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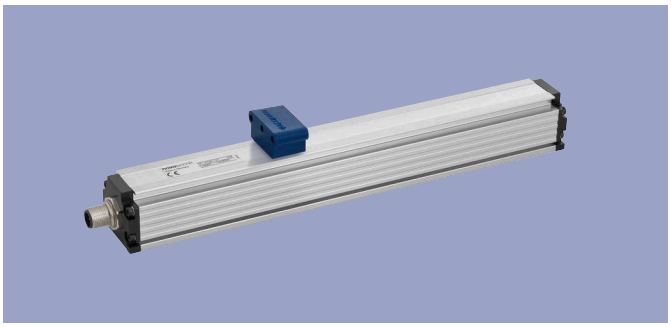
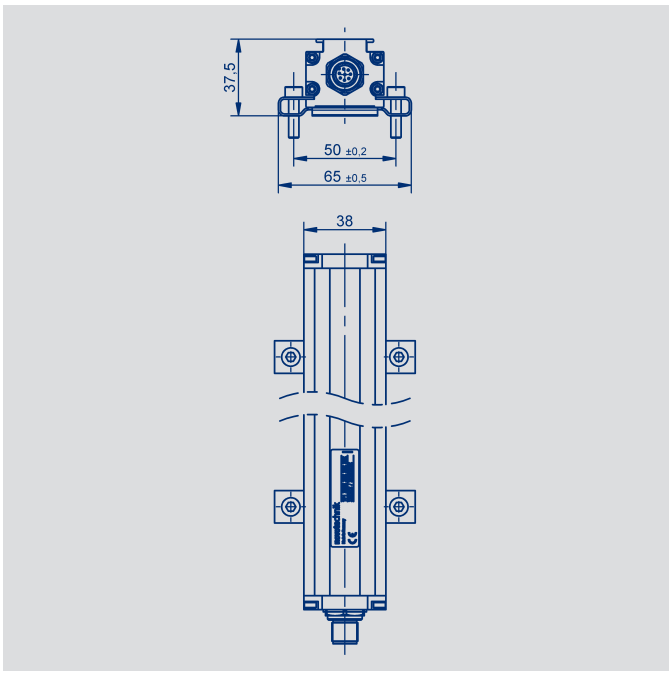
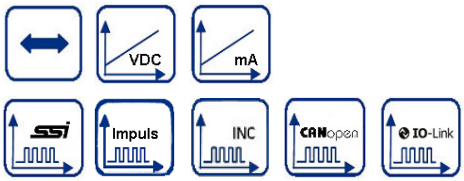
NOVOSTRICTIVE Transducer up to 4250 mm touchless

Series TP1







Special features

- Non-contacting magnetostrictive measurement technology
- Touchless position detection
- Wear-free, unlimited mechanical life
- Resolution up to 1 µm, independently of length
- Low temperature coefficient <15 ppm/K
- Insensitive to shock and vibration
- Protection class IP67 / IP68
- Position-Teach-In
- Optionally galvanic isolated
- Interfaces: Analog, SSI, Impulse, Incremental, CANopen, IO-Link

Applications

- Manufacturing Engineering
  - Plastic injection molding
  - Textile
  - Packaging
  - Sheet metal working
  - Woodwork
- Automation Technology

Transducer in profile design with magnetostrictive technology for highly accurate and reproducible position measurement for lengths up to 4250 mm. Mechanically decoupled and therefore wear-free when the floating position marker is used.

The transducer TP1 is insensitive to dirt, dust or moisture and thus proves itself in harsh industrial environments.
Depending on the interface, up to three positions and speed can be measured.

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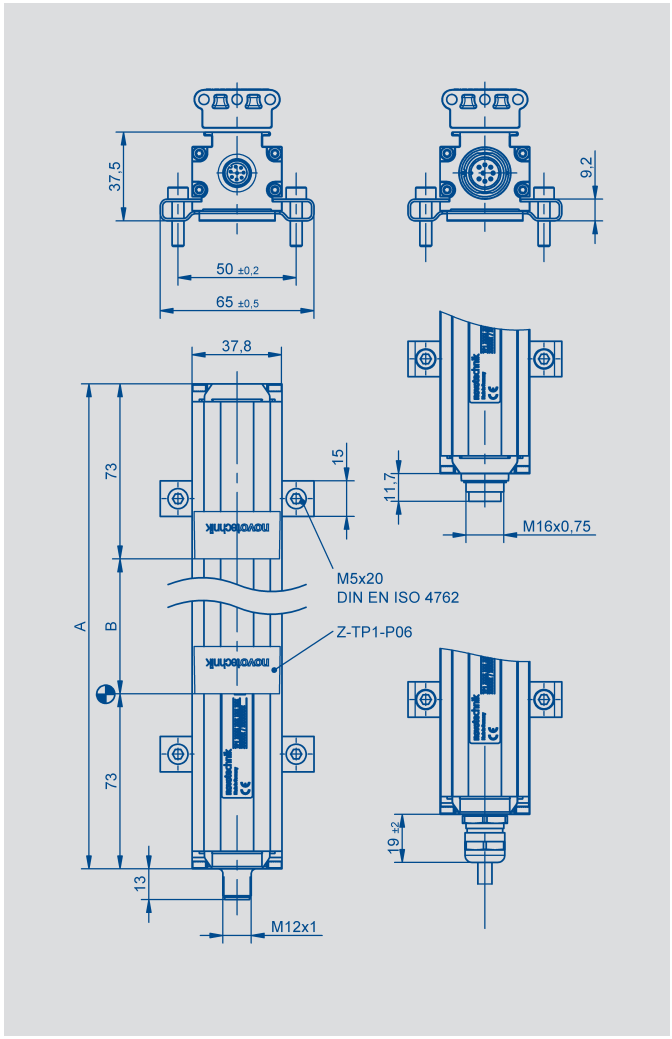
Contents

Mechanical Data



Description		
Materials	Housing: Anodized aluminum, AlMgSi0,5 F22, 3.3206.71 End flanges: Aluminum G AlSi12Cu1 (FE)	
Mounting	Adjustable clamps (included in delivery)	
Position marker	Floating position marker, plastic Guided position marker, plastic, with ball coupling	
Electrical connections	Connector M12x1, 4-pin / 5-pin / 8-pin, shielded Connector M16x0.75 (IEC 130-9), 6-pin / 8-pin, shielded PUR-cable, 8 x 0.25 mm², 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	
Length of housing (dimension A)	Dimension B + 146	mm
Electrical measuring range (dimension B)	0050 up to 0500 mm in 25 mm steps, 500 up to 1000 mm in 50 mm steps, 1000 up to 2000 mm in 100 mm steps, 2000 up to 4250 mm in 250 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 (with floating position marker)	
Operating temperature range	-40 ... +85	°C
Storage temperature range	-40 ... +105	°C
Operating humidity range	0 ... 95 (no condensation)	% R.H.

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

Technical Data
Analog Versions

Type designations	TP1- _ _ _ _-101 - 41 _ - _ _ _ Voltage	TP1- _ _ _ _-101 - 42 _ - _ _ _ Current	
Electrical Data			
Electrical measuring range (dimension B)	0050 up to 4250		mm
Output signal	0.1 ... 10 V (load ≥ 5 kΩ) -10 ... 10 V (load ≥ 5 kΩ)	0.1 ... 20 mA (burden ≤ 500 Ω) 4 ... 20 mA (burden ≤ 500 Ω)	
Number of channels	2	1	
Sampling rate / Update rate	< 750 mm: 2 kHz, 750 ... < 2000 mm: 1 kHz, > 2000 mm: 0.5 kHz Extrapolated to 16 kHz		
Resolution	16		bit
Absolute linearity *	≤ ± 0.02 (min. ± 50 µm)		% 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 with galvanic isolation	24 (18 ... 36)		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		MΩ
Environmental Data			
MTTF (IEC 60050)	270		Years
Functional safety	If you need assistance in using our products in safety-related systems, please contact us		
EMC compatibility CE	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		

Unless otherwise stated, the specified technical data applies to the use of a floating position marker. Tolerances and play in assembly and coupling may have a direct impact on the specified technical data.

*) Valid for channel 1; channel 2 with additional offset and gradient tolerances (inverted signal from channel 1).
Measured with position marker Z-TP1-P06.

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 (-10) V	do not connect
Pin 4	RD	YE	DIAG ***	DIAG ***
Pin 5	GN	GY	0 (-10)...+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)...+10 V	0 (4)...20 mA
Pin 2	BN	Signal GND	Signal GND
Pin 3	BU	+10...0 (-10) V	do not connect
Pin 4	BK	GND	GND
Pin 5	GY	Supply voltage	Supply voltage
Pin 6	GN	GND	GND

FS = Full scale: Signal span according to electrical measuring range

Ordering Specifications Analog Versions - Voltage - Current

Ordering specifications

Preferred types printed in bold

Mechanical version
101: Profile design

Electrical interface
4: Analog interface

Output signal analog interfaces 4 _ _
1: Voltage output
2: Current output

Analog interface voltage output 41_
1: 0 ... 10 V and 10 ... 0 V *
4: 0 ... 10 V and 10 ... 0 V galvanic isolated
6: -10 ... +10 V and +10 ... -10 V galvanic isolated

Analog interface current output 42_
1: 0 ... 20 mA *
2: 20 ... 0 mA *
3: 4 ... 20 mA *
4: 20 ... 4 mA *

*) With Teach-In-function

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-pole, shielded, 1 m
203: Cable, 8-pole, shielded, 3 m
205: Cable, 8-pole, shielded, 5 m

T	P	1	–	0	8	0	0	–	1	0	1	–	4	1	1	–	1	0	2

Series

Electrical measuring range
Standard lengths 0050 up to 4250 mm
0050 up to 0500 mm in 25 mm-steps, 0500 up to 1000 mm in 50 mm-steps,
1000 up to 2000 mm in 100 mm-steps, 2000 up to 4250 mm in 250 mm-steps.
Other lengths on request

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

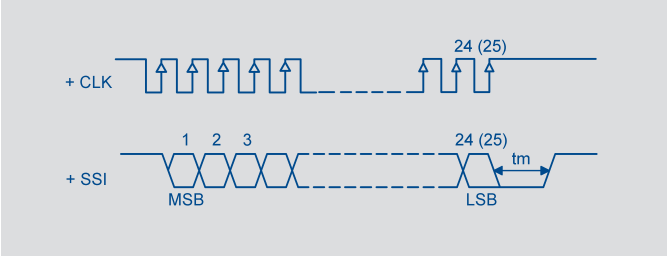
Accessories included in delivery
- Adjustable clamps and cylinder screws DIN EN ISO 4762 M5x20

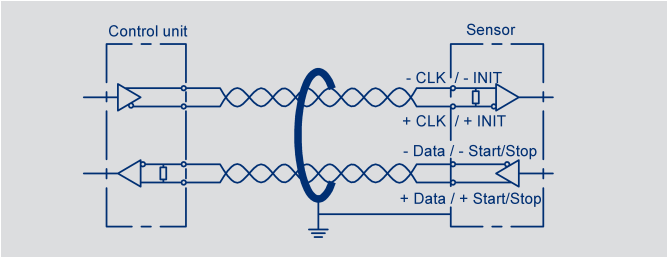
Technical Data
SSI-Interface

Type designations	TP1 - _ _ _ _ - 101 - 2_ _ - _ _ _ Synchronous-serial interface (SSI)	
Electrical Data		
Electrical measuring range (dimension B)	0050 up to 4250	mm
Protocol	SSI 24 und 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	
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 (IEC 60050)	313	Years
Functional safety	If you need assistance in using our products in safety-related systems, please contact us	
EMC compatibility CE	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	

Unless otherwise stated, the specified technical data applies to the use of a floating position marker. Tolerances and play in assembly and coupling may have a direct impact on the specified technical data.

*) 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)	Connector code 108	SSI Interface
Pin 1	WH	Pin 1	Data -
Pin 2	BN	Pin 2	Data +
Pin 3	BU	Pin 3	Clk +
Pin 4	BK	Pin 4	Clk -
Pin 5	GY	Pin 5	Supply voltage
Pin 6	GN	Pin 6	GND
-	-	Pin 7	do not connect

back to contents

Technical Data
Impulse-Interface

Type designations	TP1- _ _ _ _ - 101 - 11 _ - _ _ _ Start-Stop-Impulse-Interface	
Electrical Data		
Electrical measuring range (dimension B)	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 (IEC 60050)	313	Years
Functional safety	If you need assistance in using our products in safety-related systems, please contact us	
EMC compatibility CE	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	

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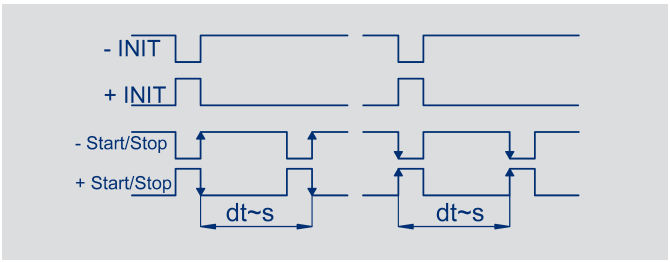
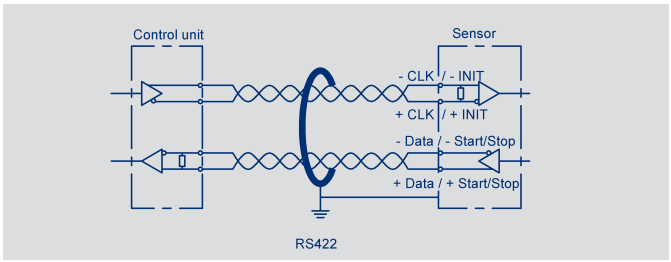




Pin assignment

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

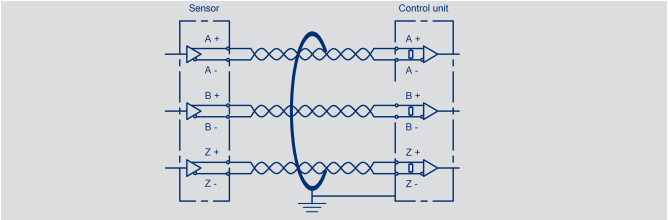
Connector code 103	Connector with cable (Accessories)	Start/Stop-Impulse-Interface
Pin 1	WH	Start/Stop -
Pin 2	BN	Start/Stop +
Pin 3	BU	INIT +
Pin 4	BK	INIT -
Pin 5	GY	Supply voltage
Pin 6	GN	GND

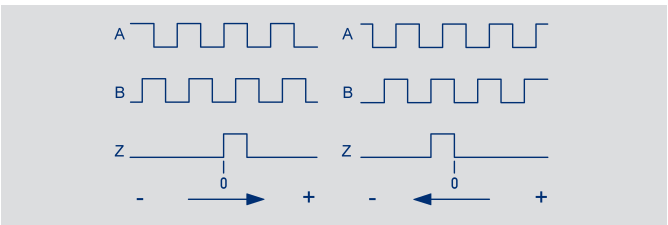
Technical Data Incremental-Interface

Type designations	TP1- _ _ _ _ - 101 - 8 _ _ - _ _ _ Incremental-Interface	
Electrical Data		
Electrical measuring range (dimension B)	0050 up to 4250	mm
Outputs	A+ / A- / B+ / B- / Z+ / Z-	
Level	RS422 differential	
Sampling rate / Update rate	< 750 mm: 2 kHz, 750 ... < 2000 mm: 1 kHz, > 2000 mm: 0.5 kHz Extrapolated to 16 kHz	
Resolution (with 4-fold interpretation)	1 or 5	µm
Max. pulse frequency at power-on (initialising)	156 high speed mode 78 low speed mode	kHz kHz
Frequency A/B-signal	Variable, depending on operational speed, max. 148	kHz
Missing increments when exceeding the max. operational speed	none	
Length Z-pulse	Distance between 2 edges A / B	
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	≤ 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
Current consumption	≤ 100	mA
Overvoltage protection	40 (permanent)	VDC
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
Insulation resistance (500 VDC)	≥ 10	MΩ
Environmental Data		
Max. operating speed **	Resolution 1 µm / Resolution 5 µm	
High speed mode	0.45 / 2.2	ms^{-1}
Low speed mode	0.22 / 1.1	ms^{-1}
MTTF (IEC 60050)	313	Years
Functional safety	If you need assistance in using our products in safety-related systems, please contact us	
EMC compatibility CE	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	

Unless otherwise stated, the specified technical data applies to the use of a floating position marker. Tolerances and play in assembly and coupling may have a direct impact on the specified technical data.

*) Measured with resolution 1 µm.
At resolution > 1 µm the permissible linearity error is increased by the resolution.
**) With valid output signal, when using a floating position marker.





Pin assignment

Connector code 102	Cable code 20 _	Connector with cable (Accessories)	Incremental Interface
Pin 1	YE	WH	A+
Pin 2	GY	BN	B+
Pin 3	GN	GN	B-
Pin 4	WH	YE	Z+
Pin 5	RD	GY	Z-
Pin 6	BU	PK	GND
Pin 7	BN	BU	Supply voltage
Pin 8	PK	RD	A-

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

Ordering specifications

Preferred types printed in bold

Mechanical version
101: Profile design

Electrical Interface
1: Impulse-Interface
2: SSI-Interface
8: Incremental-Interface (A / B / Z)

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

Output signal Incremental-Interface 8 _ _
4: Resolution 5 µm, high speed mode, power-on burst *
6: Resolution 1 µm, high speed mode, power-on burst *
7: Resolution 5 µm, low speed mode, power-on burst *
9: Resolution 1 µm, low speed mode, power-on burst *

Impulse-Interface Start-Stop Signal 11_
1: For 1 position marker
2: For 2 position markers
3: For 3 position markers

Synchronous-Serial 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

Incremental-Interface 8 _ _
1: RS422 differential (A / B / Z)

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 **
108: Connector M16x0.75 (IEC 130-9), 7-pin (only SSI interface)
201: Cable, 8-pole, shielded, 1 m
203: Cable, 8-pole, shielded, 3 m
205: Cable, 8-pole, shielded, 5 m
**) not for incremental interface

T	P	1	–	0	8	0	0	–	1	0	1	–	2	1	1	–	1	0	2

Series

Electrical measuring range
Standard lengths 0050 up to 4250 mm
0050 up to 0500 mm in 25 mm-steps, 0500 up to 1000 mm in 50 mm-steps,
1000 up to 2000 mm in 100 mm-steps, 2000 up to 4250 mm in 250 mm-steps.
Other lengths on request

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

*) Power-on burst: The burst output is triggered by switching on the power supply. The current sensor position as an absolute value is put out as an incremental pulse sequence with the selected frequency of 156 kHz (high speed mode) or 78 kHz (low speed mode). The number of pulses corresponds to the distance to the zero point in the set effective direction and resolution.

Accessories included in delivery
• Adjustable clamps and cylinder screws M5x20 DIN EN ISO 4762

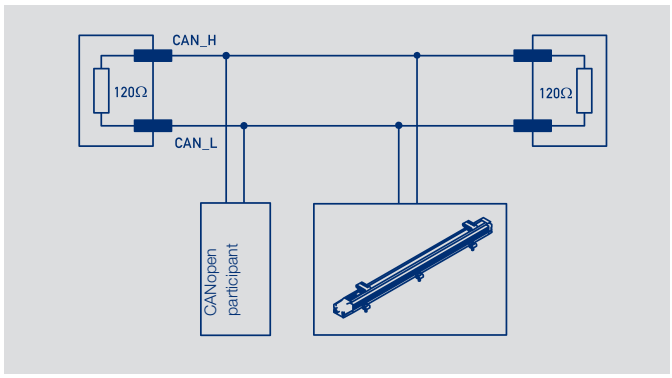
Technical Data

CANopen®

Type designations	TP1 - _ _ _ _ -101- 6 _ _ - _ _ _ CANopen-Interface		
Electrical Data			
Measured variables	Position and speed		
Electrical measuring range (dimension B)	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)		
Baud rate	20 ... 1000		kBaud
Resolution Position Speed	 1 0.1	 5 0.5	 µm mms^{-1}
Update rate	1 (Internal sampling rate < 750 mm: 2 kHz, 750 ... < 2000 mm: 1 kHz, > 2000 mm: 0.5 kHz)		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 and supply voltage max.)		
Insulation resistance (500 VDC)	≥ 10		MΩ
Bus termination internal	no		
Environmental Data			
MTTF (IEC 60050)	330		Years
Functional safety	If you need assistance in using our products in safety-related systems, please contact us		
EMC compatibility CE	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		

Unless otherwise stated, the specified technical data applies to the use of a floating position marker. Tolerances and play in assembly and coupling may have a direct impact on the specified technical data.

*) 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

Technical Data
IO-Link

Type designations	TP1 - _ _ _ _-101- A _ _ - _ _ _ IO-Link	
Electrical Data		
Measured variables	Position, speed and temperature	
Electrical measuring range (dimension B)	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 (IEC 60050)	322	Years
Functional safety	If you need assistance in using our products in safety-related systems, please contact us	
EMC compatibility CE	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	

Unless otherwise stated, the specified technical data applies to the use of a floating position marker. Tolerances and play in assembly and coupling may have a direct impact on the specified technical data.

*) 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

CANopen®
IO-Link

Ordering specifications

Preferred types printed in bold

Mechanical version
101: Profile design

Electrical Interfaces
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

Baudrate 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	P	1	–	0	8	0	0	–	1	0	1	–	6	1	3	–	1	0	6

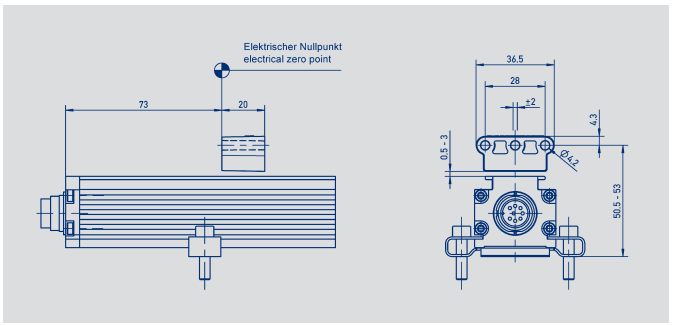
Series

Electrical measuring range
Standard lengths 0050 up to 4250 mm
0050 up to 0500 mm in 25 mm-steps, 0500 up to 1000 mm in 50 mm-steps,
1000 up to 2000 mm in 100 mm-steps, 2000 up to 4250 mm in 250 mm-steps.
Other lengths on request

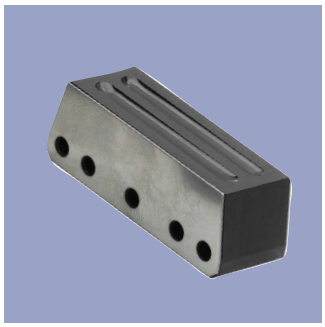
Important: Avoid equalizing currents in the cable shield caused by potential differences.
Only CANopen: Twisted pair cable (STP) is recommended.

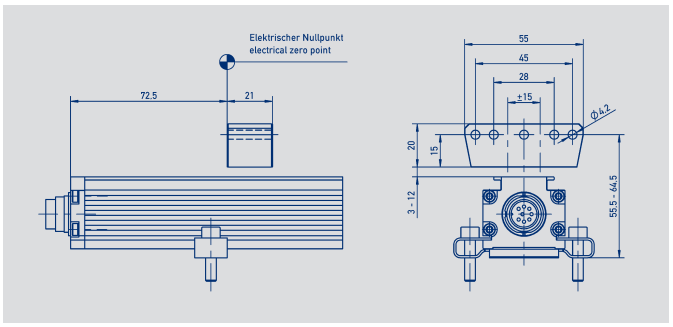
Accessories included in delivery
• Adjustable clamps and cylinder screws M5x20 DIN EN ISO 4762

Position Marker

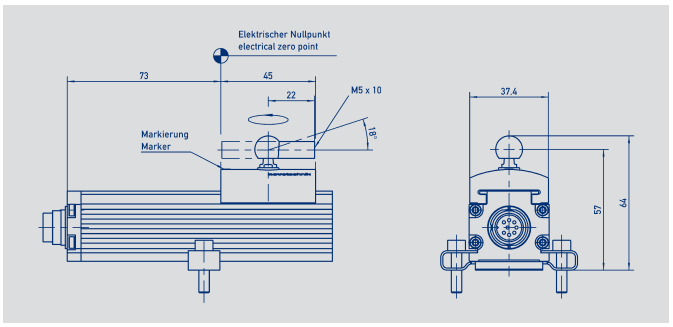


Floating positon marker	
Material	PA6 GF25
Working distance	0.5 ... 3 mm
Weight	approx. 10 g
P/N 005693, Z-TP1-P06	

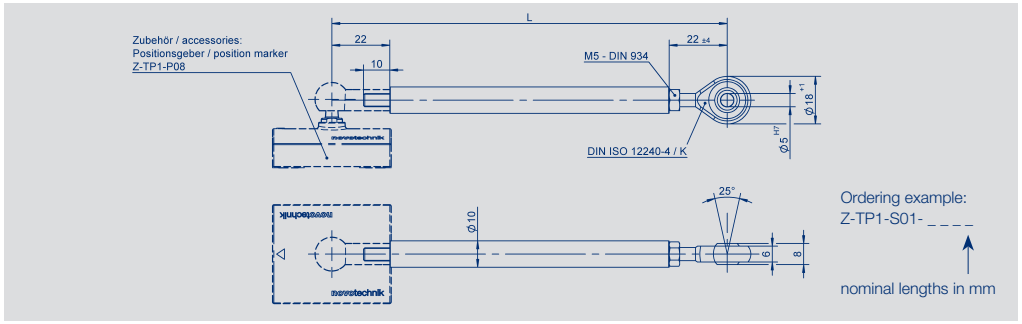




Floating positon marker for large distances	
Material	PA6 GB30
Working distance	3 ... 12 mm
Weight	approx. 40 g
P/N 005694, Z-TP1-P07	



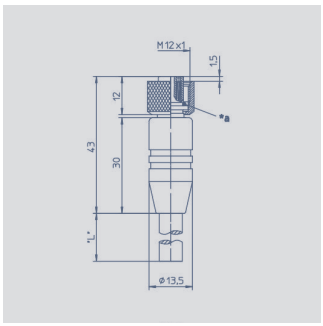
Guided position marker	
Matreial	POM
Weight	approx. 30 g
P/N 005695, Z-TP1-P08	



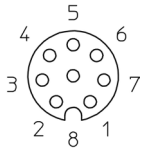
Actuating rod for guided position marker Z-TP1-P08	
Material	Aluminum
Weight	approx. 150 g
Standard-nominal lengths (mm)	0075, 0100, 0125, 0150, 0200, 0250, 0300, 0350, 0400, 0450, 0500, 0600, 0800, 1000, 1500, 2000
Z-TP1-S01-_ _ _ _	

Environmental conditions, length of actuating rod, acceleration etc. have a direct influence on life time and accuracy of the whole system; it must be qualified by the user in the real application.

Connector System M12



Pin assignment



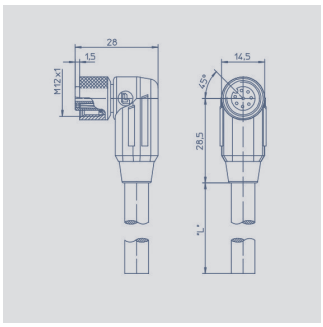
1 = white
2 = brown
3 = green
4 = yellow
5 = grey
6 = pink
7 = blue
8 = red

IP67 UL

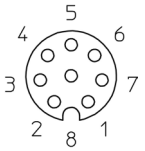
M12x1 Mating female connector, 8-pin, straight, A-coded, with molded cable, shielded, IP67, open ended

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 mm²

Length	Type	P/N
2 m	EEM 33-86	005629
5 m	EEM 33-90	005635
10 m	EEM 33-92	005637



Pin assignment



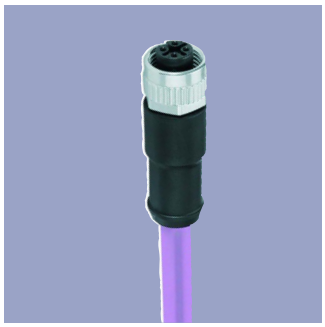
1 = white
2 = brown
3 = green
4 = yellow
5 = grey
6 = pink
7 = blue
8 = red

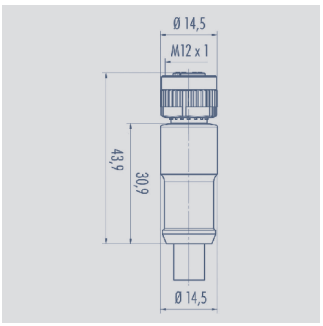
IP67 UL

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

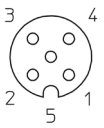
Connector housing	Plastic PA
Cable sheath	PUR; Ø = max. 8 mm, -25 °C...+80 °C (moved) -50 °C...+80 °C (fixed)
Wires	PP, 0.25 mm²

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





Pin assignment



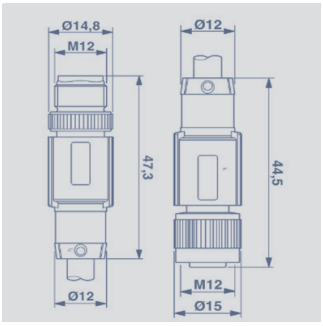
1 = Shield
2 = red (0.34 mm²)
3 = black (0.34 mm²)
4 = white (0.25 mm²)
5 = blue (0.25 mm²)

IP67 UL CANopen

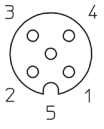
M12x1 Mating female connector, 5-pin, straight, A-coded, with molded cable, IP67, shielded, open ended, CAN-bus

Connector housing	PUR
Cable sheath	PUR Ø = max. 7.2 mm, -25 °C...+85 °C (moved)
Wires	PP 2x 0.25 mm² + 2 x 0.34 mm²

Length	Type	P/N
2 m	EEM 33-41	056141
5 m	EEM 33-50	106371
10 m	EEM 33-43	056143



Pin assignment



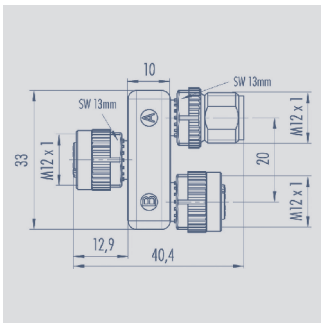
IP67 UL CANopen

M12x1 Mating female connector, 5-pin, straight, A-coded, with molded cable, IP67, shielded (shield on knurl), CAN-bus

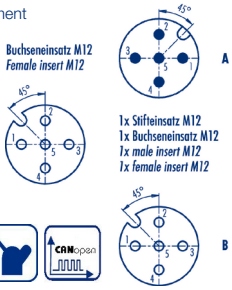
Connector housing	PUR
Cable sheath	PUR Ø = 6.7 mm, -25 °C...+90 °C (plug/socket) -20 °C...+80 °C (cable)
Wires	PE 2x 0.25 mm² + 2 x 0.34 mm²

Length	Type	P/N
5 m	EEM 33-52	106373

Connector System M12



Pin assignment

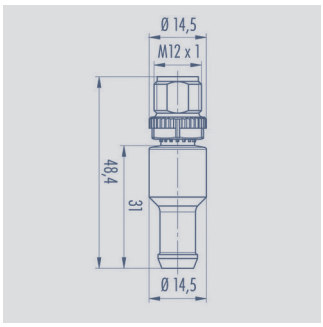


IP68 CANopen

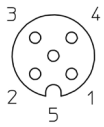
T-connector M12x1, 5-pin, A-coded, IP68, 1:1 connection, female - male - female, CAN-bus

Connector housing	PUR
Temperature range	-25 °C... +85 °C

Type EEM 33-45, P/N 056145



Pin assignment



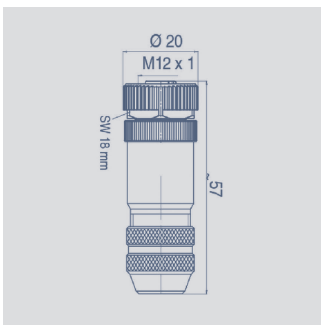
1 = n. c.
2 = n. c.
3 = n. c.
4 = Resistance
5 = 120 Ω

IP67 CANopen

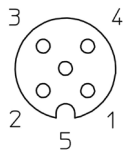
Terminating resistor M12x1, 5-pin, A-coded, IP67, 120 Ω resistance, CAN-bus

Connector housing	PUR
Temperature range	-25 °C... +85 °C

Type EEM 33-47, P/N 056147



Pin assignment

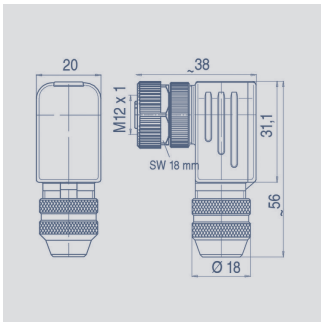


IP67 CANopen

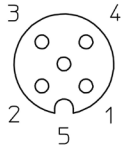
M12x1 Mating female connector, 5-pin, straight, A-coded, with coupling nut, screw termination, IP67, shieldable, CAN-bus

Connector housing	Metal -40 °C...+85 °C
For wire gauge	6...8 mm, max. 0.75 mm²

Type EEM 33-73, P/N 005645



Pin assignment



IP67 CANopen

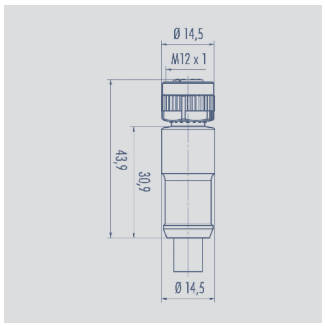
M12x1 Mating female connector, 5-pin, angled, A-coded, with coupling nut, screw termination, IP67, shieldable, CAN-bus

Connector housing	Metal -40 °C...+85 °C
For wire gauge	6...8 mm, max. 0.75 mm²

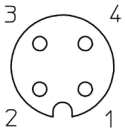
Type EEM 33-75, P/N 005646

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

Connector System M12



Pin assignment



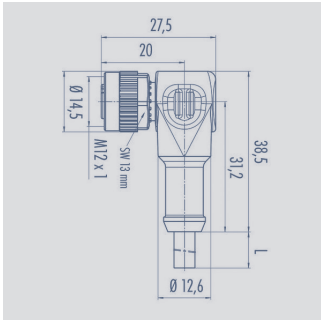
1 = brown
2 = white
3 = blue
4 = black

IP67 UL

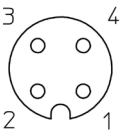
M12x1 Mating female connector, 4-pin, straight, A-coded, with molded cable, not shielded, IP67, open ended

Connector housing	Plastic PA
Cable sheath	PUR; Ø = max. 6 mm, -40 °C...+85 °C (fixed)
Wires	PP, 0.34 mm²

Length	Type	P/N
2 m	EEM 33-35	056135
5 m	EEM 33-36	056136
10 m	EEM 33-37	056137



Pin assignment



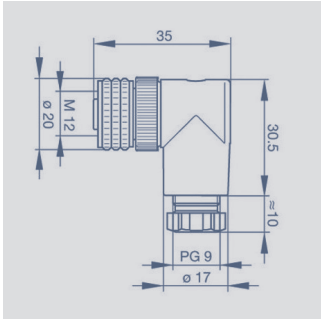
1 = brown
2 = white
3 = blue
4 = black

IP67 UL

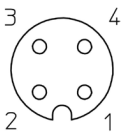
M12x1 Mating female connector, 4-pin, angled, A-coded, with molded cable, not shielded, IP67, open ended

Connector housing	Plastic PA
Cable sheath	PUR; Ø = max. 6 mm, -40 °C...+85 °C (fixed)
Wires	PP, 0.34 mm²

Length	Type	P/N
2 m	EEM 33-38	056138
5 m	EEM 33-39	056139
10 m	EEM 33-40	056140



Pin assignment



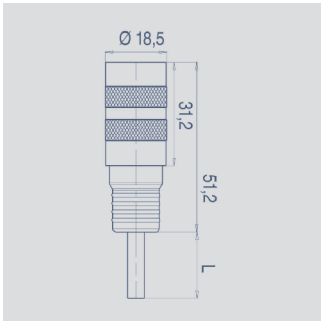
IP67

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

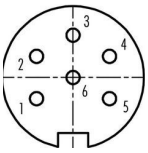
Connector housing	Plastic PBT -25 °C...+90 °C
For wire gauge	6...8 mm, max. 0.75 mm²

Type EEM 33-89, P/N 005634

Connector System M16



Pin assignment



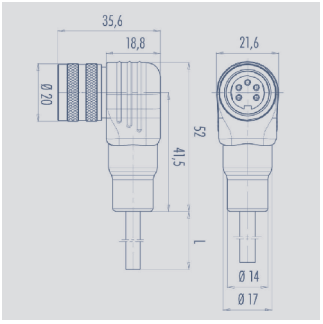
1 = red
2 = black
3 = yellow
4 = blue
5 = white
6 = green

IP67

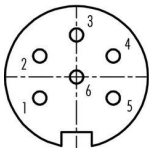
M16x0.75 Mating female connector, 6-pin, straight, with molded cable, 2 m length, shielded, IP67, open ended

Connector housing	PUR
Cable sheath	PUR; Ø max. 6 mm, -5...+70 °C (moved) -20...+70 °C (fixed)
Wires	PVC, 6 x 0.25 mm²
Type EEM 33-26, P/N 056126	

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



Pin assignment



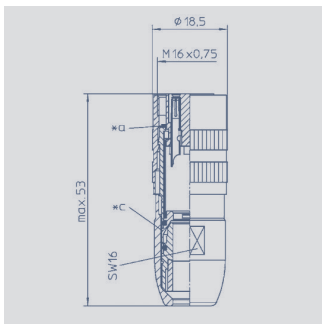
1 = red
2 = black
3 = yellow
4 = blue
5 = white
6 = green

IP67

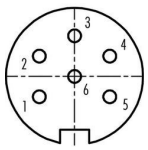
M16x0.75 Mating female connector, 6-pin, angled, with molded cable, 2 m length, shielded, IP67, open ended

Connector housing	PUR
Cable sheath	PUR; Ø max. 6 mm, -5...+70 °C (moved) -20...+70 °C (fixed)
Wires	PVC, 6 x 0.25 mm²
Type EEM 33-27, P/N 056127	

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



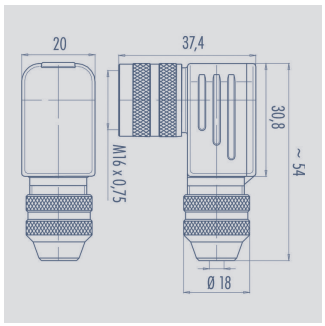
Pin assignment



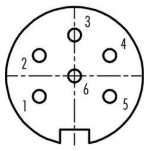
IP68

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 mm²
Type EEM 33-82, P/N 005639	



Pin assignment



IP67 UL

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 mm²
Type EEM 33-94, P/N 005648	

novotechnik
Siedle Group

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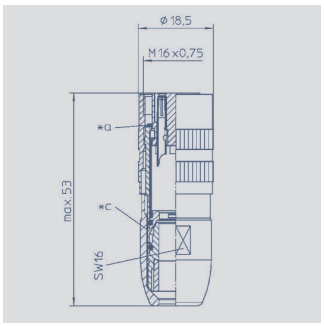
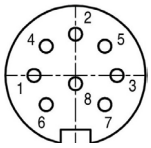
www.novotechnik.de



Pin assignment

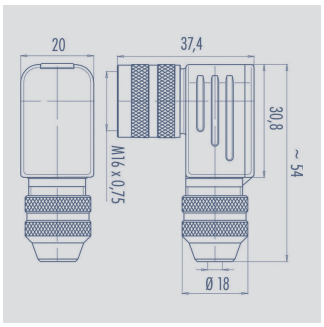


IP68

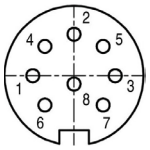
M16x0.75 Mating female connector, 8-pin, straight, with coupling nut, solder terminal, IP68, shielded

Connector housing	CuZn (Brass, nickel plated) -40 °C... +85 °C
For wire gauge	4...8 mm, max. 0.75 mm²

Type EEM 33-84, P/N 005627



Pin assignment



IP67 UL

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 mm²

Type EEM 33-85, P/N 005628

IP67 Protection class IP67 to DIN EN 60529

IP68 Protection class IP68 to DIN EN 60529

CAN-bus

Very good Electromagnetic Compatibility (EMC) and shield systems

Very good resistance to oils, coolants und lubricants

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.