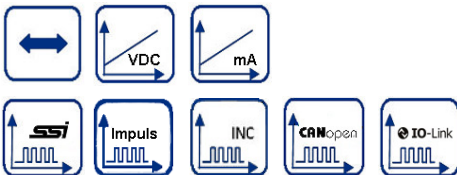
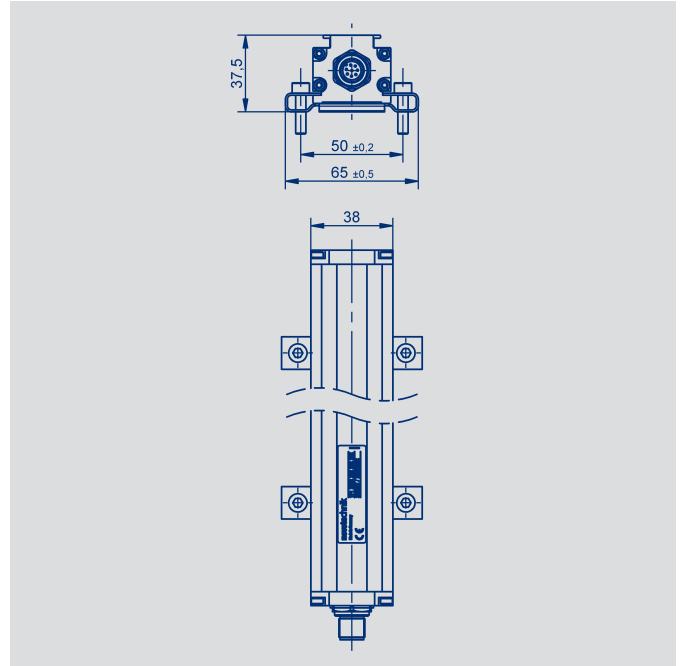
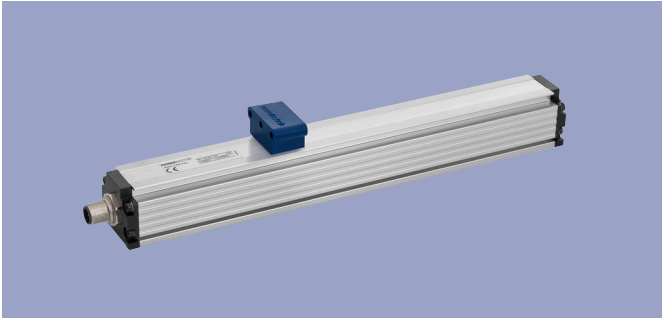


NOVOSTRICTIVE Transducer up to 4250 mm touchless

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.

Contents

Mechanical Data	3
Analog Versions	
Technical Data	4
Ordering Specifications	5
Digitale Versions	
SSI	6
Impulse	7
Incremental	8
Ordering Specifications	9
Fieldbus, IO-Link Versions	
CANopen	10
IO-Link	11
Ordering Specifications	12
Accessories	
Position Marker	13
M12 Connector System	14
M16 Connector System	17

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 $\geq 5 \text{ k}\Omega$) -10 ... 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: 2 kHz, 750 ... < 2000 mm: 1 kHz, > 2000 mm: 0.5 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 with galvanic isolation	24 (18 ... 36)	VDC
Supply voltage ripple	≤ 10	% U_b
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)	23	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-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

Ordering Specifications

Analog Versions

- Voltage

- Current

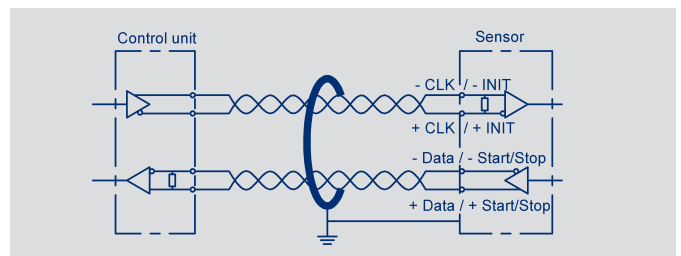
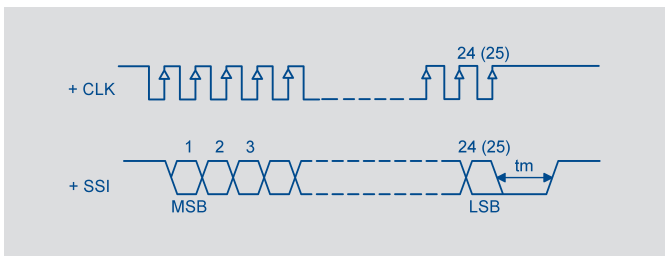
Ordering specifications										Mechanical version										Electrical interface										Output signal analog interfaces 4 _ _										Analog interface voltage output 41_										Analog interface current output 42_										Electrical connection																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
Preferred types printed in bold										101: Profile design										4: Analog interface										1: Voltage output										2: Current output										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										1: 0 ... 20 mA *										2: 20 ... 0 mA *										3: 4 ... 20 mA *										4: 20 ... 4 mA *										*) With Teach-In-function										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																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									

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

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 (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	

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



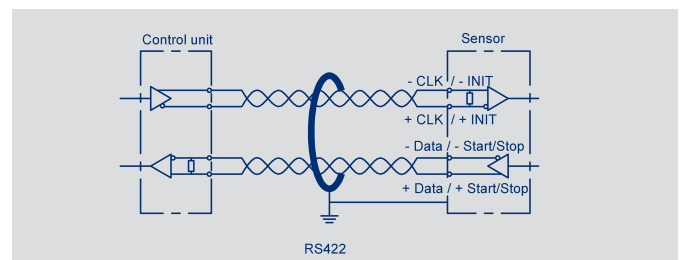
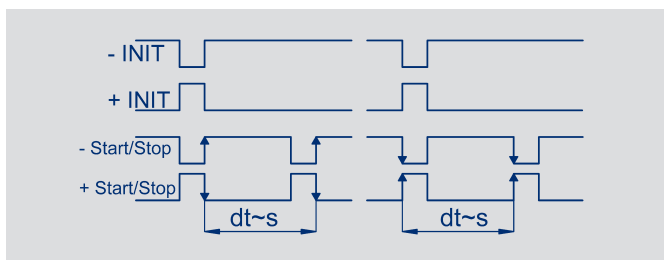
Pin assignment

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	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 (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

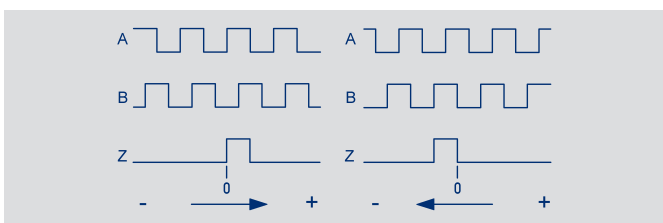
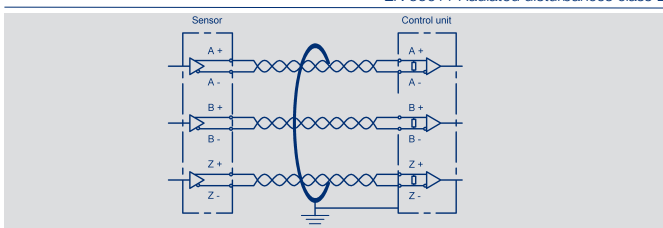
Connector code 101, 102	Cable code 20 _	Connector with cable (Accessories)	Start/Stop-Impulse-Interface
Pin 1	YE	WH	INIT +
Pin 2	GY	BN	Start/Stop +
Pin 3	PK	GN	INIT -
Pin 4	RD	YE	do not connect
Pin 5	GN	GY	Start/Stop -
Pin 6	BU	PK	GND
Pin 7	BN	BU	Supply voltage
Pin 8	WH	RD	do not connect

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

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		kHz
	78 low speed mode		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 (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		
FMC 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		

*) 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		Mechanical version	
Preferred types printed in bold		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 *	
		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	

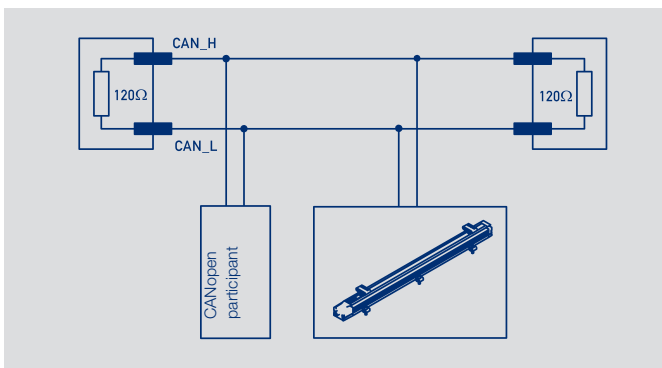
Important: Avoid equalizing currents in the cable shield caused by potential differences.
Twisted pair cable (STP) is recommended.

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	10 ... 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 and 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	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		kHz
	(Internal sampling rate < 750 mm: 2 kHz, 750 ... < 2000 mm: 1 kHz, > 2000 mm: 0.5 kHz)		
Resolution			
Position	1	5	µm
Speed	0.1	0.5	mm s ⁻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

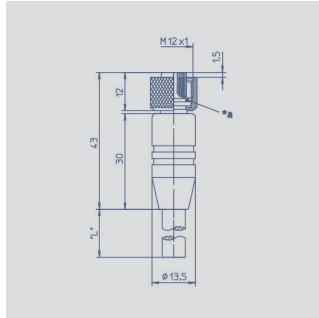
Ordering Specifications



Ordering specifications Preferred types printed in bold		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 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	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																	

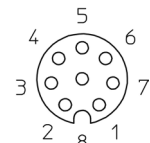
Important: Avoid equalizing currents in the cable shield caused by potential differences.
Only CANopen: Twisted pair cable (STP) is recommended.

Connector System M12



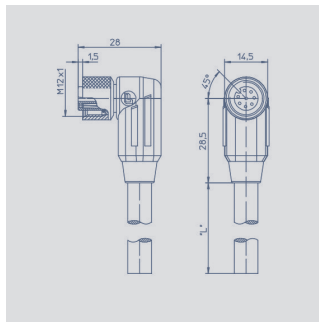
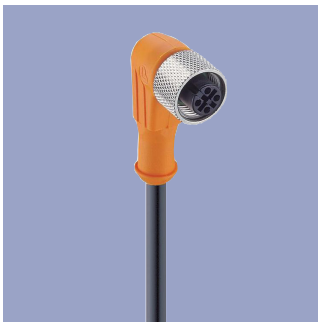
Pin assignment

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



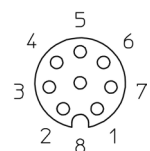
M12x1 Mating female connector, 8-pin, straight, A-coded, with molded cable, shielded, IP67, open ended

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 mm²	
Length	Type	P/N
2 m	EEM 33-86	005629
5 m	EEM 33-90	005635
10 m	EEM 33-92	005637



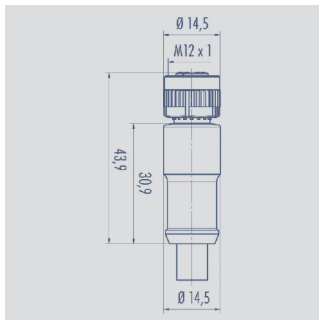
Pin assignment

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



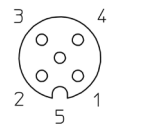
M12x1 Mating female connector, 8-pin, angled, A-coded, with molded cable, shielded, IP67, open ended

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



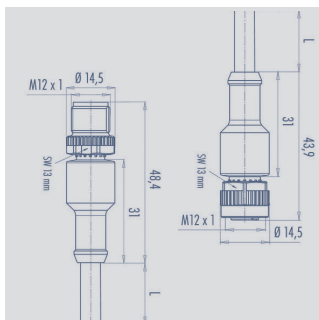
Pin assignment

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



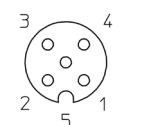
M12x1 Mating female connector, 5-pin, straight, A-coded, with molded cable, IP67, shielded, open ended, CAN-bus

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 33-42	056142
10 m	EEM 33-43	056143



Pin assignment

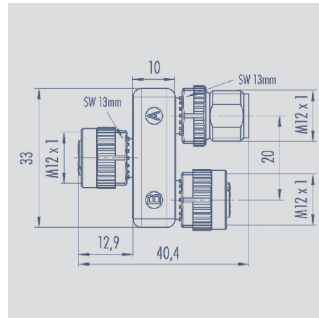
- 1 = Shield
- 2 = red (0.34 mm²)
- 3 = black (0.34 mm²)
- 4 = white (0.25 mm²)
- 5 = blue (0.25 mm²)



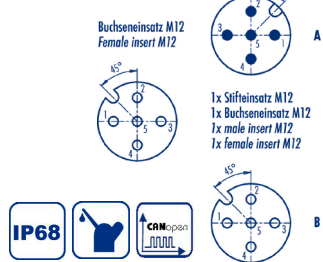
M12x1 Mating female connector, 5-pin, straight, A-coded, with molded cable, IP68, shielded, CAN-bus

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

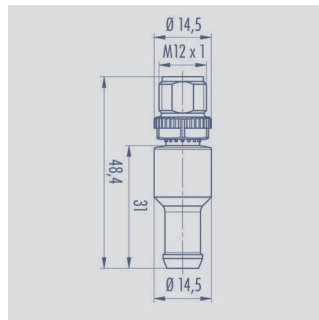


T-connector M12x1, 5-pin, A-coded, IP68, 1:1 connection, female - male - female, CAN-bus

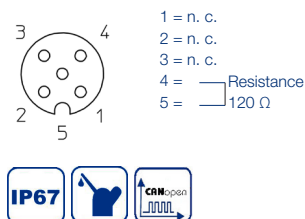
Connector housing PUR

Temperature range -25 °C... +85 °C

Type EEM 33-45, P/N 056145



Pin assignment

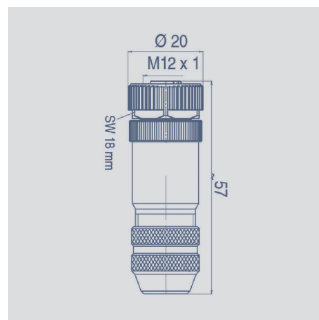


Terminating resistor M12x1, 5-pin, A-coded, IP67, 120 Ω resistance, CAN-bus

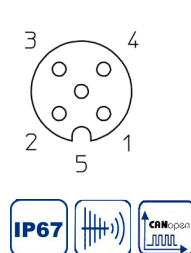
Connector housing PUR

Temperature range -25 °C... +85 °C

Type EEM 33-47, P/N 056147



Pin assignment

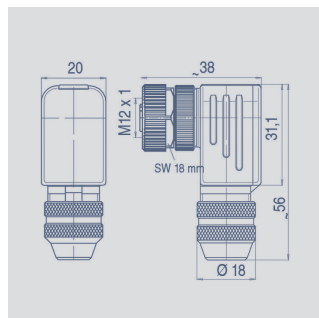


M12x1 Mating female connector, 5-pin, straight, A-coded, with coupling nut, screw termination, IP67, shieldable, CAN-bus

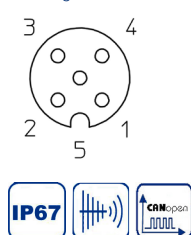
Connector housing Metal
-40 °C...+85 °C

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

Type EEM 33-73, P/N 005645



Pin assignment



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

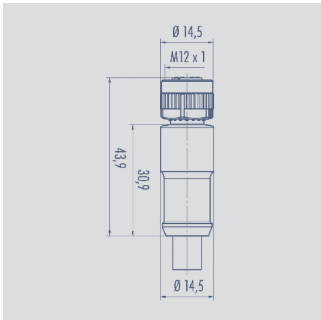
For wire gauge 6...8 mm,
max. 0.75 mm²

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

3

4

2

1

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

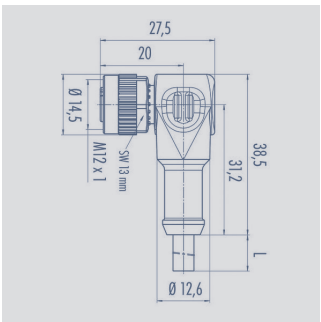
EEM 33-36

056136

10 m

EEM 33-37

056137



Pin assignment

3

4

2

1

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

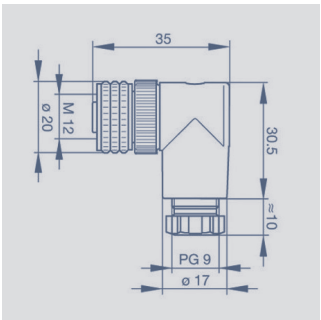
EEM 33-39

056139

10 m

EEM 33-40

056140



Pin assignment

3

4

2

1

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

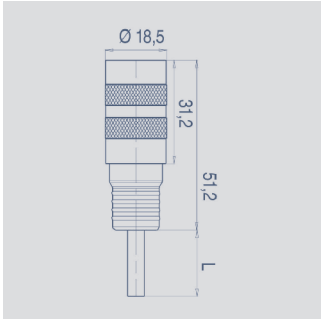
6...8 mm, max. 0.75 mm²

Type

EEM 33-89, P/N 005634

Connector System

M16



Pin assignment

1 = red

2 = black

3 = yellow

4 = blue

5 = white

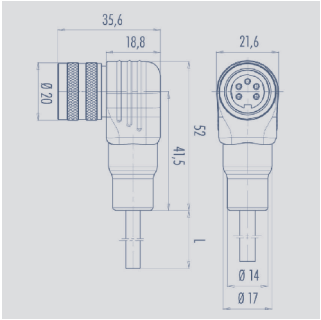
6 = green

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

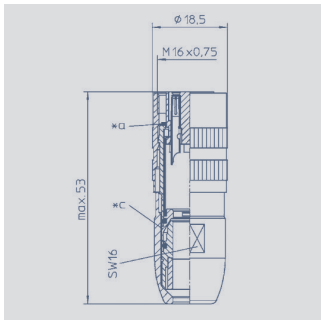
6 = green

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

1 = red

2 = black

3 = yellow

4 = blue

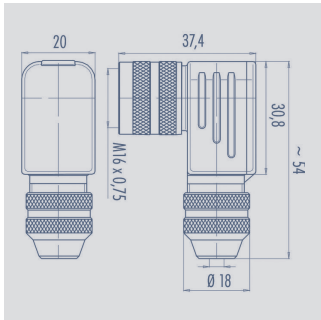
5 = white

6 = green

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

1 = red

2 = black

3 = yellow

4 = blue

5 = white

6 = green

IP67

UL

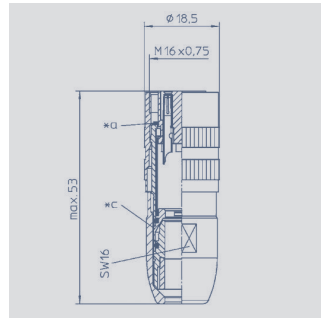
M16x0,75 Mating female connector, 6-pin, angled, with coupling nut, solder terminal, IP67, shielded

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

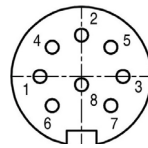
Novotechnik
Messwertaufnehmer OHG
Postfach 4220
73745 Ostfildern (Ruit)
Horbstraße 12
73760 Ostfildern (Ruit)
Telefon +49 711 4489-0
Telefax +49 711 4489-118
info@novotechnik.de
www.novotechnik.de



© 04/2018
Printed in Germany.



Pin assignment

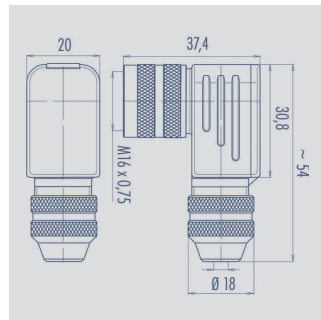


M16x0.75 Mating female connector, 8-pin, straight, with coupling nut, solder terminal, IP68, shielded

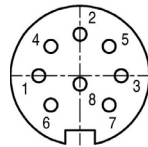
Connector housing	CuZn (Brass, nickel plated) -40 °C... +85 °C
-------------------	--

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



Protection class IP67 to DIN EN 60529



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.

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.