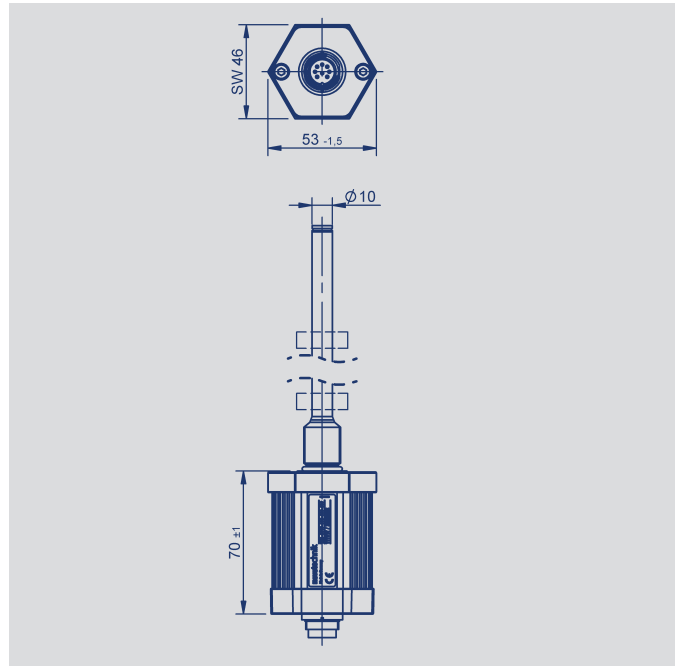
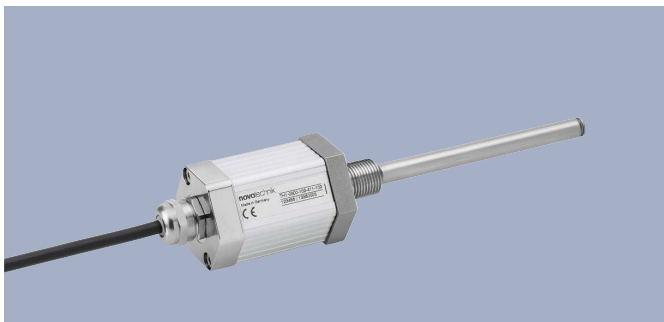
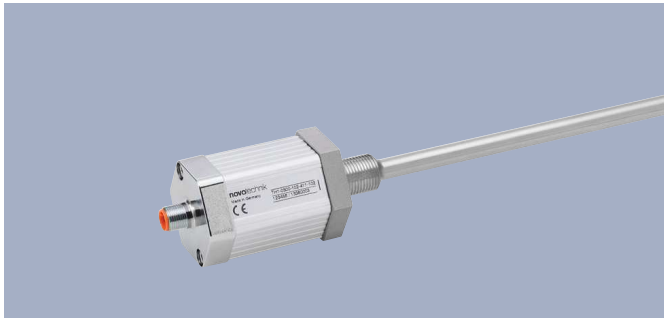


NOVOSTRICTIVE Transducer up to 4250 mm touchless

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 integrable 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.

Contents

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Technical Data Analog Versions

| Type designations | TH1- - - - - 41 - - - - | TH1- - - - - 42 - - - - |
|---|---|--|
| | Voltage | 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 |
| Sampling rate / Update rate | < 750 mm: 2kHz, 750 ... < 2000 mm: 1 kHz, > 2000 mm: 05 kHz Extrapolated to 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 | % Ub |
| 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 | |



*) 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 |
|-------------------------|----------------|------------------------------------|----------------|----------------|
| Pin 1 | YE | WH | do not connect | 0(4)...20 mA |
| Pin 2 | GY | BN | Signal GND | Signal GND |
| Pin 3 | PK | GN | +10...0 V | do not connect |
| Pin 4 | RD | YE | DIAG * | DIAG * |
| Pin 5 | GN | GY | 0...+10 V | do not connect |
| Pin 6 | BU | PK | GND | GND |
| Pin 7 | BN | BU | Supply voltage | Supply voltage |
| Pin 8 | WH | RD | PROG * | PROG * |

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

| Connector code 103 | Connector with cable (Accessories) | Analog Voltage | Analog Current |
|--------------------|------------------------------------|----------------|----------------|
| Pin 1 | WH | 0 ...+10 V | 0 (4)...20 mA |
| Pin 2 | BN | Signal GND | Signal GND |
| Pin 3 | BU | +10...0 V | do not connect |
| Pin 4 | BK | GND | GND |
| Pin 5 | GY | Supply voltage | Supply voltage |
| Pin 6 | GN | GND | GND |

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

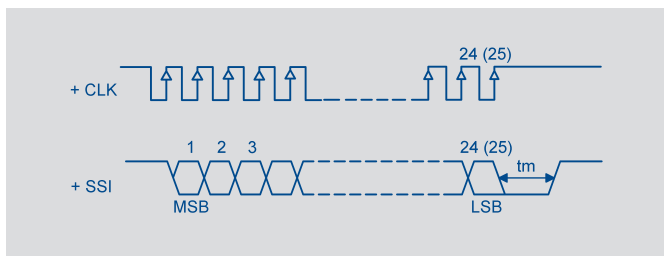
*) with internal thread M4x6 at rod end and additional length 7.5 mm

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

Technical Data SSI-Interface

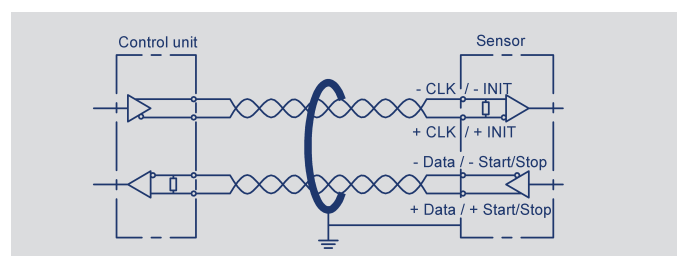
| Type designations | TH1 - _ _ _ _ - 2 _ _ - _ _ _ Synchron-Serial-Interface (SSI) | |
|---|--|-------|
| Electrical Data | | |
| Electrical measuring range (dimension L) | 0050 up to 4250 | mm |
| Protocol | SSI 24 and 25 bit (26 bit on request) | |
| Inputs | RS422 | |
| Monoflop time (tm) | 30 | µs |
| Encoding | Gray, Binary | |
| Sampling rate / Update rate | < 750 mm: 2 kHz, 750 ... < 2000 mm: 1 kHz, > 2000 mm: 0.5 kHz Extrapolated to 16 kHz | kHz |
| Resolution (LSB) | 1, 5 or 10 (other resolutions on request) | 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 | |
| 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 | % Ub |
| 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 contac us | |
| CE 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 | |

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



Pin assignment

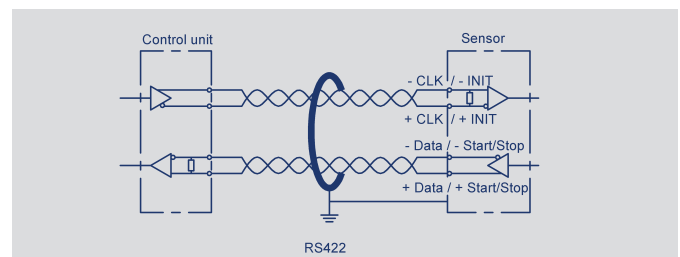
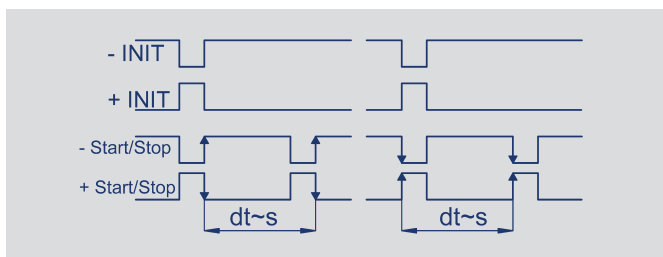
| Connector code 101, 102 | Cable code 20 _ | Connector with cable (Accessories) | SSI Interface |
|-------------------------|-----------------|------------------------------------|----------------|
| Pin 1 | YE | WH | Clk + |
| Pin 2 | GY | BN | Data + |
| Pin 3 | PK | GN | Clk - |
| Pin 4 | RD | YE | 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 | |
| Sampling rate / Update rate | < 500 mm: 1 kHz, 500 ... < 2000 mm: 0.5 kHz, > 2000 mm: 0.25 kHz | 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 | % Ub |
| 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.

Technical Data

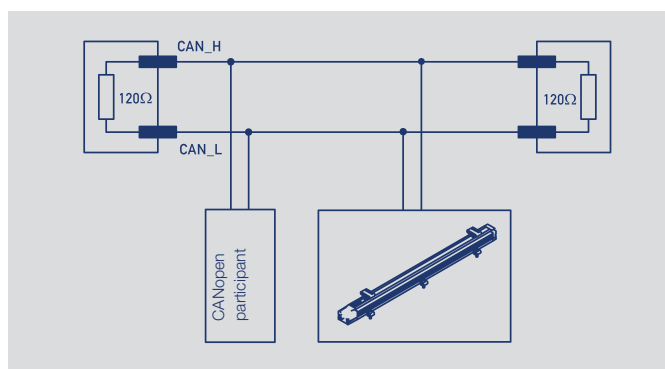


| Type designations | TH1 - _ _ _ _ - 6 _ _ _ _ _ CANopen-Interface | | |
|---|---|-----|-------------------|
| Electrical Data | | | |
| Measured variables | Position and speed | | |
| Electrical measuring range (dimension L) | 0050 up to 4250 | | mm |
| Measuring range speed | 0 ... 10 | | ms ⁻¹ |
| 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 | 20 ... 1000 | | kBaud |
| Resolution | | | |
| Position | 1 | 5 | µm |
| Speed | 0.1 | 0.5 | mms ⁻¹ |
| Update rate | 1 | | kHz |
| | (internal sampling rate < 750 mm: 2 kHz, 750 ... < 2000 mm: 1 kHz, > 2000 mm: 0.5 kHz) | | |
| 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) | | VDC |
| Supply voltage ripple | ≤ 10 | | % Ub |
| Current consumption | ≤ 100 | | mA |
| Overvoltage protection | 40 (permanent) | | VDC |
| 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 - _ _ _ _ -101- 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 sampling rate < 750 mm: 2 kHz, 750 ... < 2000 mm: 1 kHz, > 2000 mm: 0,5 kHz) | | 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 |
| Supply voltage ripple | max. 10 | | % Ub |
| 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

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 *

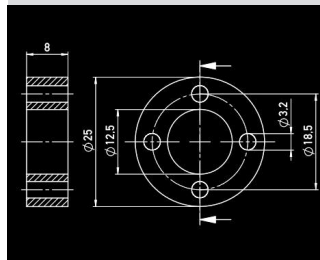
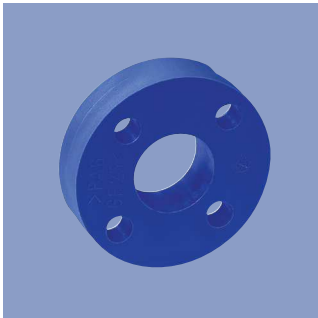
Other mechanical versions on request

*) 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

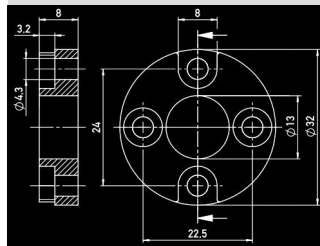
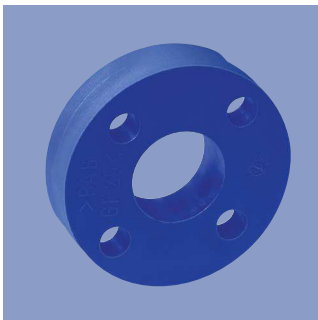


Ring Position Marker Z-TH1-P18

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 |

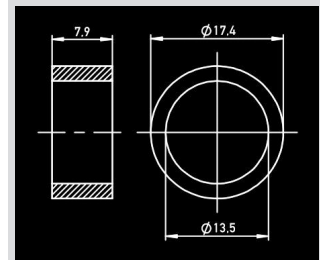
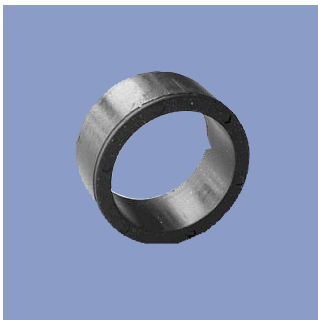


Ring Position Marker Z-TH1-P19

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 |

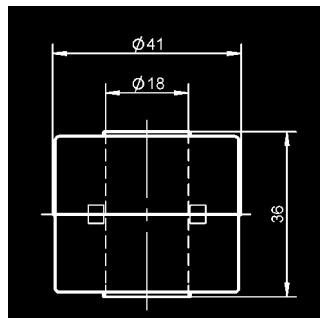
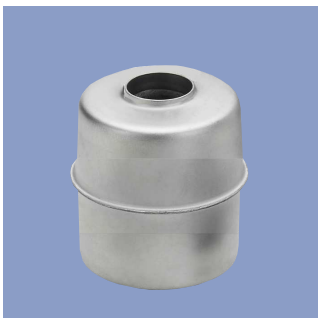


Ring Position Marker Z-TIM-P20

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

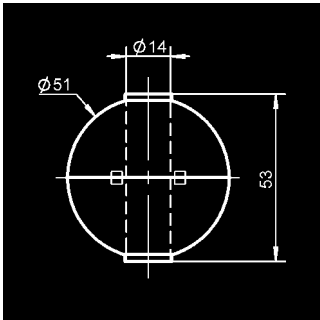
P/N 056044

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

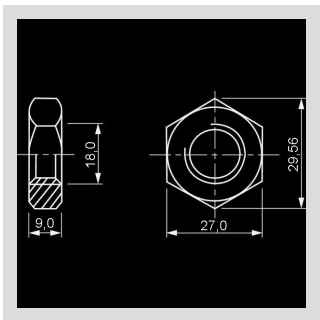


| | |
|---|----------------|
| Bowl - Floating Position Marker Z-TH1-P22 | |
| P/N 056045 | |
| Series TH1 / TIM | |
| Material | 1.4571 |
| Weight approx. | 42 g |
| Operating temperature | -40 ... +100°C |
| Compression strength, min. | < 60 bar |
| Density | 720 kg/m³ |
| Immersion depth in water | 36,7 mm |

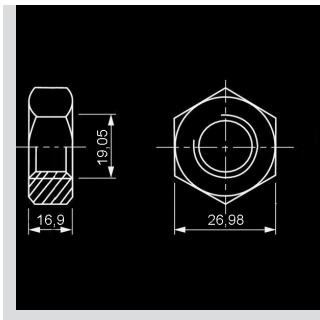
> Ø20mm

When using floating position markers, we recommend to secure the marker against loss with a washer at the rod end (s. drawing).

For this purpose, a sensor version with support at the rod end is required (s. ordering code).

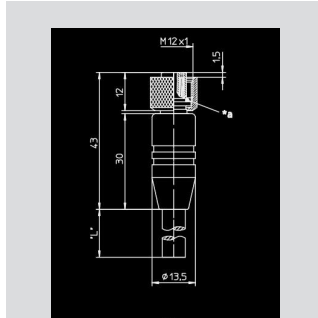


| |
|------------------------|
| Mounting nut ISO 8675, |
| M18x1.5-A2 |
| P/N 056090 |
| Z-TH1-M01 |

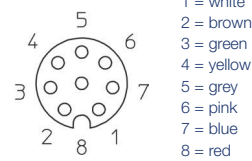


| |
|-----------------------|
| Mounting nut DIN 934, |
| 3/4" - 16UNF-A2 |
| P/N 056091 |
| Z-TH1-M02 |

Connector System M12



Pin assignment



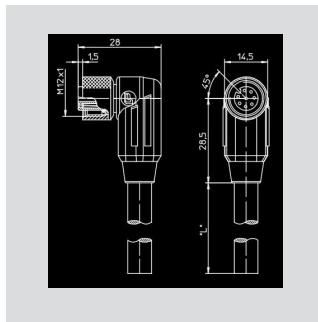
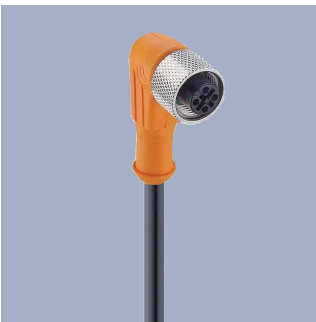
- 1 = white
2 = brown
3 = green
4 = yellow
5 = grey
6 = pink
7 = blue
8 = red



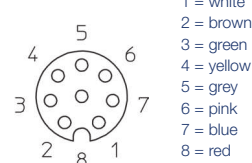
M12x1 Mating female connector, 8-pin, straight, A-coded, with molded cable, shielded, IP67, open ended

| | |
|-------------------|--|
| 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



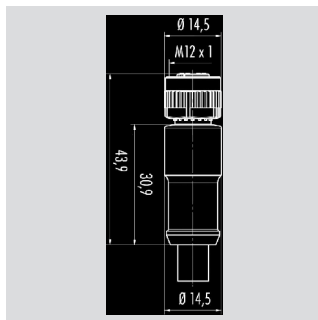
- 1 = white
2 = brown
3 = green
4 = yellow
5 = grey
6 = pink
7 = blue
8 = red



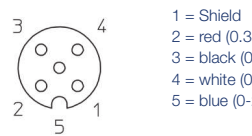
M12x1 Mating female connector, 8-pin, angled, A-coded, with molded cable, shielded, IP67, open ended

| | |
|------------------|---|
| Connecto housing | Plastic PA |
| Cable sheath | PUR; Ø = max. 8 mm, -25 °C...+80 °C (moved) -50 °C...+80 °C (fixed) |

| Length | Type | P/N |
|--------|-----------|--------|
| 2 m | EEM 33-87 | 005630 |
| 5 m | EEM 33-91 | 005636 |
| 10 m | EEM 33-93 | 005638 |



Pin assignment



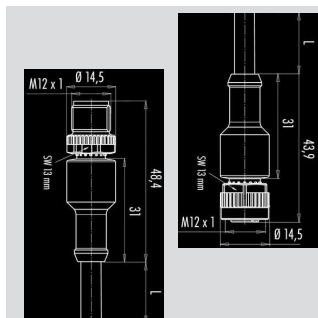
- 1 = Shield
2 = red (0.34 mm²)
3 = black (0.34 mm²)
4 = white (0.25 mm²)
5 = blue (0-25 mm²)



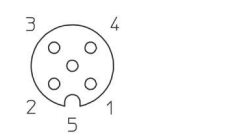
M12x1 Mating female connector, 5-pin, straight, A-coded, with molded cable, IP67, shielded, open ended, CAN-bus

| | |
|-------------------|---|
| 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

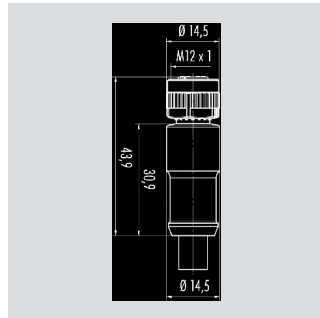


M12x1 Mating female connector, 5-pin, straight, A-coded, with molded cable, IP68, shielded, CAN-Bus

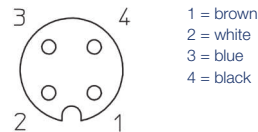
| | |
|-------------------|---|
| Connector housing | PUR |
| Cable sheath | PUR; Ø 7.2 mm -25 °C... +85 °C (fixed) |

| Length | Type | P/N |
|--------|-----------|--------|
| 5 m | EEM 33-44 | 056144 |

Connector System M12

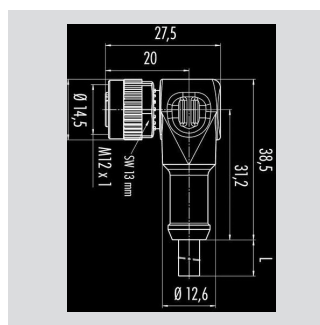


Pin assignment

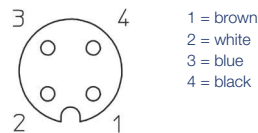


M12x1 Mating female connector, 4-pin, straight, A-coded, with molded cable, not shielded, IP67, open ended

| 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 |

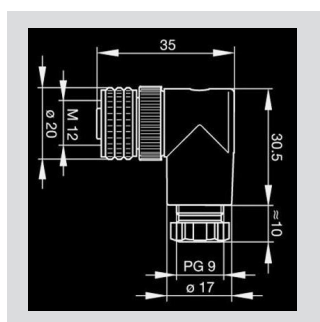


Pin assignment

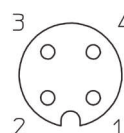


M12x1 Mating female connector, 4-pin, angled, A-coded, with molded cable, not shielded, IP67, open ended

| 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 |



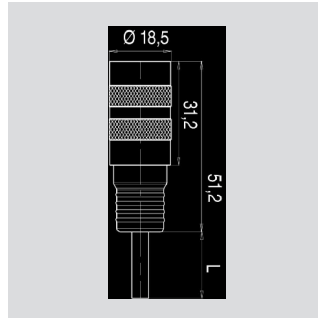
Pin assignment



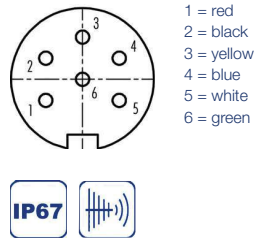
M12x1 Mating female connector, 4-pin, angled, A-coded, with coupling nut, screw termination, IP67, not shielded

| | | |
|-------------------|-------------------------------------|--|
| 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



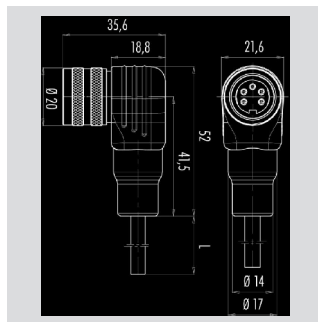
Pin assignment



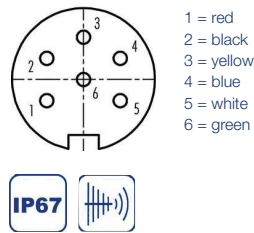
M16x0.75 Mating female connector, 6-pin, straight, with molded cable, 2 m length, shielded, IP67, open ended

| | |
|----------------------------|--|
| 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.



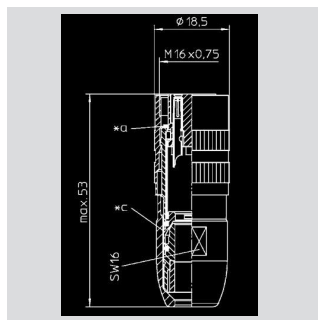
Pin assignment



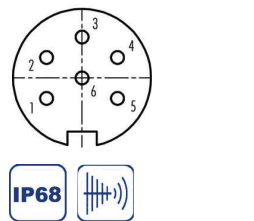
M16x0.75 Mating female connector, 6-pin, angled, with molded cable, 2 m length, shielded, IP67, open ended

| | |
|----------------------------|--|
| 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.

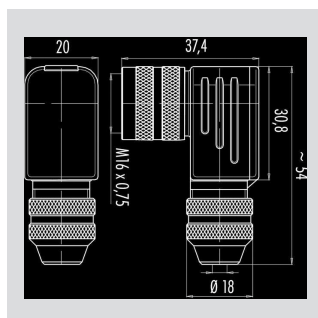


Pin assignment

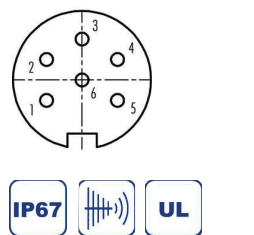


M16x0.75 Mating female connector, 6-pin, straight, with coupling nut, solder terminal, IP68, shielded

| | |
|----------------------------|--|
| 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



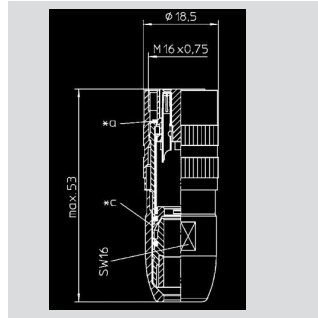
M16x0.75 Mating female connector, 6-pin, angled, with coupling nut, solder terminal, IP67, shielded

| | |
|----------------------------|--|
| 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 | |

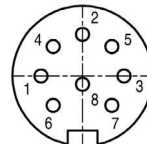
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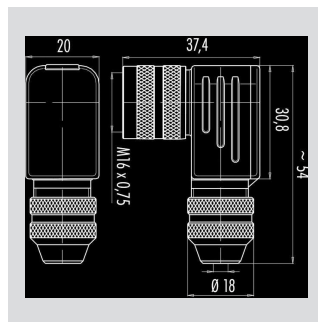


Pin assignment

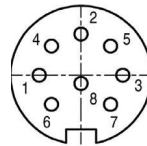


M16x0.75 Mating female connector, 8-pin, straight, with coupling nut, solder terminal, IP68, shielded

| | |
|-------------------|--|
| Connector housing | CuZn (Brass, nickel plated) -40 °C... +85 °C |
| For wire gauge | 4...8 mm, max. 0.75 mm ² |
| Type | EEM 33-84, P/N 005627 |



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 |
| For wire gauge | 6...8 mm, PG 9 max. 0.75 mm ² |
| Type | EEM 33-85, P/N 005628 |

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.

The specifications contained in our datasheets are intended solely for informational purposes. The documented specification values are based on ideal operational and environmental conditions and can vary significantly depending on the actual customer application. Using our products at or close to one or more of the specified performance ranges can lead to limitations regarding other performance parameters. It is therefore necessary that the end user verifies relevant performance parameters in the intended application. We reserve the right to change product specifications without notice.