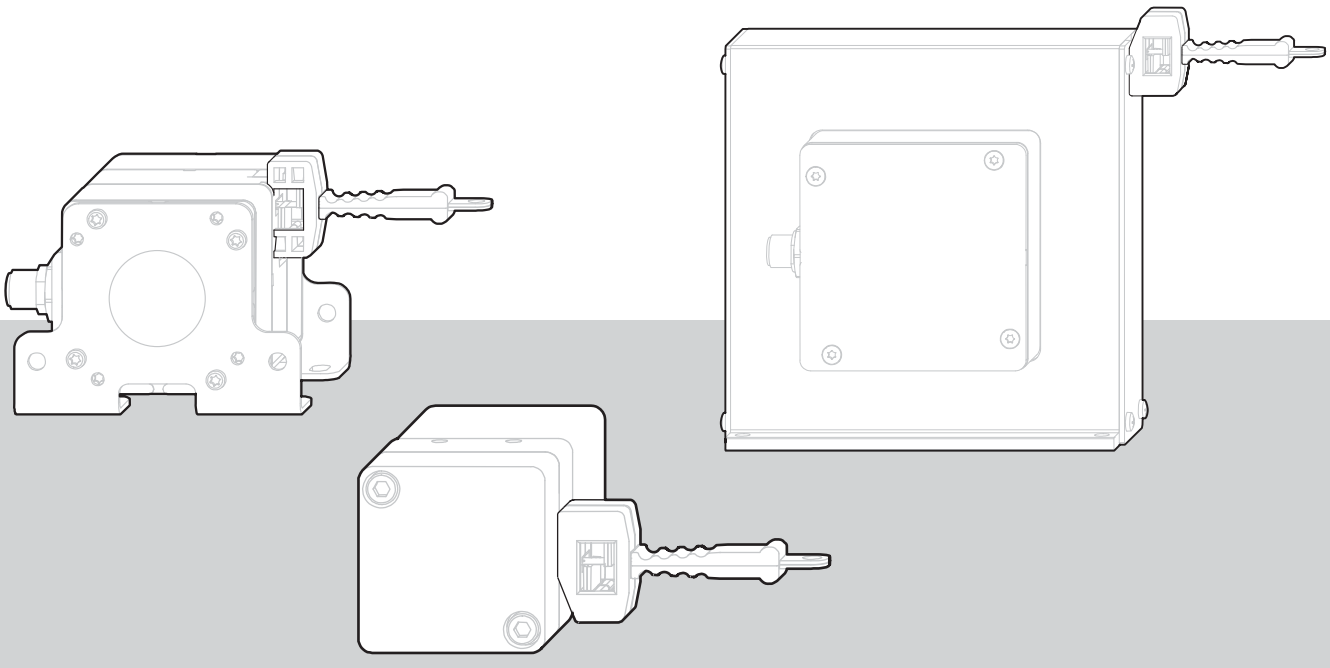
ASM®
perfect in sensors.

positape®

Tape Extension Position Sensors

Installation and operation manual EN



Please read carefully before installation and operation!

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Germany

1 Safety instructions 4
1.1 Signal words and symbols 4
1.2 General safety instructions 5
1.3 Intended use 6

2 Transport and storage 6

3 Installation and initial operation 7
3.1 Mechanical installation 7
3.2 Electrical connection 11
3.3 Operating temperature 13

4 Maintenance and disposal 13
4.1 Maintenance and repair 13
4.2 Disposal 13

5 Output specification 14
5.1 Measurement signal and range 14
5.2 Analog output 15
5.3 Digital output 21

1 Safety instructions

1.1 Signal words and symbols



WARNING, Risk of Injury:
Indicates a potentially hazardous situation, which, if not avoided, can result in serious injury or property damage.

⚠ DANGER

WARNING, Risk of Personal Injury or Death:
Indicates a situation that can result in serious personal injury or death if not properly avoided.

⚠ WARNING

WARNING, Risk of Personal Injury or Death:
Indicates a situation that can result in moderate personal injury or death if not properly avoided.

⚠ CAUTION

WARNING, Risk of Personal Injury:
Indicates a situation that can result in minor personal injury if not properly avoided.

NOTICE

WARNING, Risk of Property Damage:
Indicates a situation that can result in minor to major property damage if not properly avoided.

Product liability

- Disregarding the following instructions may result in malfunction, damage to property and personal injury and releases the manufacturer from product liability.

Safety regulations

- National safety regulations must be observed!

1.2 General safety instructions

⚠ WARNING

Danger or injury to the operator or damage to the property

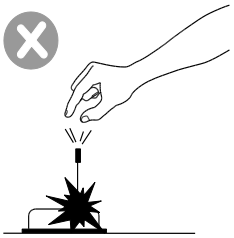
- Connection to power supply must be performed in accordance with safety instructions for electrical facilities and performed only by qualified personnel.
- Any alteration, reconstruction or extension of the sensor is not allowed!
- The sensor must be operated only within values specified in the catalog or datasheet.
- The danger of personal injury and danger of property damage due to a malfunction of the sensor in machines or systems must be excluded by additional safety measures.
- In safety-relevant applications, additional facilities shall be provided for maintaining safety and preventing damage.
- Check whether the protection class of the sensor is suitable for the application.

⚠ CAUTION

Risk of crushing and cutting injury due to pre-tensioned spring being released from housing when opened!

- Do not open the sensor.

Risk of cutting injury due to uncontrolled retraction of the tape



- Do not damage the measuring tape!
- Do not let the measuring tape spring back uncontrolled!
- Do not exceed the maximum tape extension range!
- Do not bend the measuring tape!
- Do not let the measuring tape be dragged on objects!

NOTICE

Mechanical damage or destruction of the sensor

- Avoid impact and shock to the sensor.
- Do not allow the measuring tape to spring back uncontrolled.
- Do not pull out the measuring tape beyond the range of the sensor.

Malfunction due to the accumulation of dirt on the measuring tape

- Do not oil or lubricate the measuring tape.

1.3 Intended use

The positape® Tape Extension Position Sensor is intended for distance measurement through the extraction of the measuring tape. For determining measuring range, environmental compatibility and connection data of the sensor, please note the data sheet. Use the sensor as intended by operating within its specified technical data and ambient conditions.

The installation and operating instructions supplied with the unit must be respected. All maintenance and service work must be carried out. The data sheet of the respective sensor is part of this instruction manual. If not yet available, it may be requested by stating the respective model number.

The sensor must not be improperly mounted, operated or serviced. In addition, operation of the sensor in faulty condition is prohibited.

2 Transport and storage

NOTICE

Risk of damage to the measuring tape

- Do not lift the sensor by the tape.

Observe storage and transport temperatures according to the operating temperature (see data sheet)

Max. rel. humidity 60%, condensation must be excluded

The device must be secured against slipping and tipping during transport.

Unpacking

Do not unpack sensor by holding it at the tape or tape stop.

Shipment damages

Check sensor immediately for shipment damage. In case of any damage or equipment not operating appropriately, please contact your supplier. Avoid bending the tape stop while packing the sensor.

Shipment content

- Sensor
- Installation and operation manual

3 Installation and initial operation

3.1 Mechanical installation

⚠ CAUTION

Risk of injury from touching the moving measuring tape or moving parts during operation

- Operate the sensor only with a suitable protective device (eg. tape cover) to prevent injury!

Choice of installation position

- Select a protected installation position for the measuring tape.
  This prevents damage of the measuring tape.
- Preferably mount the sensor with the tape outlet pointing downwards.
  This prevents liquids from entering through the tape outlet.
- Screw the sensor onto a flat surface or provide a three-point mounting.
  This avoids distortion and damage to the sensor.

Fitting the sensor

Depending upon the sensor model, holes in the base plate or threads in the sensor housing enable attachment of the sensor. Dimensions required are listed in the data sheet and the catalog.

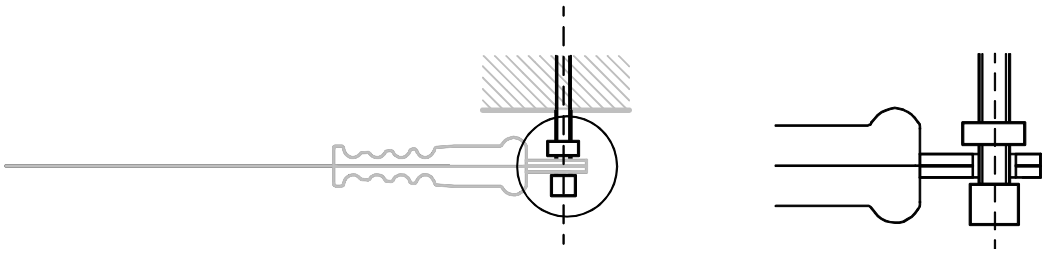
Tape attachment device

For fastening the tape clip the 5 mm dia. bore is provided.

NOTICE

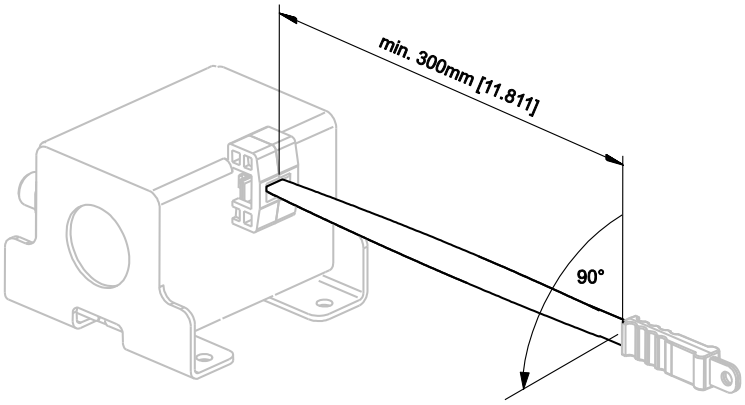
Damage to the measuring tape due to incorrect installation

- Prevent the measuring tape from binding.
- Ensure sensor is installed and aligned correctly to prevent damage to tape. Where required use a tape diverting pulley WBR1.



Damage to the measuring tape due to an axial twist

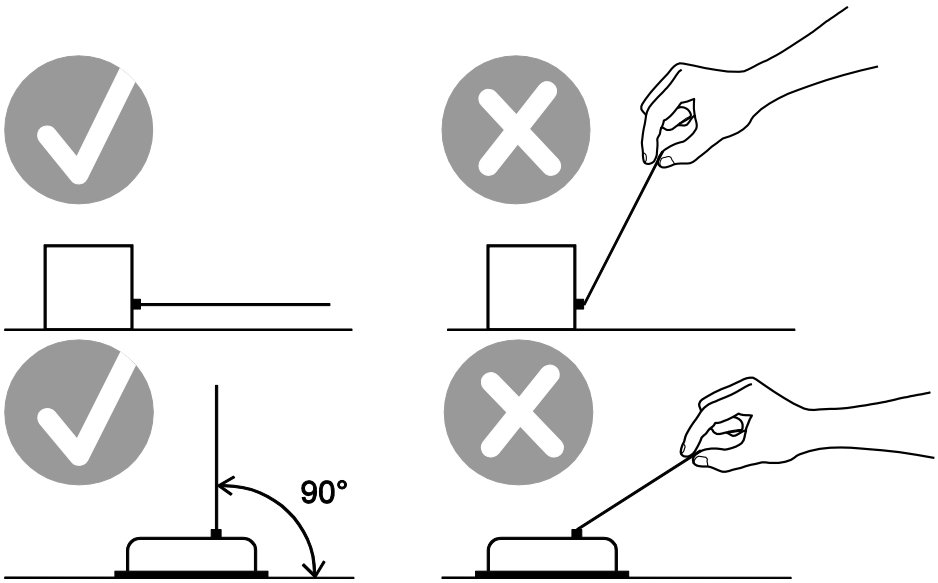
- Do not exceed the maximum twist of 90° of the measurement tape
- A single tape twist of 90° is possible. Before twisting the tape, a distance of at least 30 cm from the tape outlet must be kept in axial direction. While retracting the tape, it must be twisted back at the distance of at least 30 cm before the tape entirely enters the tape outlet.



Damage to the measuring tape due to the tape misalignment

- Tape travel should only be axial to the tape outlet - no misalignment is allowed!
- Tape misalignment shortens service life of sensor and causes error in measurement. Warranty will not be granted for damage caused by misalignment.

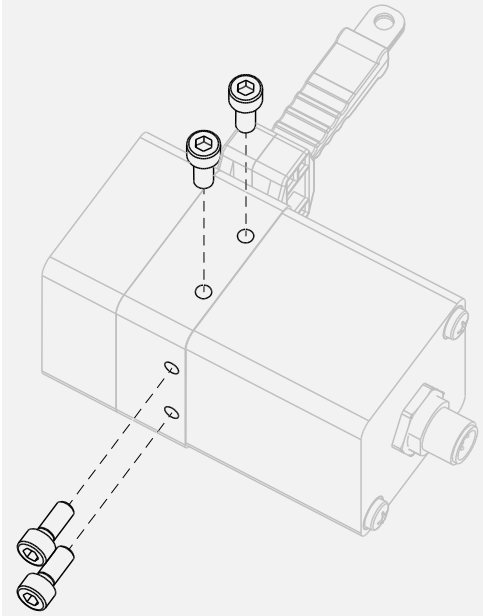
correct **incorrect**



If tape travel axial to the tape outlet is not possible, a tape guide wheel must be used in order to divert the tape. The deflection is possible only in one axis - on the flat side. Pulley wheels with the diameter of >15 mm are recommended (see chapter “Accessories” in the catalog positape®).

Fixing screws

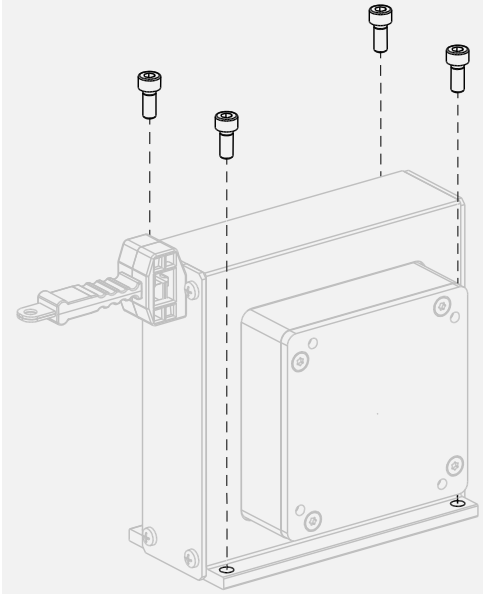
Sensors with threads in the sensor housing



Model	Screw	Screw material	Torque [Nm]
WB10ZG	M5	A2	2
WB12	M5	A2	2

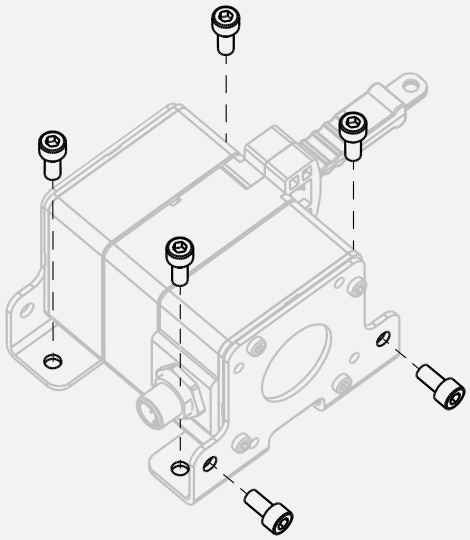
Fixing is possible laterally or on the bottom side of the sensor.
For the length of thread engagement see the outline drawing in the data sheet.

Sensors with holes in the base plate



Model	Screw	Screw material	Torque [Nm]
WB21	M5	A2	2.5
WB21	M6	A2	3.0

Sensors with mounting clamps



Model	Screw	Screw material	Torque [Nm]
WB61 (oval hole)	M5	A2	2.0
WB85	M6	A2	4.0
WB85 (oval hole)	M6	A2	3.0

The clamps are mounted ex-factory.
Fixing is possible laterally or on the bottom side of the clamp.

3.2 Electrical connection

NOTICE

Damage or destruction of the sensor due to excessive operating voltage or mounting error

- The applied operating voltage must not exceed the value specified in the data sheet.
- Operate the sensor only within the limits specified in the data sheet.
- Connection to the power supply only by qualified personnel and in accordance with the applicable safety regulations for electrical equipment.
- Do not connect or disconnect the sensor under voltage!

Corrosion in the sensor due to moisture penetration

- Use the sensor only according to protection class.
- The mating connector should have the same protection class as the sensor, otherwise the lower protection class of the mating connector is valid.
- Avoid crossing the dew point.
- Cable outputs must be installed in such a way that no moisture can get into the cable.
- The protection class of sensors with connector output is valid only if the electrical plug is connected!

Damage of the sensor cable due to mechanical stress

- Do not twist the M12 connector inserts.
- It is important that the knurled nuts on the connectors are tightened to the correct torque for each different size of the connector:
  - M12-ASM connectors / couplings: 1.0 Nm
  - connectors / couplings of other manufacturers: according to manufacturer instruction.
  - Use a torque wrench.
- Do not strain the connection cable.
- A separate strain relief is recommended.

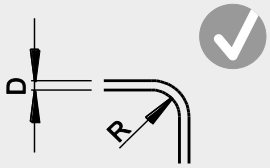
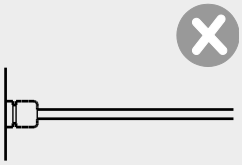
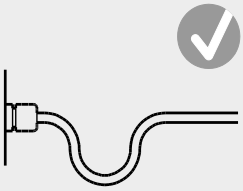
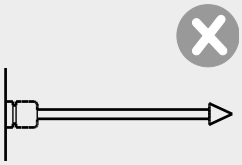
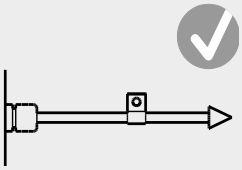
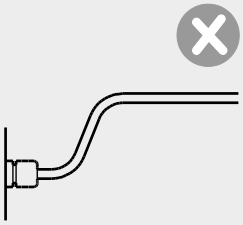
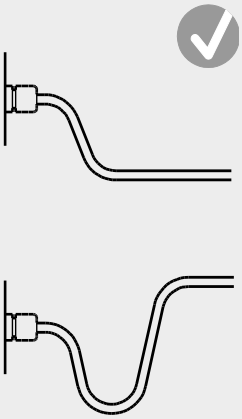
Connector Pin assignment

According to the definitions of the output types contained in the appendix. Observe different color code for pre-assembled accessory cables. See catalog information for accessories.

Supply voltage

See specification in the data sheet of the sensor. The maximum operating voltage must not be exceeded.

Installation of the sensor supply cable

	incorrect	correct
Admissible bending radius of the cable must be observed: R ~ 5 x D R ~ 10 x D (underwater cable)		
Length compensation for the cable must be observed		
A separate cord grip for cable strain relief is recommended		
Observe cable routing in case of splashing water, water condensation and humidity		

Electromagnetic Compatibility (EMC)

The electromagnetic compatibility of positape® Tape Extension Position Sensors is influenced by the sensor wiring.

NOTICE

Possible malfunction of the sensor when used in systems with highly interference-prone components such as frequency inverters

Recommended wiring:

- Use single shielded sensor cable with twisted pair conductors for power supply and signal output.
- Connect the cable shield to ground on one side of the control cabinet. Connect the shield connection over a large area using cable clamps before or at the cable entry into the control cabinet. When preassembled cables are delivered, the screen is not connected to the housing on the sensor side.
- Do not install sensor cables close to power conductors such as motor or contactor control cables (use separate cable ducts for signal and power cables).
- Install the cables in metal cable ducts connected to ground.

3.3 Operating temperature

positape® WB12	-40 … +85°C
positape® WB61	-40 … +85°C
positape® WB85	-40 … +85°C
positape® WB21	-40 … +85°C
positape® WB10ZG	-20 … +85°C
positape® WB100M	-20 … +85°C

4 Maintenance and disposal

4.1 Maintenance and repair

⚠ CAUTION

Risk of crushing and cutting injury due to pre-tensioned spring being released from housing when opened!

- Do not open the sensor.
- Due to possible risk of injury by improper handling, we strongly advise against repair attempts.

The measuring tape must be cleaned regularly to avoid malfunctions.
Check sensor regularly for possible damage:

Inspection of …	**Measures**
Integrity of housing	Send damaged sensor to ASM for repair
Integrity of connector, cable	Replace damaged parts resp. send sensor to ASM for repair
Mounting elements	Tighten mounting parts with recommended torque, if applicable use bolt adhesive
Measuring tape	Damaged tape, (e.g. bended tape): send sensor to ASM for repair

NOTICE

Opening the following sensors will cause damage and void the warranty:

- positape® WB12
- positape® WB61
- positape® WB85
- positape® WB21

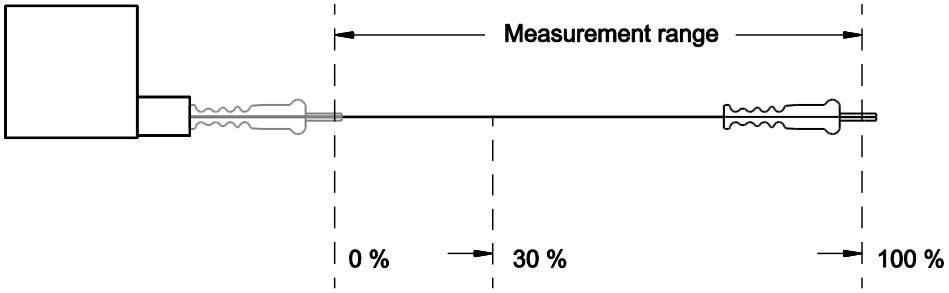
Calibration
The recommended calibration interval is 1 year.
Test protocol and traceable calibration certificate (ISO9001 / ISO10012) is available on request.

4.2 Disposal

Disposal according to applicable government regulations.

5 Output specification

5.1 Measurement signal and range



Analog

Measuring range corresponds to the electrical measuring range (e.g. 4 … 20 mA).

Position	0%	30%	100%
Measurement value	4 mA	8.8 mA	20 mA

Digital absolute

Absolute encoder

Measurement range corresponds to a digitally coded number (resolution eg. 10 steps / mm).

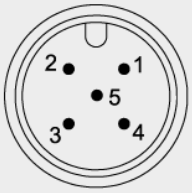
Position	0%	30%	100%
Measurement value (example)	0 steps	3,000 steps	10,000 steps

5.2 Analog output

U2 Voltage output 0.5 ... 10 V 	Excitation voltage	8 … 36 V DC
	Excitation current	20 mA typical at 24 V DC 38 mA typical at 12 V DC max. 50 mA
	Output voltage	0.5 ... 10 V DC
	Output current	2 mA max.
	Measuring rate	1 kHz standard
	Stability (temperature)	±50 x 10^{-6} / °C f.s. (typical)
	Protection	Reverse polarity, short circuit
	Operating temperature	See specification of the respective sensor
	EMC	DIN EN 61326-1:2013

U8 Voltage output 0.5 … 4.5 V 	Excitation voltage	8 … 36 V DC
	Excitation current	17 mA typical at 24 V DC 32 mA typical at 12 V DC 50 mA max.
	Output voltage	0.5 … 4.5 V DC
	Output current	2 mA max.
	Measuring rate	1 kHz standard
	Stability (temperature)	±50 x 10^{-6} / °C f.s. (typical)
	Protection	Reverse polarity, short circuit
	Operating temperature	See specification of the respective sensor
	EMC	DIN EN 61326-1:2013

I1 Current output 4 … 20 mA, 3 wires  	Excitation voltage	8 … 36 V DC
	Excitation current	typical 36 mA at 24 V DC typical 70 mA at 12 V DC 120 mA max.
	Load R_L	500 Ω max.
	Output current	4 … 20 mA
	Measuring rate	1 kHz standard
	Stability (temperature)	±50 x 10^{-6} / °C f.s. (typical)
	Protection	Reverse polarity, short circuit
	Operating temperature	See specification of the respective sensor
	EMC	DIN EN 61326-1:2013

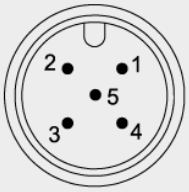
Signal wiring **Connector M12, 5 pin**	**Output signals**	**Connector pin no.**	**Cable color**
 View to the sensor connector	Excitation +	1	brown
	Signal	2	white
	GND	3	blue
	Do not connect!	4	black
	Do not connect!	5	(grey)

Analog output, programmable

U2/PMU Voltage output 0.5 ... 10 V 	Excitation voltage	8 … 36 V DC
	Excitation current	20 mA typical at 24 V DC 38 mA typical at 12 V DC max. 50 mA
	Output voltage	0,5 ... 10 V DC
	Output current	2 mA max.
	Measuring rate	1 kHz standard
	Stability (temperature)	±50 x 10^{-6} / °C f.s. (typical)
	Protection	Reverse polarity, short circuit
	Operating temperature	See specification of the respective sensor
	EMC	EN 61326-1:2013

U8/PMU Voltage output 0.5 … 4.5 V 	Excitation voltage	8 … 36 V DC
	Excitation current	17 mA typical at 24 V DC 32 mA typical at 12 V DC max. 50 mA
	Output voltage	0.5 … 4.5 V DC
	Output current	2 mA max.
	Measuring rate	1 kHz standard
	Stabilität (Temperatur)	±50 x 10^{-6} / °C f.s. (typical)
	Protection	Reverse polarity, short circuit
	Operating temperature	See specification of the respective sensor
	EMC	DIN EN 61326-1:2013

I1/PMU Current output 4 … 20 mA, 3 wires 	Excitation voltage	8 … 36 V DC
	Excitation current	typical 36 mA at 24 V DC typical 70 mA at 12 V DC max. 120 mA
	Load R_L	500 Ω max.
	Output current	4 … 20 mA
	Measuring rate	1 kHz standard
	Stability (temperature)	±50 x 10^{-6} / °C f.s. (typical)
	Protection	Reverse polarity, short circuit
	Operating temperature	See specification of the respective sensor
	EMC	DIN EN 61326-1:2013

Signal wiring **Connector M12, 5 pin**	**Output signals**	**Connector pin no.**	**Cable color**
 View to the sensor connector	Excitation +	1	brown
	Signal	2	white
	GND	3	blue
	Do not connect!	4	black
	SPAN/ZERO	5	grey

Output …/PMU

Programming of the start and end value by the customer (programmable)

Teach-In of start and end value for the analog outputs U2/PMU, U8/PMU, I1/PMU is provided by a binary signal SPAN/ZERO. At the start position connect signal SPAN/ZERO for a period of 2 ... 3 seconds to GND via push button. At the end position connect signal SPAN/ZERO for a period of 5 ... 6 seconds to GND via a push button. The scaling range will be stored non-volatile.

To reset the sensor to factory default ZERO/END must be connected to ground while powering up the sensor for 2 … 3 seconds.

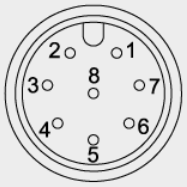
Analog output, redundant

U2R Voltage output 0.5 ... 10 V 	Excitation voltage	8 … 36 V DC
	Excitation current	20 mA typical at 24 V DC 38 mA typical at 12 V DC max. 50 mA per channel
	Output voltage	0.5 ... 10 V DC
	Output current	2 mA max.
	Measuring rate	1 kHz standard
	Stability (temperature)	±50 x 10^{-6} / °C f.s. (typical)
	Protection	Reverse polarity, short circuit
	Operating temperature	See specification of the respective sensor
	EMC	DIN EN 61326-1:2013

U8R Voltage output 0.5 … 4.5 V 	Excitation voltage	8 … 36 V DC
	Excitation current	17 mA typical at 24 V DC 32 mA typical at 12 V DC max. 50 mA per channel
	Output voltage	0.5 … 4.5 V DC
	Output current	2 mA max.
	Measuring rate	1 kHz standard
	Stability (temperature)	±50 x 10^{-6} / °C f.s. (typical)
	Protection	Reverse polarity, short circuit
	Operating temperature	See specification of the respective sensor
	EMC	DIN EN 61326-1:2013

I1R Current output 4 … 20 mA, 3 wires  	Excitation voltage	8 … 36 V DC
	Excitation current	36 mA typical at 24 V DC 76 mA typical at 12 V DC max. 120 mA per channel
	Load R_L	500 Ω max.
	Output current	4 … 20 mA
	Measuring rate	1 kHz standard
	Stability (temperature)	±50 x 10^{-6} / °C f.s. (typical)
	Protection	Reverse polarity, short circuit
	Operating temperature	See specification of the respective sensor
	EMC	DIN EN 61326-1:2013

Signal wiring
Connector M12, 8 pin



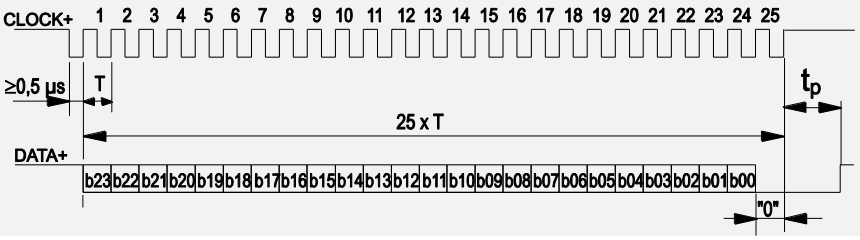
View to the sensor connector

Channel	Output signals	Connector pin no.	Cable color
1	Excitation +	1	white
	Signal	2	brown
	GND	3	green
	Do not connect!	4	yellow
2	Excitation +	5	grey
	Signal	6	pink
	GND	7	blue
	Do not connect!	8	red

5.3 Digital output

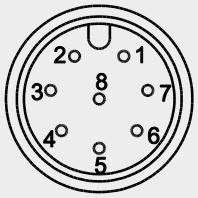
MSSI Synchronous serial SSI 	Interface	EIA RS-422
	Excitation voltage	8 ... 36 V DC
	Excitation current	19 mA typical at 24 V DC 35 mA typical at 12 V DC max. 80 mA
	Clock frequency	100 kHz ... 500 kHz
	Code	Gray-Code, continuous progression
	Delay between pulse trains (t_p)	30 µs min.
	Stability (temperature)	±50 x 10^{-6} / °C f.s. (typical)
	Operating temperature	See specification of the respective sensor
	Protection	Reverse polarity, short circuit
	EMC	DIN EN 61326-1:2013

Data format
(Train of 26 pulses)



Transmission rate	**Cable length**	**Baud rate**	**Note:**
	50 m	100-400 kHz	Extension of the cable length will reduce the maximum transmission rate.
	100 m	100-300 kHz	

Signal wiring
Connector M12, 8 pin



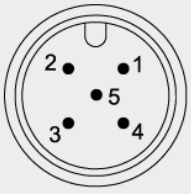
View to the sensor connector

Output signals	**Connector pin no.**	**Cable color**
Excitation +	1	white
Excitation GND	2	brown
CLOCK	3	green
$\overline{\text{CLOCK}}$	4	yellow
DATA	5	grey
$\overline{\text{DATA}}$	6	pink
-	7	blue
-	8	red

MCANOP, CANOPR CANopen	CAN specification	ISO 11898, Basic and Full CAN 2.0 B
	Communication profile	CANopen CiA 301 V 4.02, Slave
	Encoder profile	Encoder CiA 406 V 3.2
	Error Control	Node Guarding, Heartbeat, Emergency Message
	Node ID	Adjustable via LSS or SDO, default: 127
	PDO	3 TxPDO, 0 RxPDO, no linking, static mapping
	PDO Modes	Event-/Time triggered, Remote-request, Sync cyclic/acyclic
	SDO	1 Server, 0 Client
	CAM	8 cams
	Certified	Yes
	Transmission rate	50 kBit bis 1 Mbit, adjustable via LSS or SDO, default: 125 kBit
	Bus connection	M12 conncector, 5 pin
	Integrated bus terminating resistor	120Ω adjustable by the customer
	Bus, galvanic isolated	no

Specifications	Excitation voltage	8 ... 36 V DC
	Excitation current	20 mA typical at 24 V DC 40 mA typical at 12 V DC 80 mA max.
	Measuring rate	1 kHz (asynchronous)
	Stability (temperature)	±50 x 10^{-6}/°C f.s. (typical)
	Repeatability	1 LSB
	Operating temperature	See specification of the respective sensor
	Protection	Reverse polarity, short circuit
	Dielectric strength	1 kV (V AC, 50 Hz, 1 min.)
	EMC	EN 61326-1:2013

Signal wiring
Connector M12, 5 pin



View to the sensor connector

Output signals	Connector pin no.	Cable color
Shield	1	brown
Excitation +	2	white
GND	3	blue
CAN-H	4	black
CAN-L	5	grey

CANopen – Set up (MCANOP)



Download

- A detailed specification of this interface can be downloaded from the ASM website:

  www.asm-sensor.com/en/downloads.html > Configuration files

⚠ WARNING

Risk of injury by unexpected machine movement

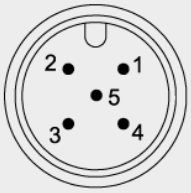
- Change parameters only when machine is in a safe condition!
- Changing parameters may cause unexpected machine movement.
- Changing parameters may influence dependent parameters e.g. changing the resolution may have influence on position of CAM switches.
- Precautions have to be taken to avoid damage to human and machine parts!

MCANJ1939 SAE J1939 	CAN Specification	ISO 11898, Basic and Full CAN 2.0 B	
	Transceiver	24V-compliant, not isolated	
	Communication profile	SAE J1939	
	Baud Rate	250 kbit/s	
	Internal termination resistor	120 Ω adjustable by the customer	
	Address	Default 247d, configurable	

NAME Fields	Arbitrary address capable	1	Yes
	Industry group	0	Global
	Vehicle system	7Fh (127d)	Non specific
	Vehicle system instance	0	
	Function	FFh (255d)	Non specific
	Function instance	0	
	ECU instance	0	
	Manufacturer	145h (325d)	Manufacturer ID
	Identity number	0nnn	Serial number 21 bit

Parameter Group Numbers (PGN)	Configuration data	PGN EF00h	Proprietary-A (PDU1 peer-to-peer)
	Process data	PGN FFnnh	Proprietary-B (PDU2 broadcast); nn Group Extension (PS) configurable

Specifications	Excitation voltage	8 ... 36 V DC
	Excitation current	20 mA typical at 24 V DC 40 mA typical at 12 V DC max. 80 mA
	Measuring rate	1 kHz (asynchronous)
	Stability (temperature)	±50 x 10^{-6}/°C f.s. (typical)
	Repeatability	1 LSB
	Operating temperature	See specification of the respective sensor
	Protection	Reverse polarity, short circuit
	Dielectric strength	1 kV (V AC, 50 Hz, 1 min.)
	EMV	EN 61326-1:2013

Signal wiring Connector M12, 5 pin	Output signals	Connector pin no.	Cable color
 View to the sensor connector	Shield	1	brown
	Excitation +	2	white
	GND	3	blue
	CAN-H	4	black
	CAN-L	5	grey

SAE J1939 – Set up (MCANJ1939)

WWW.

Download

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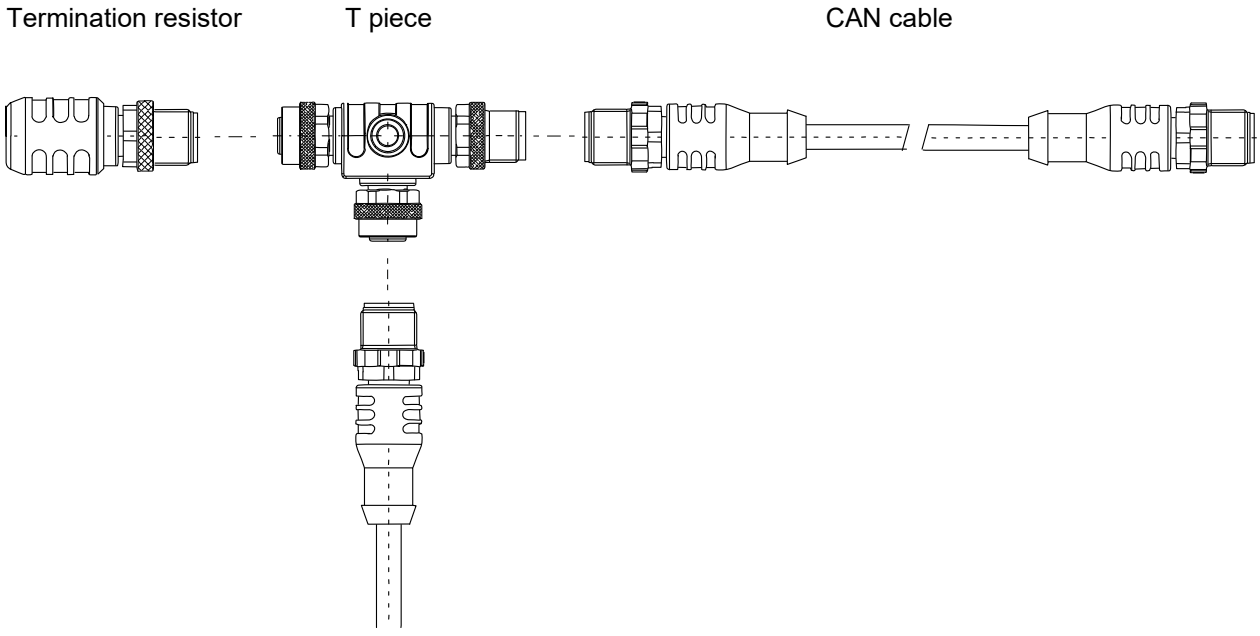
⚠ WARNING

Risk of injury due to unexpected machine movement

- Change parameters only when machine is in a safe condition!
- Changing parameters may cause unexpected machine movement.
- Changing parameters may influence dependent parameters e.g. changing the resolution may have influence on position of CAM switches.
- Precautions have to be taken to avoid damage to human and machine parts!

CAN-Bus wiring

Connect the device by a T-connector to the CAN trunk line. Total length of stubs should be minimized. Do not use single stub lines longer than 0.5 m. Connect terminating resistors 120 Ohm at both ends of the trunk line.



Reliability characteristics

Model	**WB10ZG, WB12, WB21, WB61, WB85, WB100M**	
Output	**single-channel**	
	U2	Voltage output 0.5 ... 10 V
	U6, U8	Voltage output 0.5 ... 4.5 V
	I1	Current output 4 ... 20 mA
	MCANOP	CAN-Bus (CANopen)
	MCANJ1939	CAN-Bus (SAE J1939)
	MSSI	SSI output
	dual-channel	
	U2R	Voltage output 0.5 ... 10 V, redundant
	U6R, U8R	Voltage output 0.5 ... 4.5 V, redundant
	I1R	Current output 4 ... 20 mA, redundant
	MCANOPR	CAN-BUS, redundant (CANopen)
	MCANJ1939R	CAN-BUS, redundant (SAE J1939)

Characteristics	Device type	B
	Life period (electronics) $MTTF_d$	320 years / channel*)
	Probability of failure PFH (λ_{DU})	350 Fit / channel
	Life period (mechanics) B_{10}	$5*10^6$ cycles (draft)
	Probability of failure (mechanics) λ_{MECH}	0,1 * C_h / B_{10} C_h = cycles per hour
	Working life	10 years
	Calibration intervall	annually

Operating conditions	Pull-out speed (max)	1 m/s
	Pull-in speed (max)	1 m/s
	Assembly	No deflection

Standards	Failure rate of electronic components (Siemens)	SN 29500

*) = Reference Conditions: Reference Supply Voltage UB_{REF}= 24 V, Reference Temperature ϑ_{REF}= 60 °C

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