)



S- (V_S: 10 to 30 V DC)



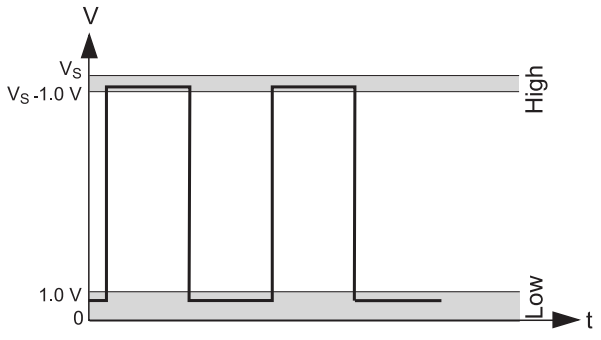
Explanation

x-	= voltage output
x**I**	= current output
x**L**	= voltage output (low current)(1)
x**M**	= voltage output (standstill voltage)
1, 2	= channel 1, channel 2
$\bar{1}, \bar{2}$	= inverse channel 1, inverse channel 2
	= galvanically isolated
V_S	= supply voltage

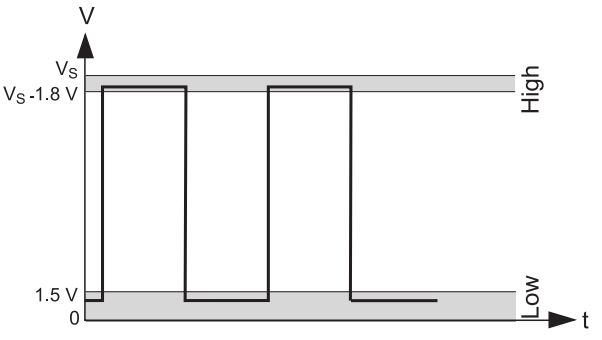
(1) with reduced current consumption

Signal level

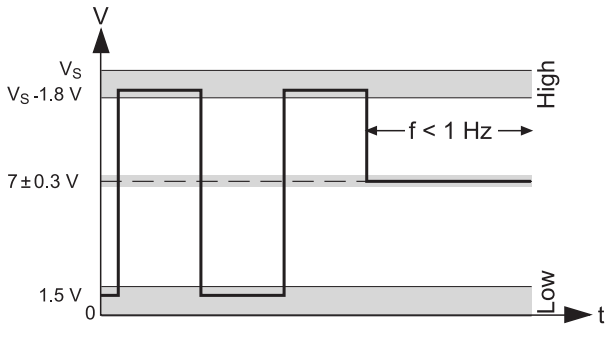
Voltage output S-, V-, X-



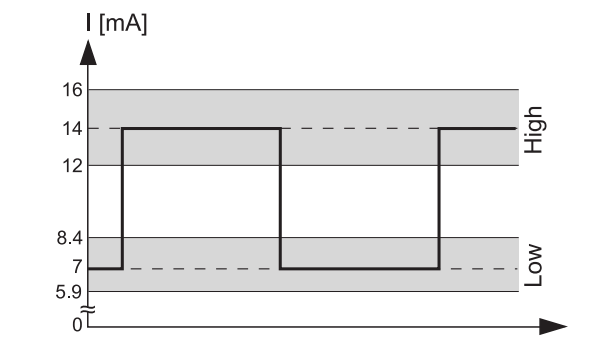
Voltage output D-, H-, DL, HL

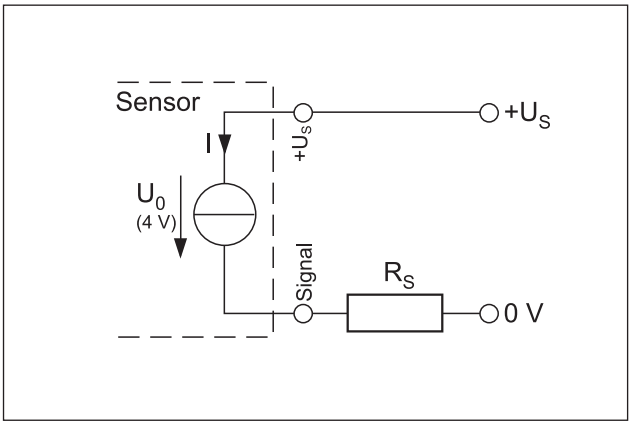


Voltage output DM, VM



Current output DI, VI





When using the current output, the resistor to be connected must not exceed a specific value:

$R_{B,max} = (V_S – 4\ V) / I_{max}$

with V_S = 10 to 20 V DC and I_{max} = 16 mA

Example for V_S = 15 V:

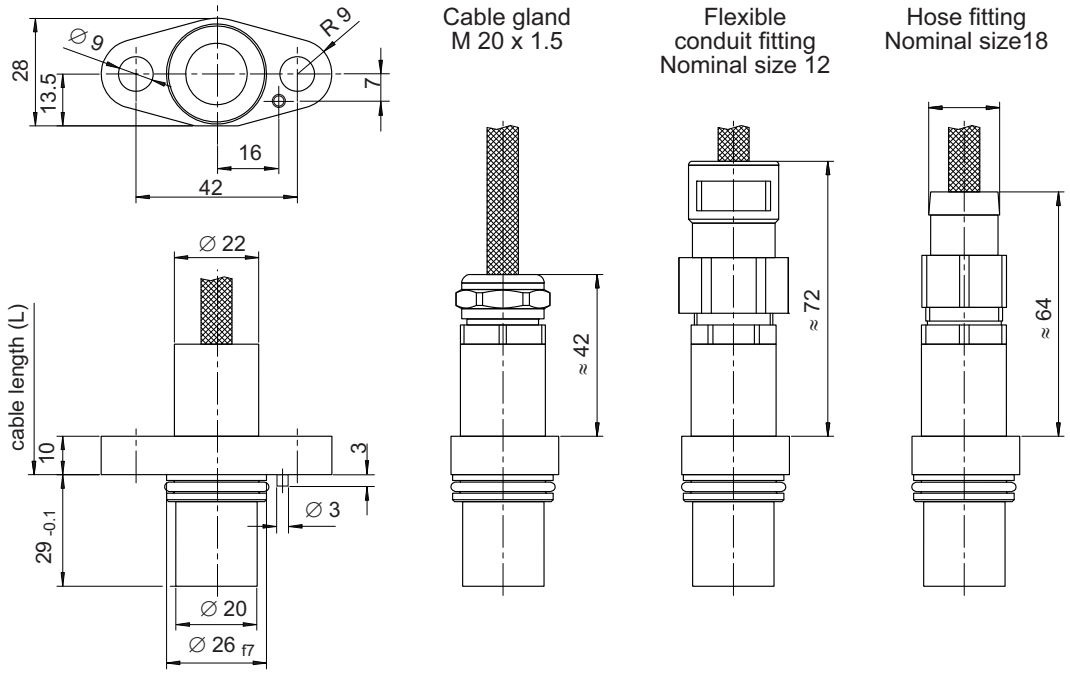
$R_{B,max}$ = 11 V / 16 mA = 690 Ω

Electrical connection, Dimensions

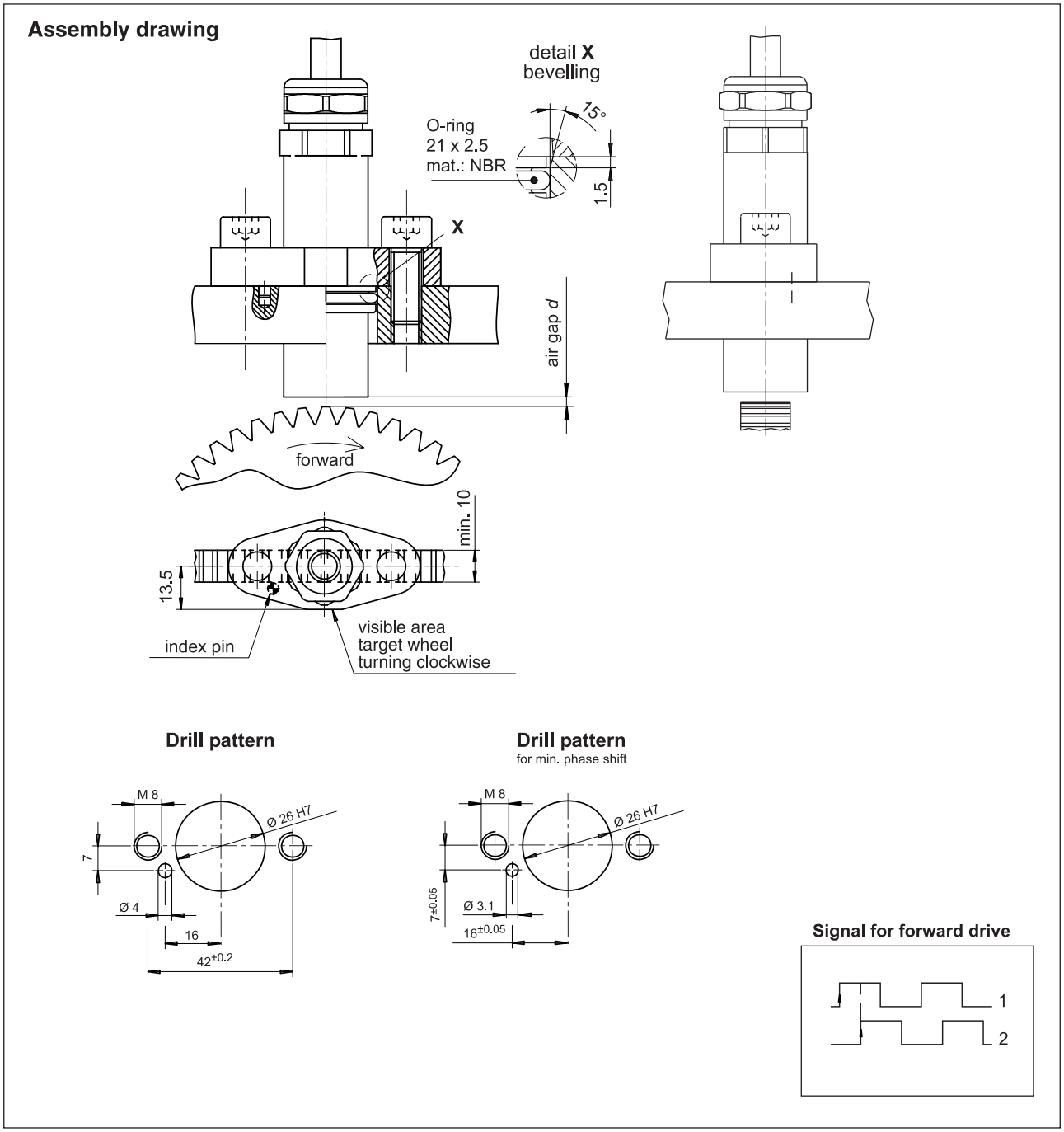
Electrical connection

Signal	D-		H-		S-	V-	X-	DI		VI	DL		HL		DM		VM
Channel 1	ye		ye		ye	ye	ye	bl		bl	ye		ye		wh		bl
Channel 2		wh		wh	wh	wh	wh		gn	gn		wh		wh		gn	wh
Channel $\overline{1}$			bk				bk						bk				
Channel $\overline{2}$				br			br							br			
GND (0 V)	bl	gr	bl	gr	bl	bl	bl				bl	gr	bl	gr	bk	vi	gn
$+V_S$ (10 to 30 V DC)	rd	pi	rd	pi	rd	rd	rd				rd	pi	rd	pi			
$+V_S$ (10 to 20 V DC)								rd	ye	rd					rd	or	or
Cable / Screen	1/1		1/1		1/1	1/1	1/1	1/1		1/1	1/1		1/1		2 / 2		1/1
bk = black, bl =blue, br = brown, gn = green, gr = grey, or = orange, pi = pink, rd = red, vi = violet, ye = yellow, wh = white																	

Dimensions



Assembly drawing



Please observe the EMC-reference into the operating instruction!

Permissible air gap (for module m)

	D-	H-	S-	V-	X-	DI	VI	DL	HL	DM	VM
m = 1.0	0.2 to 1.4 mm							0.2 to 0.9 mm			
m = 1.5	0.2 to 1.8 mm							0.2 to 1.5 mm			
m = 2.0	0.2 to 2.2 mm							0.2 to 2.0 mm		0.2 to 2.2 mm	
m = 2.5	0.2 to 2.8 mm							0.2 to 2.2 mm			
m = 3.5	0.2 to 3.0 mm							0.2 to 2.8 mm			

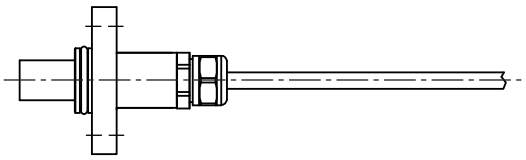
Type code GEL 2475

	Signal pattern							
	S	1-channel square-wave signals with direction signal						
	V	2-channel square-wave signals shifted by 90°						
	X	2-channel square-wave signals shifted by 90° and their inversed signals						
	D	2-channel square-wave signals shifted by 90°, galvanically isolated						
	H	2-channel square-wave signals shifted by 90° and their inversed signals, galvanically isolated						
		Signal output						
		-	Voltage					
		I	Current (with signal patterns V and D only)					
		L	Voltage, with reduced current consumption (with signal patterns D and H only)					
		M	Standstill monitoring voltage 7 V (with signal patterns V and D only)					
			Module M					
			100	Module 1.00				
			125	Module 1.25				
			150	Module 1.50				
			.					
			.					
			.					
			350	Module 3.50				
				Cable screening				
				L	Connected to sensor housing			
				P	Not connected to sensor housing			
					Cable outlet			
					K	Cable gland		
					W	Flexible conduit fitting		
					G	Hose fitting		
						Cable length L		
						xxx	Cable length in cm	
							Costumising	
							N	Standard version
							S	Special version
2475	_	_	_ _ _	_	_	_ _ _	_	

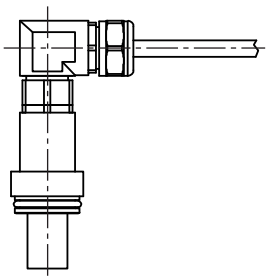
Notes: For a special customized version a Y-No. will be created. A special version 2475Yxxx is manufactured according to a drawing or application description and could differ from the technical standard specification.

Example for customized cable connections

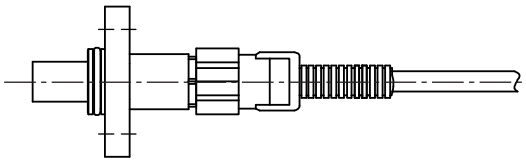
Encoder end



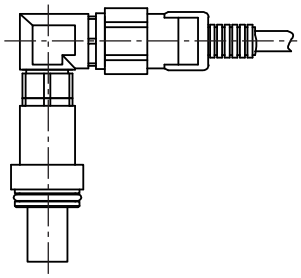
standard, straight outlet



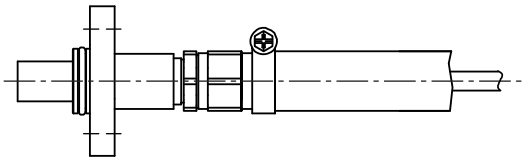
cable output, side outlet



flexible conduit, straight outlet

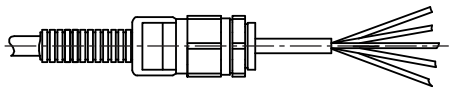


flexible conduit, side outlet

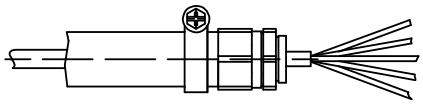


rubber conduit, straight outlet

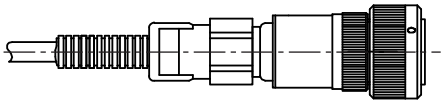
Cable end



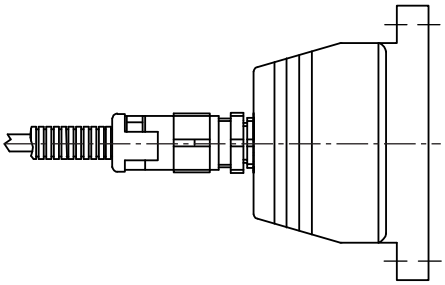
flexible conduit connection and cable end open



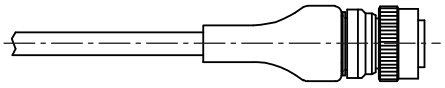
rubber conduit and cable end open



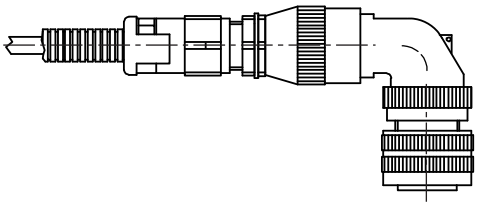
round connector with flexible conduit



HTS connector with flexible conduit



connector with shrink moulded sleeve



round connector, 90° elbow with flexible conduit

Notices

We have agencies in:
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