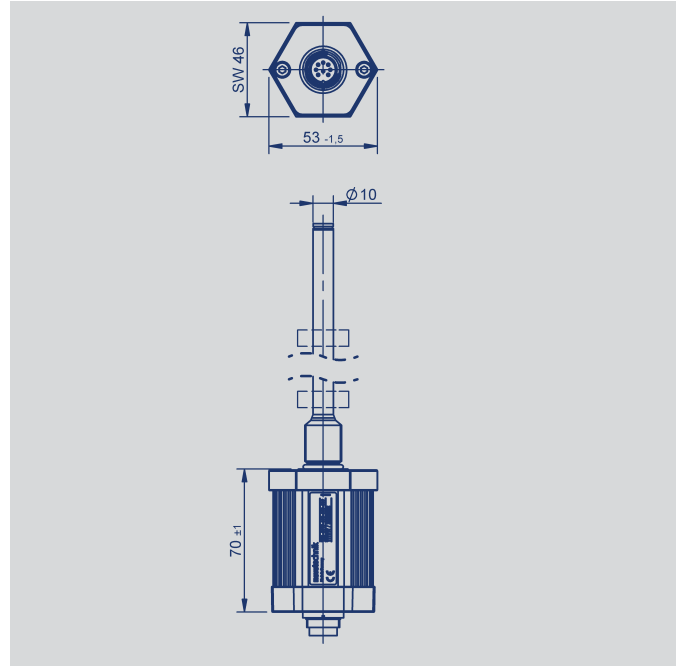
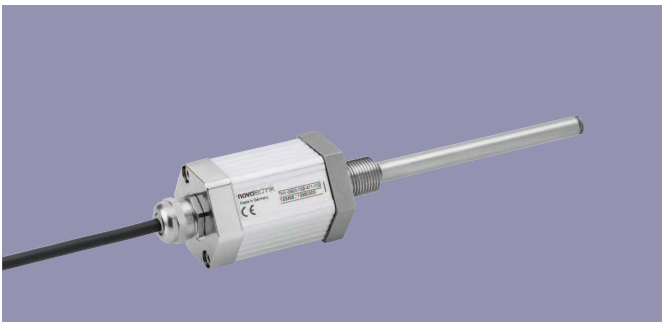


NOVOSTRICTIVE
Transducer
up to 4250 mm
touchless

Series TH1



Special features

- Touchless magnetostrictive measurement technology
- Rod style transducer, integratable
- Non-contacting position detection with ring shaped position marker
- Unlimited mechanical life
- Resolution up to 1 μm , independently of length
- Low temperature coefficient <15 ppm/K
- Position-Teach-In
- Insensitive to shock and vibration
- Operating pressure up to 350 bar
- Protection class IP67 / IP68
- Interfaces: Analog, SSI, Impulse, CANopen, IO-Link

Applications

- Fluid Power
Pneumatic- or Hydraulic Cylinder
- Manufacturing Engineering
- Mobile Machinery

High precision transducer with touchless magnetostrictive technology

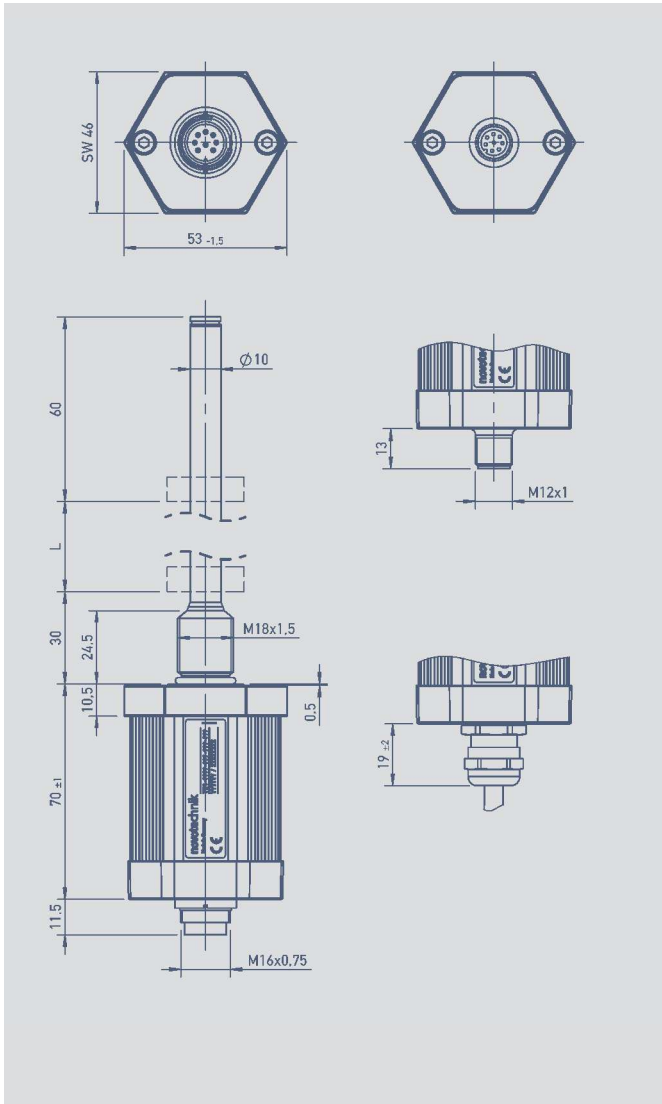
for mechanically decoupled and therefore wear-free position measurement for lengths up to 4250 mm. The integratable and pressure-resistant rod design with passive ring position markers allow the use inside of hydraulic cylinders. Here, the pressure area is sealed by an O-ring on the flange.

Depending on the interface, up to three positions and speed can be measured.

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Mechanical Data



Description

Materials	Housing: Anodized aluminum, AlMgSi0,5 F22, 3.3206.71 Screw flange: stainless steel X2CrNiMoN 18-14-3, 1.3952 Rod: stainless steel X6CrNiMoTi 17-12-2, 1.4571
Mounting	Bushing M18x1,5 for screw plug hole per ISO6149 Bushing 3/4"-16UNF for screw plug hole per SAE J475
Position marker	Ring shaped position marker
Messverfahren	NOVOSTRICTIVE, touchless magnetostrictive
Electr. connections	Connector M12x1, 4-pol., 5-pol. / 8-pin., shielded Connector M16x0.75 (IEC 130-9), 6-pin. / 8-pin., shielded PUR-cable, 8x0.25 mm ² , shielded; 1 m, 3 m oder 5 m length
Electronic	SMD with ASIC, integrated Connector casing (shield) is connected to the sensor housing. Housing is capacitively decoupled to the electronics

Mechanical Data

Dimensions	see dimension drawing
Electrical measuring range (Dimension L)	0050 up to 4250 mm in 25 mm steps other lengths on request
Max. operational speed with valid output signal	10 ms ⁻¹
Max. operational acceleration with valid output signal	200 ms ⁻²
Shock (IEC 60068-2-27)	100 (11 ms) (single hit) g
Vibration (IEC 60068-2-6)	20 (5...2000 Hz, Amax = 0.75 mm) g
Protection class (DIN EN 60529)	IP67 with fastened connector IP68 with cable connection
Life	Mechanically unlimited
Operating temperature range	-40 ... +85 °C
Storage temperature range	-40 ... +100 °C
Operating humidity range	0 ... 95 (no condensation) % R.H.
Pressure rating	
Operating pressure	≤ 350 bar
Pressure peaks	≤ 600 bar
Burst pressure	> 700 bar

CAD data see
www.novotechnik.de/en/download/cad-data/

Technical Data Analog Versions

Type designations	TH1- _ _ _ _ - 41 _ _ _ _ Voltage	TH1- _ _ _ _ - 42 _ _ _ _ Current	
Electrical Data			
Electrical measuring range (dimension L)	0050 up to 4250		mm
Output signal	0.1 ... 10 V (load $\geq 5 \text{ k}\Omega$)	0.1 ... 20 mA (burden $\leq 500 \Omega$) 4 ... 20 mA (burden $\leq 500 \Omega$)	
Number of channels	2	1	
Update rate	$\leq 16^*$		kHz
Resolution	16		Bit
Absolute linearity	$\leq \pm 0.02$ (min. $\pm 50 \mu\text{m}$) **		% FS
Tolerance of electr. zero point	± 0.5 (min. 2 x reproducibility)		mm
Reproducibility	≤ 0.03		% FS
Hysteresis	≤ 0.01		% FS
Temperature error	≤ 30 (min. 0.01 mm/K)		ppm/K
Supply voltage	24 (19 ... 30)		VDC
Supply voltage ripple	≤ 10		% Vss
Current consumption	≤ 100		mA
Overvoltage protection	40 (temporary / 1 min.)		VDC
Polarity protection	Yes, up to supply voltage max.		VDC
Short circuit protection	Yes (outputs vs. GND and supply voltage max.)		
Insulation resistance (500 VDC)	≥ 10		M Ω
Environmental Data			
MTTF (DIN EN ISO 13849-1 parts count method, w/o load, wc)	28		Years
Functional safety	If you need assistance in using our products in safety-related systems, please contact us		
EMC compatibility	EN 61000-4-2 Electrostatic discharges (ESD) 4 kV, 8 kV EN 61000-4-3 Electromagnetic fields 10 V/m EN 61000-4-4 Electrical fast transients (burst) 2 kV EN 61000-4-6 Conducted disturbances, induced by RF-fields 10 V eff. EN 55011 Radiated disturbances class B		

*) Data are extrapolated, internal measuring rate depends on measuring length.
**) Valid for channel 1; channel 2 with additional offset and gradient tolerances (inverted signal from channel 1).
Measured with position marker Z-TH1-P18 or Z-TH1-P19.

Pin assignment

Connector code 101, 102	Cable code 20_	Connector with cable (Accessories)	Analog voltage	Analog current	Connector code 103	Connector with cable (Accessories)	Analog Voltage	Analog Current
Pin 1	YE	WH	do not connect	0(4)...20 mA	Pin 1	WH	0 ... +10 V	0 (4)...20 mA
Pin 2	GY	BN	Signal GND	Signal GND	Pin 2	BN	Signal GND	Signal GND
Pin 3	PK	GN	+10...0 V	do not connect	Pin 3	BU	+10...0 V	do not connect
Pin 4	RD	YE	DIAG *	DIAG *	Pin 4	BK	GND	GND
Pin 5	GN	GY	0...+10 V	do not connect	Pin 5	GY	Supply voltage	Supply voltage
Pin 6	BU	PK	GND	GND	Pin 6	GN	GND	GND
Pin 7	BN	BU	Supply voltage	Supply voltage				
Pin 8	WH	RD	PROG *	PROG *				

*) Connect only for Teach-In-function (see manual).

Ordering Specifications
Analog Versions
- Voltage
- Current

Ordering Specifications

Preferred types printed in bold

Electrical interfaces
4: Analog Interfaces

Output signal analog interfaces 4 _ _

- 1: Voltage output**
- 2: Current output**

Analog interface voltage output 41_

- 1: 0 ... 10 V and 10 ... 0 V**

Analog interface current output 42_

- 1: 0 ... 20 mA
- 2: 20 ... 0 mA
- 3: 4 ... 20 mA**
- 4: 20 ... 4 mA

Electrical connection

- 101: Connector M16x0.75 (IEC 130-9), 8-pin
- 102: Connector M12x1, 8-pin**
- 103: Connector M16x0.75 (IEC 130-9), 6-pin
- 201: Cable, 8-pol., shielded, 1 m**
- 203: Cable, 8-pol., shielded, 3 m
- 205: Cable, 8-pol., shielded, 5 m
- Other cable lengths and assembled connectors on request

T H 1 - 0 8 0 0 - 1 0 2 - 4 1 1 - 1 0 2

Series

Electrical measuring range
Standard lengths
0050 up to 4250 mm
in 25 mm-steps.
Other lengths on request

Mechanical version

- 102: Screw flange M18x1.5, zero point at 30 mm**
- 103: Screw flange 3/4" - 16UNF, zero point at 30 mm
- 104: Screw flange M18x1.5, zero point at 51 mm
- 105: Screw flange 3/4" - 16UNF, zero point at 51 mm
- 106: Screw flange M18x1.5, zero point at 30 mm, for supporting at rod end *
- 107: Screw flange 3/4" - 16UNF, zero point at 30 mm, for supporting at rod end *
- 108: Screw flange M18x1.5, zero point at 51 mm, for supporting at rod end *
- 109: Screw flange 3/4" - 16UNF, zero point at 51 mm, for supporting at rod end *
- Other mechanical versions on request

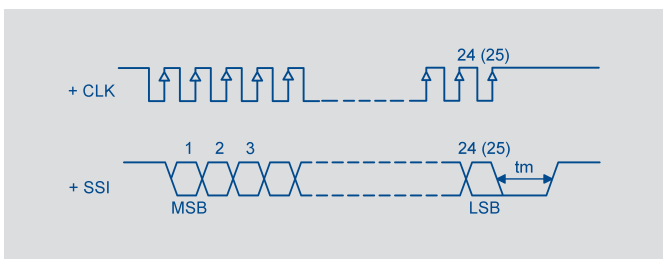
*) with internal thread M4x6 at rod end and additional length 7.5 mm

Important: Avoid equalizing currents in the cable shield caused by potential differences.
Twisted pair cable (STP) is recommended.

Technical Data SSI-Interface

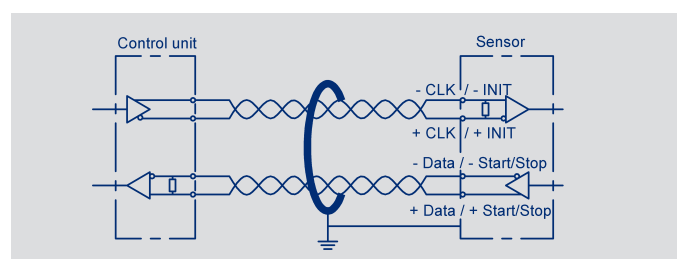
Type designations	TH1 - - - - - 2 - - - - - Synchron-Serial-Interface (SSI)	
Electrical Data		
Electrical measuring range (dimension L)	0050 up to 4250	mm
Protocol	SSI 24 and 25 bit (26 bit on request)	
Inputs	RS422	
Monoflop time (tm)	30	µs
Encoding	Gray, Binary	
Update rate	16 *	kHz
Resolution (LSB)	1, 5 or 10 (other resolutions on request)	µm
Absolute linearity **	$< 250 \text{ mm} \leq \pm 25 \text{ µm}$ $< 750 \text{ mm} \leq \pm 30 \text{ µm}$ $< 1000 \text{ mm} \leq \pm 50 \text{ µm}$ $< 2500 \text{ mm} \leq \pm 80 \text{ µm}$ up to 4250 mm $\leq \pm 120 \text{ µm}$	
Tolerance of electr. zero point	± 0.5	mm
Reproducibility (rounded to LSB)	≤ 6	µm
Hysteresis (rounded to LSB)	≤ 4	µm
Temperature error	≤ 15 (min. 0.01 mm/K)	ppm/K
Supply voltage	24 (13 ... 34)	VDC
Supply voltage ripple	≤ 10	% V _{SS}
Overvoltage protection	40 (permanent)	VDC
Current consumption	≤ 100	mA
Polarity protection	Yes, up to supply voltage max.	
Short circuit protection	Yes (outputs vs. GND and supply voltage up to 7 V)	
Ohmic load at outputs	> 120	Ω
Max. Clock rate	2	MHz
Insulation resistance (500 VDC)	≥ 10	MΩ
Environmental Data		
MTTF (DIN EN ISO 13849-1, parts count method, w/o load, wc)	32	Years
Functional safety	If you need assistance in using our products in safety-related systems, please contact us	
EMC compatibility	EN 61000-4-2 Electrostatic discharges (ESD) 4 kV, 8 kV EN 61000-4-3 Electromagnetic fields 10 V/m EN 61000-4-4 Electrical fast transients (burst) 1 kV EN 61000-4-6 Conducted disturbances, induced by RF-fields 10 V eff. EN 61000-4-8 Magnetfelder mit energietechnischen Frequenzen 3 A/m EN 55011 Radiated disturbances class B	

*) Data are extrapolated, internal measuring rate depends on measuring length.
**) Measured with resolution 1 µm.
At resolution $> 1 \text{ µm}$ the permissible linearity error is increased by the resolution.



Pin assignment

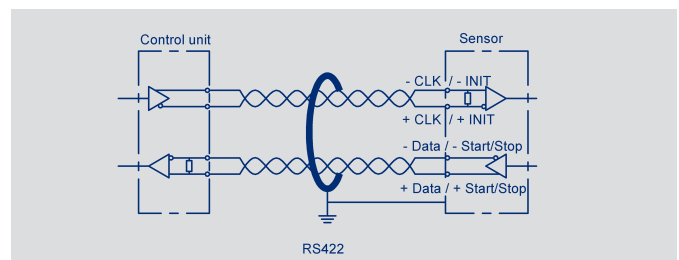
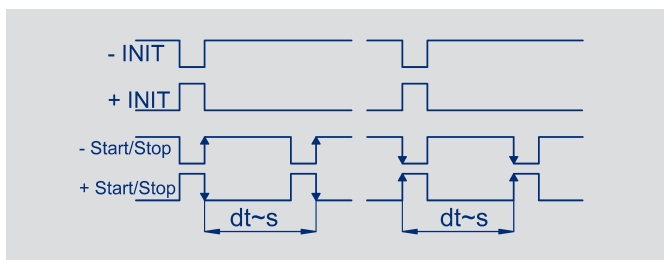
Connector code 101, 102	Cable code 20 _	Connector with cable (Accessories)	SSI Interface
Pin 1	YE	WH	Clk +
Pin 2	GY	BN	Data +
Pin 3	PK	GN	Clk -
Pin 4	RD	YE	do not connect
Pin 5	GN	GY	Data -
Pin 6	BU	PK	GND
Pin 7	BN	BU	Supply voltage
Pin 8	WH	RD	do not connect



Connector code 103	Connector with cable (Accessories)	SSI Interface
Pin 1	WH	Data -
Pin 2	BN	Data +
Pin 3	BU	Clk +
Pin 4	BK	Clk -
Pin 5	GY	Supply voltage
Pin 6	GN	GND

Technical Data Impulse-Interface

Type designations	TH1- _ _ _ _ - _ _ _ - 11 _ - _ _ _ Start-Stop-Impulse-Interface	
Electrical Data		
Electrical measuring range (dimension L)	0050 up to 4250	mm
Number of position markers	1 up to 3	
Protocol	Impulse	
Inputs	RS422	
Update rate	0.25 ... 1 (internal measuring rate depends on measuring length)	kHz
Resolution	Depending on interpretation, normalized to 2800 ms ⁻¹	
Absolute linearity	< 1000 mm ≤ ±50 μm < 2500 mm ≤ ±80 μm up to 4250 mm ≤ ±120 μm	μm
Tolerance of electr. zero point	± 0.5	mm
Reproducibility	≤ 6	μm
Hysteresis	≤ 4	μm
Temperature error	≤ 15 (min. 0,01 mm/K)	ppm/K
Supply voltage	24 (13 ... 34)	VDC
Supply voltage ripple	≤ 10	% V _{ss}
Overvoltage protection	40 (permanent)	VDC
Current consumption	≤ 100	mA
Polarity protection	Yes, up to supply voltage max.	
Short circuit protection	Yes (outputs vs. GND and supply voltage up to 7 V)	
Insulation resistance (500 VDC)	≥ 10	MΩ
Environmental Data		
MTTF (DIN EN ISO 13849-1, parts count method, w/o load, wc)	27	Years
Functional safety	If you need assistance in using our products in safety-related systems, please contact us	
EMC compatibility	EN 61000-4-2 Electrostatic discharges (ESD) 4 kV, 8 kV EN 61000-4-3 Electromagnetic fields 10 V/m EN 61000-4-4 Electrical fast transients (burst) 2 kV EN 61000-4-6 Conducted disturbances, induced by RF-fields 10 V eff. EN 55011 Radiated disturbances class B	



Pin assignment

Connector code 101, 102	Cable code 20 _	Connector with cable (Accessories)	Start/Stop-Impulse Interface
PIN 1	YE	WH	INIT +
PIN 2	GY	BN	Start/Stop +
PIN 3	PK	GN	INIT -
PIN 4	RD	YE	do not connect
PIN 5	GN	GY	Start/Stop -
PIN 6	BU	PK	GND
PIN 7	BN	BU	Supply voltage
PIN 8	WH	RD	do not connect

Connector code 103	Connector with cable (Accessories)	Start/Stop-Impulse Interface
Pin 1	WH	Start/Stop -
Pin 2	BN	Start/Stop +
Pin 3	BU	INIT +
Pin 4	BK	INIT -
Pin 5	GY	Supply voltage
Pin 6	GN	GND

Ordering Specifications
Digital Versions
- SSI
- Start-Stop-Impulse

Ordering Specifications

Preferred types printed in bold

Electrical Interfaces

- 1: Impulse Interface**
2: SSI Interface

Output Signal Impulse Interface 1 __

- 1: Impulse-Interface Start Stop Signal**

Output Signal SSI Interface 2 __

- 1: SSI 24 bit**
2: SSI 25 bit
7: SSI 26 bit (25 = alarm, 26 = parity even) on request

Impulse-Interface Start Stop Signal 11_

- 1: For 1 position marker**
2: For 2 position markers
3: For 3 position markers

SSI-Interface 2 __

- 1: Binary code; resolution 5 µm**
2: Gray code; resolution 5 µm
4: Binary code; resolution 1 µm
5: Gray code; resolution 1 µm
7: Binary code; resolution 10 µm
8: Gray code; resolution 10 µm

Electrical connection

- 101: Connector M16x0,75 (IEC 130-9), 8-pin
102: Connector M12x1, 8-pin
103: Connector M16x0,75 (IEC 130-9), 6-pin
201: Cable, 8-pol., shielded, 1 m
203: Cable, 8-pol., shielded, 3 m
205: Cable, 8-pol., shielded, 5 m
Other cable lengths and assembled connectors on request

T H 1 - 0 8 0 0 - 1 0 2 - 2 1 1 - 1 0 2

Series

Electrical measuring range

Standard lengths

0050 up to 4250 mm

in 25 mm-steps.

Other lengths on request

Mechanical version

102: Screw flange M18x1.5, zero point at 30 mm

103: Screw flange 3/4" - 16UNF, zero point at 30 mm

104: Screw flange M18x1.5, zero point at 51 mm

105: Screw flange 3/4" - 16UNF, zero point at 51 mm

106: Screw flange M18x1.5, zero point at 30 mm, for supporting at rod end *

107: Screw flange 3/4" - 16UNF, zero point at 30 mm, for supporting at rod end *

108: Screw flange M18x1.5, zero point at 51 mm, for supporting at rod end *

109: Screw flange 3/4" - 16UNF, zero point at 51 mm, for supporting at rod end *

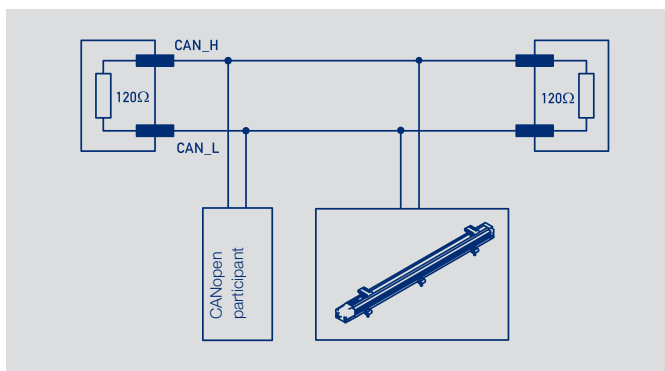
Other mechanical versions on request

*) with internal thread M4x6 at rod end and additional length 7.5 mm

Important: Avoid equalizing currents in the cable shield caused by potential differences.
Twisted pair cable (STP) is recommended.

Type designations	TH1 - - - - - 6 - - - - - CANopen-Interface		
Electrical Data			
Measured variables	Position and speed		
Electrical measuring range (dimension L)	0050 up to 4250		mm
Measuring range speed	0 ... 10		ms ⁻¹
Number of position markers	1 / 2		
Output signal / Protocol	CANopen protocol to CiA DS-301 V4.2.0, Device profile DS-406 V3.2 Encoder class C2, LSS services to CiA DS-305 V1.1.2		
Programmable parameters	Position, speed, cams, working areas, temperature, node-ID, baud rate		
Node-ID	1 ... 127 (default 127)		
Baudrate	10 ... 1000		
Resolution			
Position	1	5	µm
Speed	0.1	0.5	mms ⁻¹
Update rate	1 (internal measuring rate depends on measuring length)		
Absolute linearity *	< 250 mm ≤ ±25 µm < 750 mm ≤ ±30 µm < 1000 mm ≤ ±50 µm < 2500 mm ≤ ±80 µm up to 4250 mm ≤ ±120 µm		
Tolerance of electr. zero point	0.5		±mm
Reproducibility (rounded to resolution)	≤ 6		µm
Hysteresis (rounded to resolution)	≤ 4		µm
Temperature error	≤ 15 (min. 0.01 mm/K)		ppm/K
Supply voltage	24 (13 ... 34)		
Supply voltage ripple	≤ 10		% V _{ss}
Current consumption	≤ 100		mA
Overvoltage protection	40 (permanent)		
Polarity protection	Yes, up to supply voltage max.		
Short circuit protection	Yes (outputs vs. GND und supply voltage max.)		
Insulation resistance (500 VDC)	≥ 10		MΩ
Bus termination internal	no		
Environmental Data			
MTTF (DIN EN ISO 13849-1 parts count method, w/o load, wc)	25		Years
Functional safety	If you need assistance in using our products in safety-related systems, please contact us		
EMC compatibility	EN 61000-4-2 Electrostatic discharges (ESD) 4 kV, 8 kV EN 61000-4-3 Electromagnetic fields 10 V/m EN 61000-4-4 Electrical fast transients (burst) 1 kV EN 61000-4-6 Conducted disturbances, induced by RF-fields 10 V eff. EN 55016-2-3 Noise radiation class B		

*) Measured with resolution 1 µm.
At resolution > 1 µm the permissible linearity error is increased by the resolution.



Pin assignment

Connector code 106	Connector code 105	CANopen Interface
Pin 1	Pin 3	CAN_SHLD ***
Pin 2	Pin 5	Supply voltage
Pin 3	Pin 6	GND
Pin 4	Pin 2	CAN_H
Pin 5	Pin 1	CAN_L
-	Pin 4	n/a

***) CAN_SHLD: CAN-shield, internally connected to housing

Type designations	TH1 - - - - -1 - - - A - - - - - IO-Link		
Electrical Data			
Measured variables	Position, speed and temperature		
Electrical measuring range (dimension L)	0050 up to 4250		mm
Number of position markers	1 up to 3		
Output signal / protocol	IO-Link Spec V1.1 to IEC 61131-9, Smart Sensor Profil (V1.0 compatible)		
Programmable parameters	Zero point offset, resolution, averaging		
Configurability	Number of position markers and measured variables (position, speed). All product versions listed in the ordering specifications (e.g. 1 x position) are also configurable by the customer (e.g. into 2 x position and 2 x speed)		
Transfer rate	COM 3 (230.4 kB)		
Frame type	2.2		
Minimum cycle time	1		ms
Update rate	1 (internal measuring rate depends on measuring length)		kHz
Resolution			
Position	1	5	µm
Speed	0.1	0.5	mms ⁻¹
Reproducibility (rounded to resolution)	≤ 6		µm
Hysteresis (rounded to resolution)	≤ 4		µm
Absolute linearity *	< 250 mm ≤ ±25 µm < 750 mm ≤ ±30 µm < 1000 mm ≤ ±50 µm < 2500 mm ≤ ±80 µm up to 4250 mm ≤ ±120 µm		
Zero point tolerance	0.5		±mm
Temperature error	≤ 15 (min. 0,01 mm/K)		±ppm/K
Supply voltage	24 (18 ... 30)		VDC
Ripple	max. 10		%V _{ss}
Current consumption (w/o load)	≤ 100		mA
Reverse voltage	yes, up to supply voltage max.		
Short circuit protection	yes (C/Q vs. GND and supply voltage)		
Overvoltage protection	36 (permanent)		VDC
Insulation resistance (500 VDC)	≥ 10		MΩ
Environmental Data			
MTTF (DIN EN ISO 13849-1 parts count method, w/o load, wc)	> 28.6		Years
Functional safety	If you need assistance in using our products in safety-related systems, please contact us		
EMC compatibility	EN 61000-4-2 Electrostatic discharges (ESD) 4 kV, 8 kV EN 61000-4-3 Electromagnetic fields 10 V/m EN 61000-4-4 Electrical fast transients (burst) 1 kV EN 61000-4-6 Conducted disturbances, induced by RF-fields 10 V eff. EN 55016-2-3 Noise radiation class B		

*) Measured with resolution 1 µm.
At resolution > 1 µm the permissible linearity error is increased by the resolution.

Pin assignment

Connector M12 Code 107	Connector with cable (accessories)	IO-Link
PIN 1	BN	Supply voltage (L+)
PIN 2	WH	do not connect *
PIN 3	BU	GND (L-)
PIN 4	BK	C/Q

*) alternatively on GND

Ordering
Specifications



Ordering Specifications

Preferred types printed in bold

Electrical interface

6: CANopen-Interface

A: IO-Link

Interface parameters for CANopen 6 _ _

1: Resolution 5 µm, 1 x position and speed, 1 position marker fix

3: Resolution 1 µm, 1 x position and speed, 1 position marker fix

5: Resolution 5 µm, 2 x position and speed, 2 position markers fix

6: Resolution 1 µm, 2 x position and speed, 2 position markers fix

Interface parameters for IO-Link A _ _

11: Resolution 5 µm, 1 x position, 1 position marker fix

12: Resolution 5 µm, 1 x position and speed, 1 position marker fix

13: Resolution 5 µm, 2 x position, 2 position markers fix

14: Resolution 5 µm, 2 x position and speed, 2 position markers fix

15: Resolution 5 µm, 3 x position, 3 position markers fix

31: Resolution 1 µm, 1 x position, 1 position marker fix

32: Resolution 1 µm, 1 x position and speed, 1 position marker fix

33: Resolution 1 µm, 2 x position, 2 position markers fix

34: Resolution 1 µm, 2 x position and speed, 2 position markers fix

35: Resolution 1 µm, 3 x position, 3 position markers fix

Baud rate CANopen 6 _ _

1: Baud rate 1000 kBaud

2: Baud rate 800 kBaud

3: Baud rate 500 kBaud

4: Baud rate 250 kBaud

5: Baud rate 125 kBaud

7: Baud rate 50 kBaud

8: Baud rate 20 kBaud

9: Baud rate 10 kBaud

Electrical connection CANopen

105: Connector M16x0.75 (IEC130-9), 6-pin

106: Connector M12x1, 5-pin

Electrical connection IO-Link

107: Connector M12x1, 4-pin

T H 1 - 0 8 0 0 - 1 0 2 - 6 1 3 - 1 0 6

Series

Electrical measuring range

Standard lengths

0050 up to 4250 mm

in 25 mm-steps.

Other lengths on request

Mechanical version

102: Screw flange M18x1.5, zero point at 30 mm

103: Screw flange 3/4" - 16UNF, zero point at 30 mm

104: Screw flange M18x1.5, zero point at 51 mm

105: Screw flange 3/4" - 16UNF, zero point at 51 mm

106: Screw flange M18x1.5, zero point at 30 mm, for supporting at rod end *

107: Screw flange 3/4" - 16UNF, zero point at 30 mm, for supporting at rod end *

108: Screw flange M18x1.5, Zero point at 51 mm, for supporting at rod end *

109: Screw flange 3/4" - 16UNF, zero point at 51 mm, for supporting at rod end *

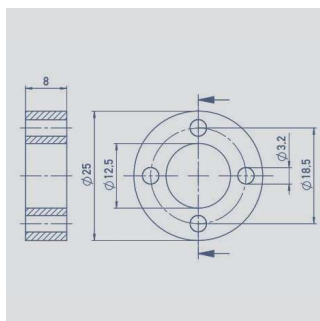
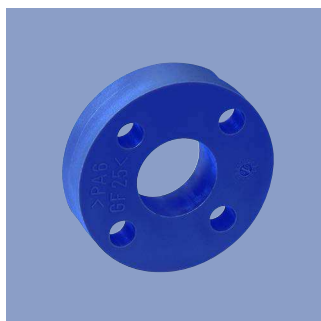
Other mechanical versions on request

*) with internal thread M4x6 at rod end and additional length 7.5 mm

Important: Avoid equalizing currents in the cable shield caused by potential differences.

Only CANopen: Twisted pair cable (STP) is recommended.

Position marker

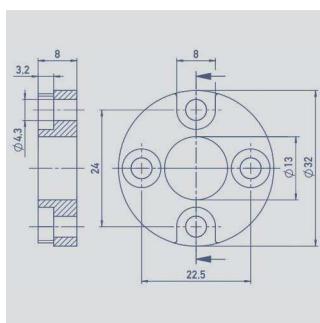


Ring Position Marker Z-TH1-P18

P/N 005697

Series TH1 / TIM

Material	PA6-GF25
Weight approx.	12 g
Operating temperature	-40 ... +100° C
Surface pressure max.	40 N/mm ²
Fastening torque of mounting screws, max.	1 Nm

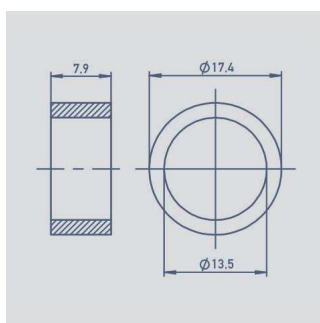
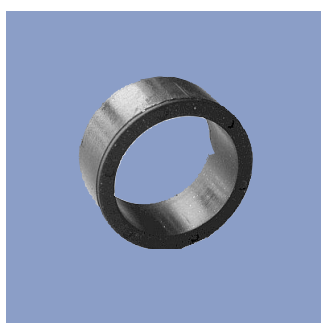


Ring Position Marker Z-TH1-P19

P/N 005698

Series TH1 / TIM

Material	PA6-GF25
Weight approx.	14 g
Operating temperature	-40 ... +100°C
Surface pressure max.	40 N/mm ²
Fastening torque of mounting screws, max.	1 Nm

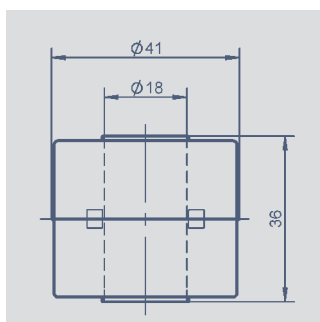


Ring Position Marker Z-TIM-P20

P/N 005699

Series TH1 / TIM

Material	PA-Neonbond Compound
Weight approx.	5 g
Operating temperature	-40 ... +100°C
Surface pressure max.	10 N/mm ²
Mounting via lock washer and lock ring	



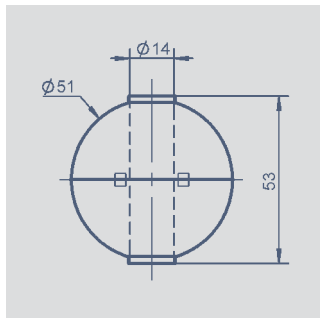
Cylinder - Floating Position Marker Z-TH1-P21

P/N 056044

Series TH1 / TIM

Material	1.4404
Weight approx.	20 g
Operating temperature	-40 ... +100°C
Compression strength, min.	< 8 bar
Density	740 kg/m ³
Immersion depth in water	26,6 mm

Position marker Fastening elements

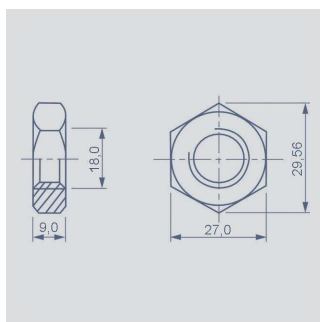
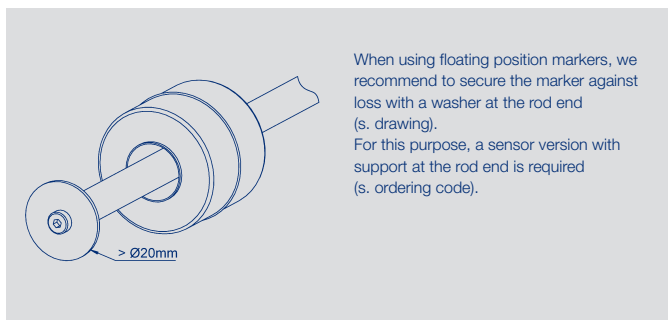


Bowl - Floating Position Marker Z-TH1-P22

P/N 056045

Series TH1 / TIM

Material	1.4571
Weight approx.	42 g
Operating temperature	-40 ... +100°C
Compression strength, min.	< 60 bar
Density	720 kg/m ³
Immersion depth in water	36,7 mm

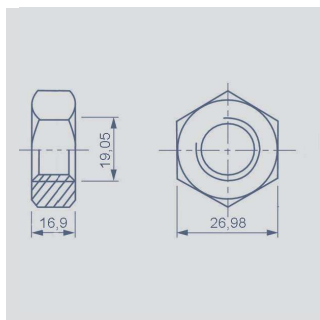


Mounting nut ISO 8675,

M18x1.5-A2

P/N 056090

Z-TH1-M01



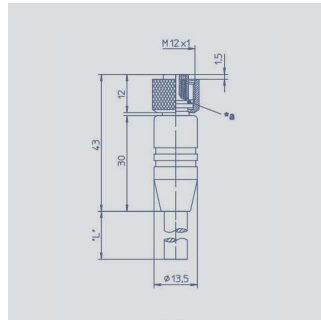
Mounting nut DIN 934,

3/4" - 16UNF-A2

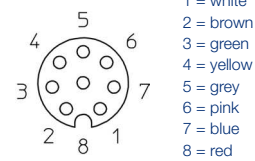
P/N 056091

Z-TH1-M02

Connector System M12

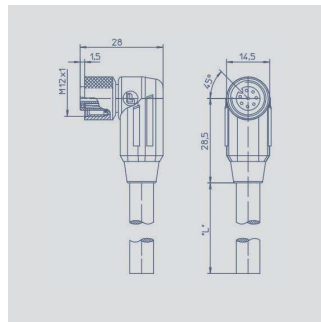


Pin assignment

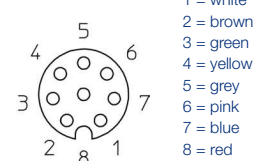


M12x1 Mating female connector, 8-pin, straight, A-coded, with molded cable, shielded, IP67, open ended

Connector housing	Plastic PA	
Cable sheath	PUR; Ø = max. 8 mm -25 °C...+80 °C (moved) -50 °C...+80 °C (fixed)	
Wires	PP, 0.25 mm ²	
Length	Type	P/N
2 m	EEM 33-86	005629
5 m	EEM 33-90	005635
10 m	EEM 33-92	005637

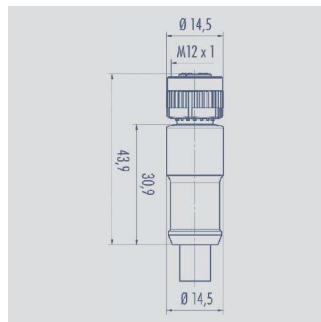


Pin assignment

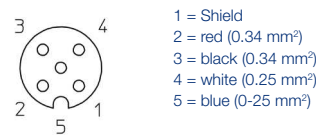


M12x1 Mating female connector, 8-pin, angled, A-coded, with molded cable, shielded, IP67, open ended

Connecto housing	Plastic PA	
Cable sheath	PUR; Ø = max. 8 mm, -25 °C...+80 °C (moved) -50 °C...+80 °C (fixed)	
Wires	PP, 0.25 mm ²	
Length	Type	P/N
2 m	EEM 33-87	005630
5 m	EEM 33-91	005636
10 m	EEM 33-93	005638

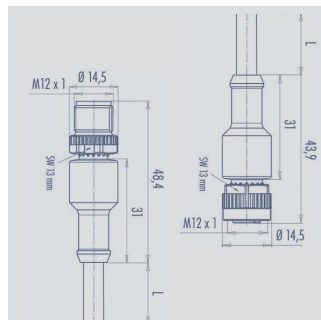


Pin assignment

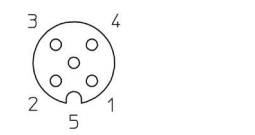


M12x1 Mating female connector, 5-pin, straight, A-coded, with molded cable, IP67, shielded, open ended, CAN-bus

Connector housing	PUR	
Cable sheath	PUR Ø = max. 7.2 mm, -25 °C...+85 °C (moved)	
Wires	PP 2x 0.25 mm ² + 2 x 0.34 mm ²	
Length	Type	P/N
2 m	EEM 33-41	056141
5 m	EEM 33-42	056142
10 m	EEM 33-43	056143



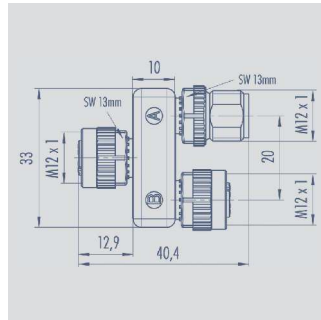
Pin assignment



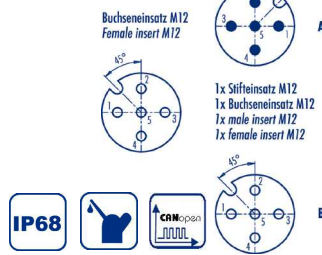
M12x1 Mating female connector, 5-pin, straight, A-coded, with molded cable, IP68, shielded, CAN-Bus

Connector housing	PUR	
Cable sheath	PUR; Ø 7.2 mm -25 °C... +85 °C (fixed)	
Length	Type	P/N
5 m	EEM 33-44	056144

Connector System M12



Pin assignment

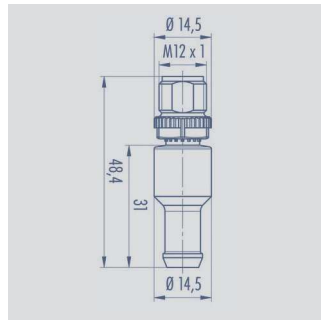


**M12x1 splitter / T-connector, 5-pin,
A-coded, IP68, 1:1 connection,
female - male - female, CAN-bus**

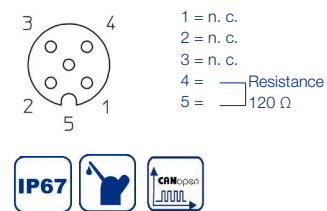
Connector housing PUR

Temperature range -25 °C... +85 °C

Type EEM 33-45, P/N 056145



Pin assignment

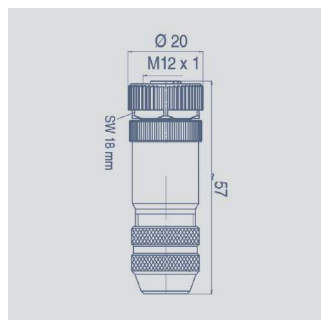


**M12x1 terminating resistor, 5-pin,
A-coded, IP67, 120 Ω resistance, CAN-bus**

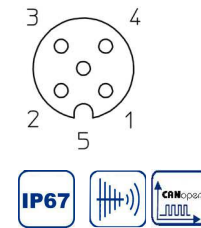
Connector housing PUR

Temperature range -25 °C... +85 °C

Type EEM 33-47, P/N 056147



Pin assignment

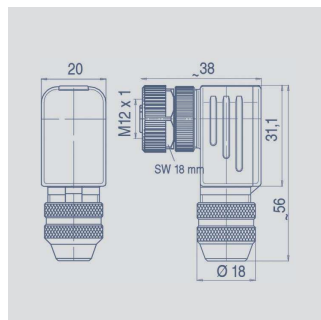


**M12x1 Mating female connector 5-pin,
straight, A-coded, with coupling nut,
screw termination, IP67, shieldable,
CAN-bus**

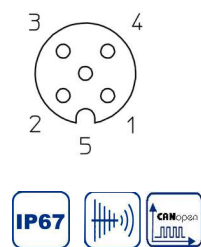
Connector housing Metall
-40 °C...+85 °C

For wire gauge 6...8 mm, max. 0.75 mm²

Type EEM 33-73, P/N 005645



Pin assignment



**M12x1 Mating female connector, 5-pin,
angled, A-coded, with coupling nut, screw
termination, IP67, shieldable, CAN-Bus**

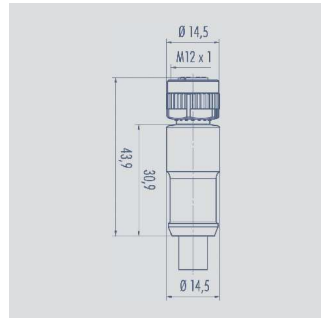
Connector housing Metall
-40 °C...+85 °C

For wire gauge 6...8 mm, max. 0.75 mm²

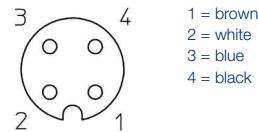
Type EEM 33-75, P/N 005646

It is possible to turn and fix the contact carrier in 90° positions.

Connector System M12

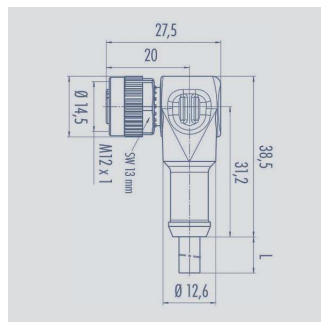


Pin assignment

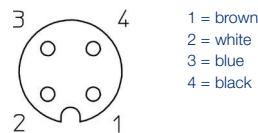


M12x1 Mating female connector, 4-pin, straight, A-coded, with molded cable, not shielded, IP67, open ended

Connector housing	Plastic PA	
Cable sheath	PUR; Ø = max. 6 mm, -40 °C...+85 °C (fixed)	
Wires	PP, 0.34 mm ²	
Length	Type	P/N
2 m	EEM 33-35	056135
5 m	EEM 33-36	056136
10 m	EEM 33-37	056137

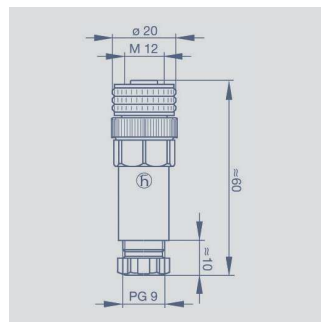


Pin assignment

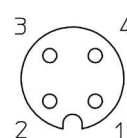


M12x1 Mating female connector, 4-pin, angled, A-coded, with molded cable, not shielded, IP67, open ended

Connector housing	Plastic PA	
Cable sheath	PUR; Ø = max. 6 mm, -40 °C...+85 °C (fixed)	
Wires	PP, 0.34 mm ²	
Length	Type	P/N
2 m	EEM 33-38	056138
5 m	EEM 33-39	056139
10 m	EEM 33-40	056140

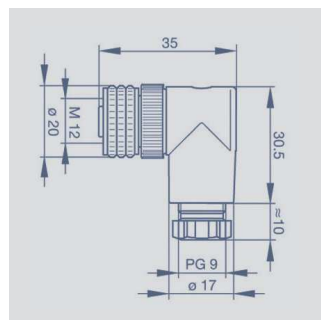


Pin assignment

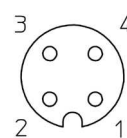


M12x1 Mating female connector, 4-pin, straight, A-coded, with coupling nut, screw termination, IP67, not shielded

Connector housing	Plastic PBT -25 °C...+90 °C	
For wire gauge	6...8 mm, max. 0.75 mm ²	
Type	EEM 33-88, P/N 005633	



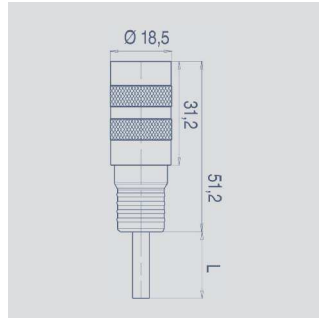
Pin assignment



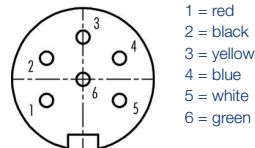
M12x1 Mating female connector, 4-pin, angled, A-coded, with coupling nut, screw termination, IP67, not shielded

Connector housing	Plastic PBT -25 °C...+90 °C	
For wire gauge	6...8 mm, max. 0.75 mm ²	
Type	EEM 33-89, P/N 005634	

Connector System M16



Pin assignment



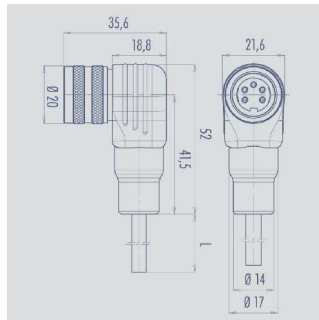
- 1 = red
- 2 = black
- 3 = yellow
- 4 = blue
- 5 = white
- 6 = green



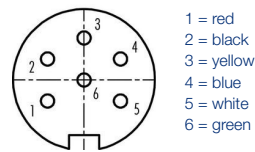
M16x0.75 Mating female connector, 6-pin, straight, with molded cable, 2 m length, shielded, IP67, open ended

Connector housing	PUR
Cable sheath	PUR; Ø max. 6 mm, -5...+70 °C (moved) -20...+70 °C (fixed)
Wires	PVC, 6 x 0,25 mm ²
Type EEM 33-26, P/N 056126	

This coupling can be used in combination with 5-pin M16 connectors. Than „pin 6 / green“ is open.



Pin assignment



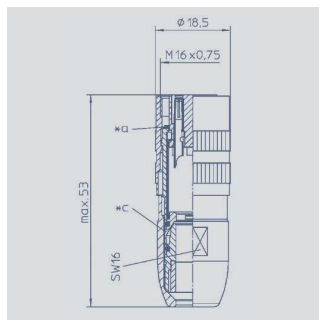
- 1 = red
- 2 = black
- 3 = yellow
- 4 = blue
- 5 = white
- 6 = green



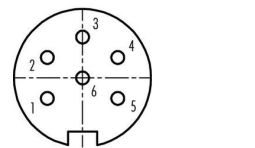
M16x0.75 Mating female connector, 6-pin, angled, with molded cable, 2 m length, shielded, IP67, open ended

Connector housing	PUR
Cable sheath	PUR; Ø max. 6 mm, -5...+70 °C (moved) -20...+70 °C (fixed)
Wires	PVC, 6 x 0,25 mm ²
Type EEM 33-27, P/N 056127	

This coupling can be used in combination with 5-pin M16 connectors. Than „pin 6 / green“ is open.

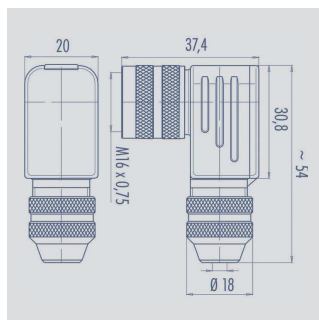


Pin assignment

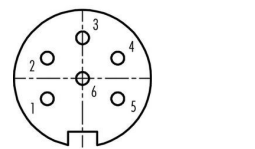


M16x0.75 Mating female connector, 6-pin, straight, with coupling nut, solder terminal, IP68, shielded

Connector housing	CuZn (Brass, nickel plated) -40 °C... +85 °C
For wire gauge	4...8 mm, max. 0,75 mm ²
Type EEM 33-82, P/N 005639	



Pin assignment

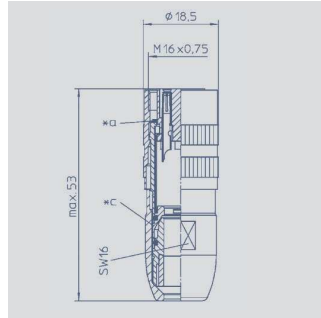


M16x0.75 Mating female connector, 6-pin, angled, with couplingnut, solder terminal, IP67, shielded

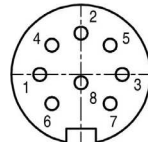
Connector housing	CuZn (Brass, nickel plated) -40 °C... +95 °C
For wire gauge	6...8 mm, PG 9 max. 0,75 mm ²
Type EEM 33-94, P/N 005648	

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Printed in Germany.



Pin assignment

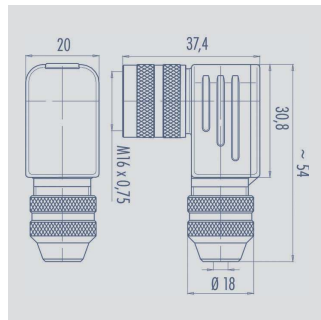


M16x0.75 Mating female connector, 8-pin, straight, with coupling nut, solder terminal, IP68, shielded

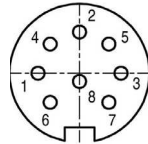
Connector housing	CuZn (Brass, nickel plated) -40 °C... +85 °C
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For wire gauge	4...8 mm, max. 0.75 mm ²
----------------	--

Type	EEM 33-84, P/N 005627
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Pin assignment



M16x0.75 Mating female connector, 8-pin, angled, with coupling nut, solder terminal, IP67, shielded

Connector housing	CuZn (Brass, nickel plated) -40 °C... +95 °C
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For wire gauge	6...8 mm, PG 9 max. 0.75 mm ²
----------------	---

Type	EEM 33-85, P/N 005628
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IP67 Protection class IP67 to DIN EN 60529

IP68 Protection class IP68 to DIN EN 60529

CANopen CAN-bus

Very good Electromagnetic Compatibility (EMC) and shield systems

Very good resistance to oils, coolants and lubricants

UL UL - approved

Suited for applications in dragchains

Note: The protection class is valid only in locked position with its plugs.
The application of these products in harsh environments must be checked in particular cases.

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