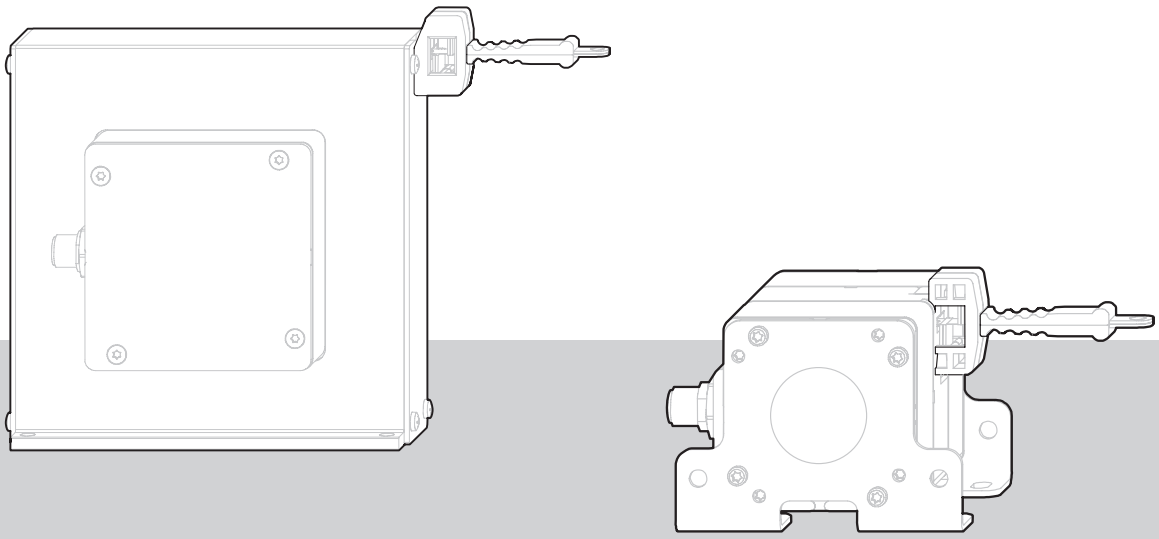
ASM®
perfect in sensors.

positape® WBT Series

Combined displacement and inclination sensors

Installation and operation manual **EN**



Please read carefully before installation and operation!

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Germany

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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

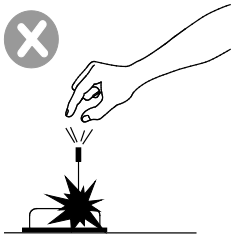
- Connection to power supply must be performed in accordance with safety instructions for electrical facilities and performed only by qualified personnel.
- Any alteration, reconstruction or extension of the sensor is not allowed!
  - The sensor must be operated only within values specified in the catalog 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

positape® Tape Extension Position Sensor with an integrated inclinometer are used to measure both linear and inclination position at the same time. Both output parameters – linear position and inclination – are independent of each other.

The ranges for the measuring length and inclination as well as the information on environmental compatibility and connection data given in the data sheet must be observed. The sensor is used as intended if it is operated within its specified technical data and ambient conditions.

The installation and operating instructions supplied with the unit must be observed and all maintenance and service work must be carried out. The data sheet of the respective sensor is part of this instruction manual. If not 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.

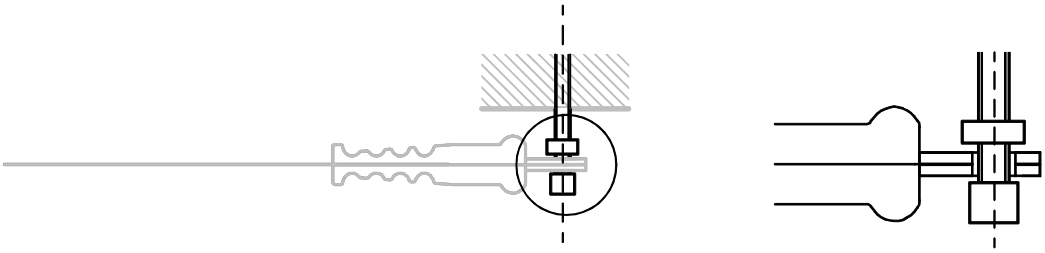
Tape attachment device

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

NOTICE

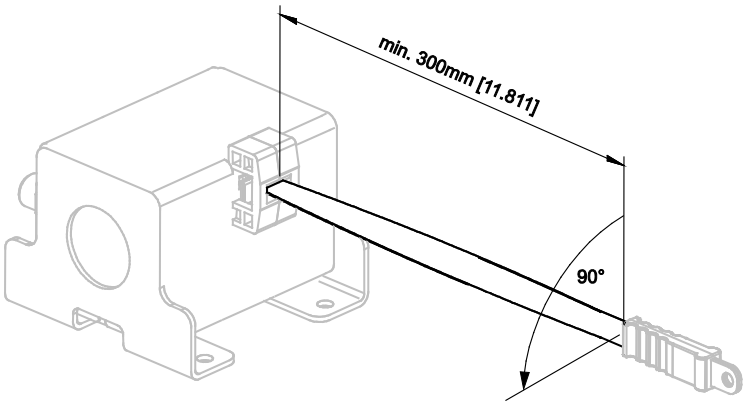
Damage to the measuring tape due to incorrect installation

- 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.



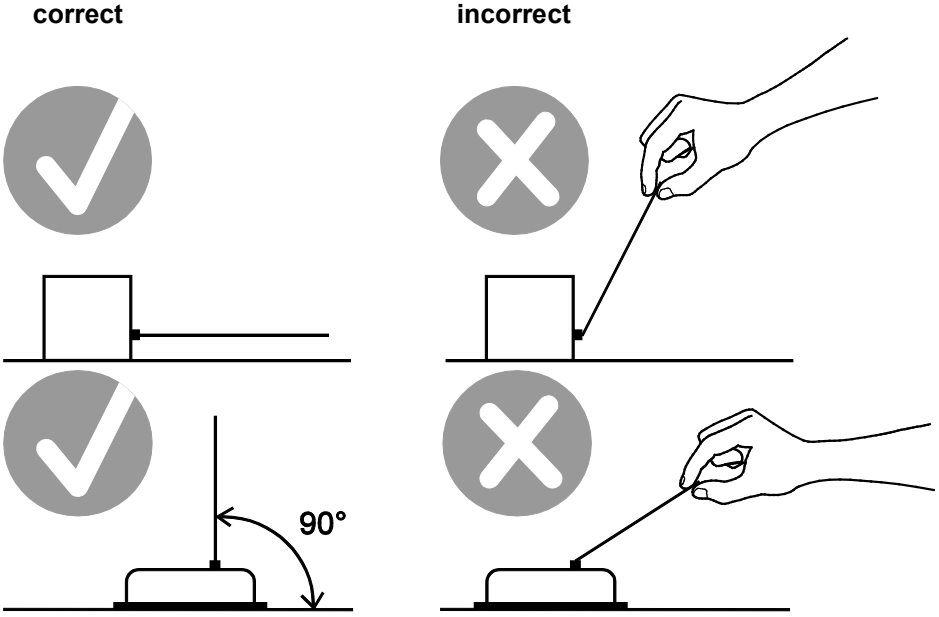
Damage to the measuring tape due to an axial twist

- 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

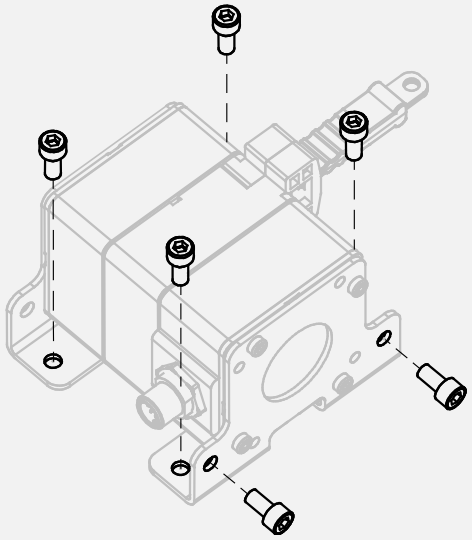
- Tape travel should only be axial to the tape outlet - no misalignment is allowed!
- Tape misalignment shortens service life of sensor and causes error in measurement. Warranty will not be granted for damage caused by misalignment.



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®).

Torques for fixing screws

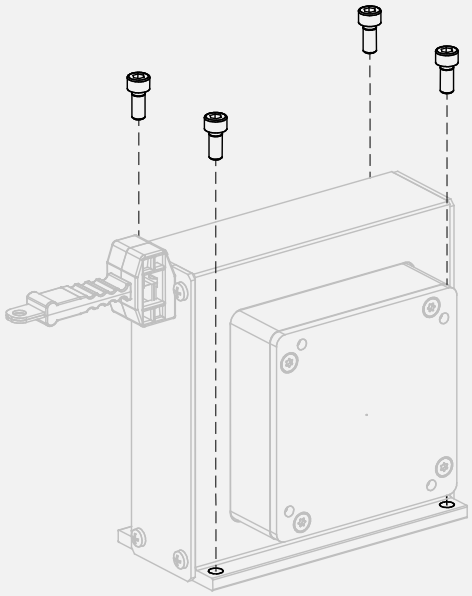
Sensors with mounting clamps



Model	Screw	Screw material	Torque [Nm]
WBT61 (oval hole)	M5	A2	2.0
WBT85	M6	A2	4.0
WBT85 (oval hole)	M6	A2	3.0

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

Sensors with holes in the base plate



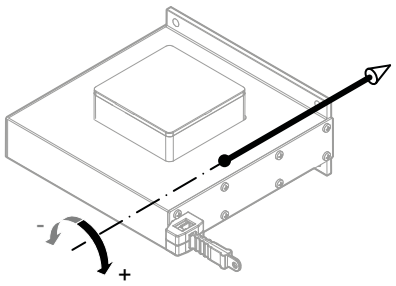
Model	Screw	Screw material	Torque [Nm]
WBT21	M5	A2	2.5
WBT21	M6	A2	3.0

Mounting options for inclination measurement for WBT21 sensors

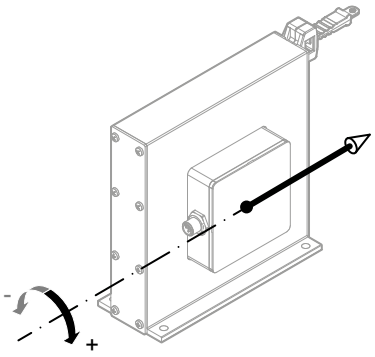
The mounting option can be set by the user via software. Sensor position as shown equals 0°.

WBT21

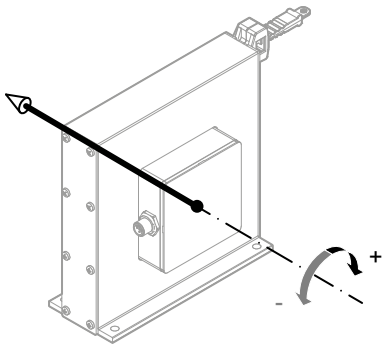
Mounting option 1



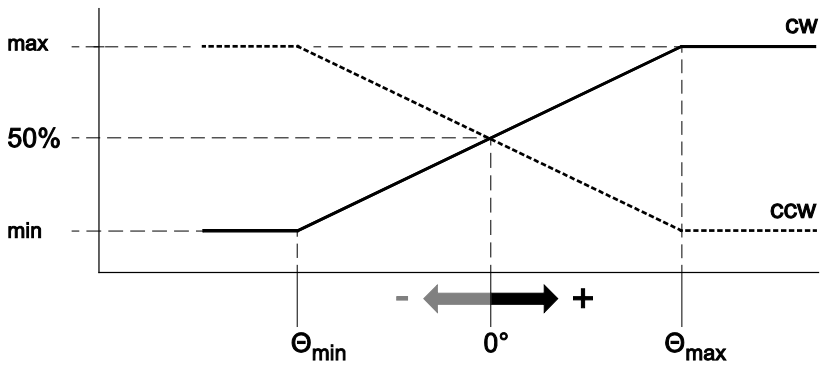
Mounting option 2



Mounting option 3



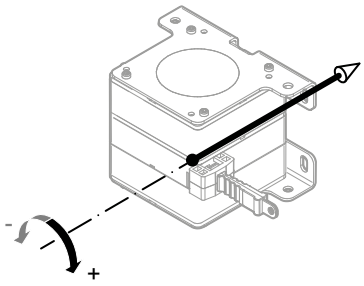
Output signal



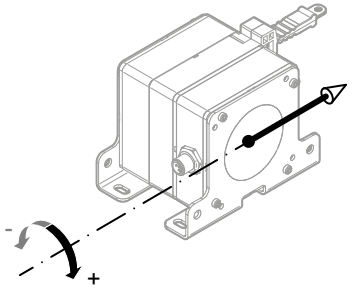
Mounting options for inclination measurement for WBT61 / WBT85 sensors
The mounting option can be set by the user via software. Sensor position as shown equals 0°.

WBT61 / WBT85

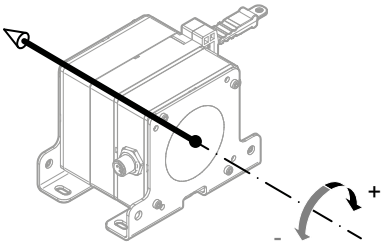
Mounting option 1



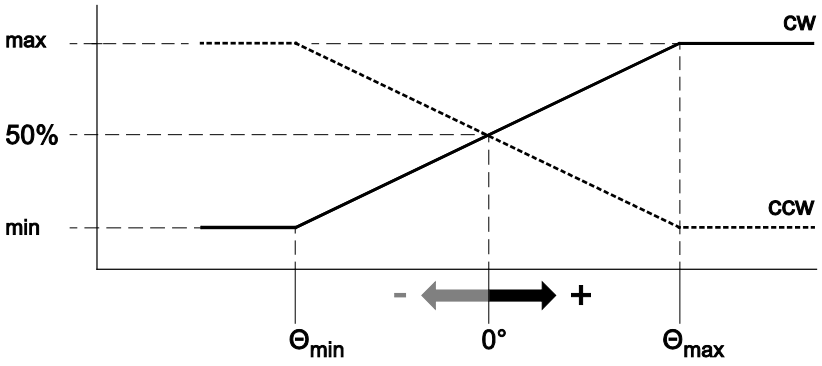
Mounting option 2



Mounting option 3



Output signal



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.
- Connecting 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 insert.
- 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.

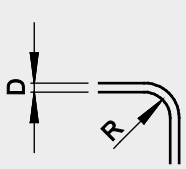
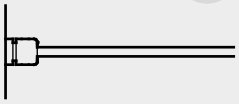
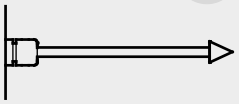
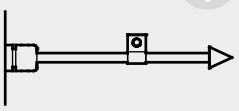
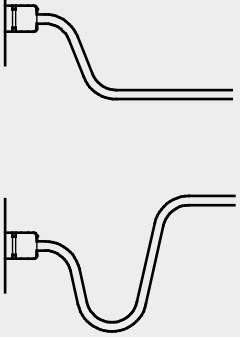
Connector Pin assignment

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® WBT61	-40 … +85°C
positape® WBT85	-40 … +85°C
positape® WBT21	-40 … +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® WBT61
- positape® WBT85
- positape® WBT21

Calibration

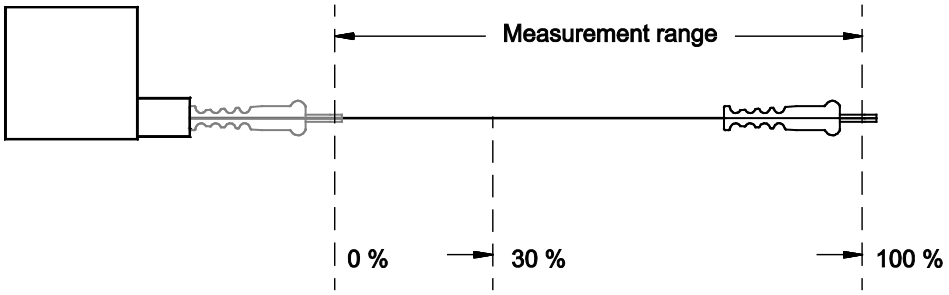
The recommended calibration interval is 1 year.
Test protocol and traceable calibration certificate (ISO9001 / ISO10012) is available on request.

4.2 Disposal

Disposal according to applicable government regulations.

5 Output specification

5.1 Measurement signal and range



Digital absolute

Absolute encoder

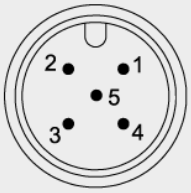
Measurement range corresponds to a digitally coded number (resolution eg. 10 steps / mm).

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

5.2 Digital interface CANopen

MCANOP, CANOPR 	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	0.5 kHz
	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	Output signals	Connector pin no.
 View to the sensor connector	Shield	1
	Excitation +	2
	GND	3
	CAN-H	4
	CAN-L	5

CANopen – Set up (MCANOP)

WWW.

Download

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

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

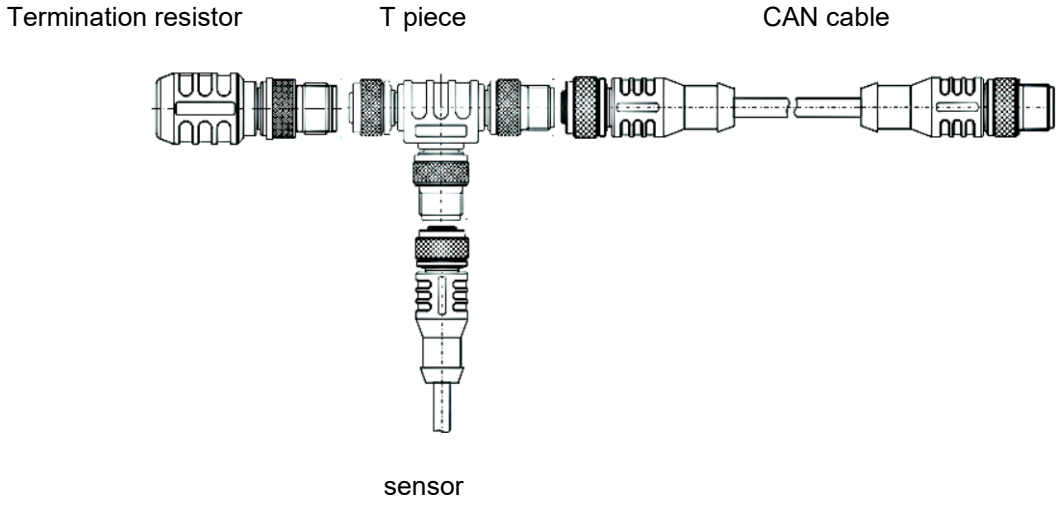
⚠ WARNING

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!

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

Models with magnetic encoder	**WBT61, WBT85, WBT21**	
Output	**single-channel**	
	MCANOP	CAN-BUS (CANopen)
	dual-channel	
	MCANOPR	CAN-BUS, redundant (CANopen)
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

perfect in sensors.

www.asm-sensor.com

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