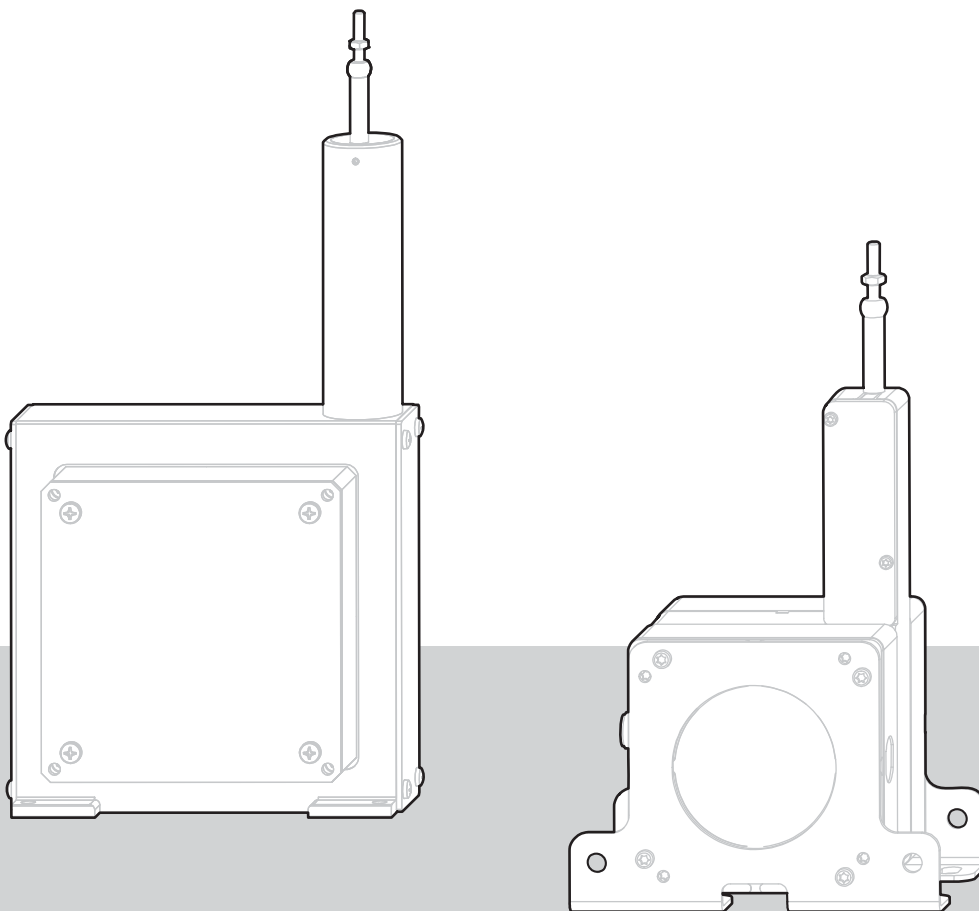


# posiwire<sup>®</sup> WST Series

Combined displacement and inclination sensors

Installation and operation manual

EN



Please read carefully before installation and operation!

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85452 Moosinning  
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 of injury to the operator or damage to the property**

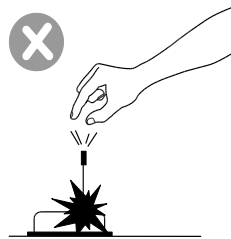
- Connection to power supply must be performed in accordance with safety instructions for electrical facilities and performed only by qualified personnel.
- Any alteration, reconstruction or extension of the sensor is not allowed!
- The sensor must be operated only within values specified in the datasheet.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



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

### **NOTICE**

#### **Mechanical damage or destruction of the sensor**

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

#### **Malfunction due to the accumulation of dirt on the measuring cable**

- Do not oil or lubricate the measuring cable.

---

## 1.3 Intended use

posiwire® Cable Extension Position Sensors 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. 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 yet 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 cable or cable fixing**

- Do not lift the sensor by the cable or cable attachment.

Observe storage and transport temperatures according to the temperatures specified in the data sheet.

Max. rel. humidity 60%, dew condensation must be prevented at all times.

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

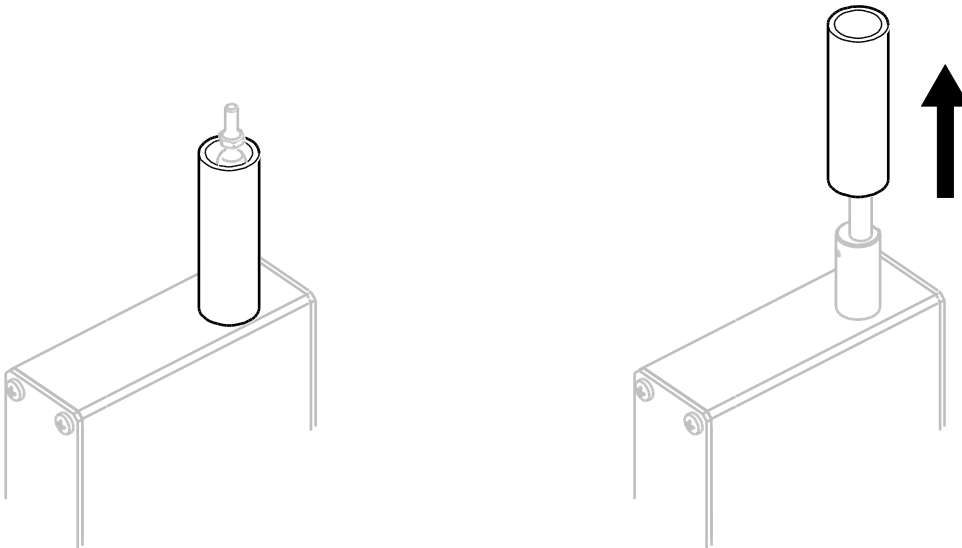
### Unpacking

Do not unpack sensor by pulling cable or cable clip.

### Shipment damages

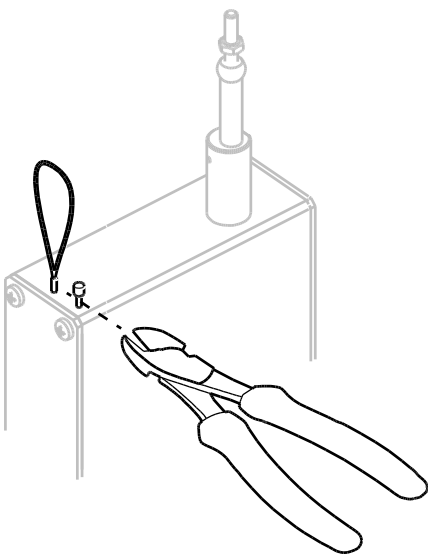
Check sensor immediately for shipment damage. In case of any damage, please contact your supplier.

### Removing kink protection / Shipment protection

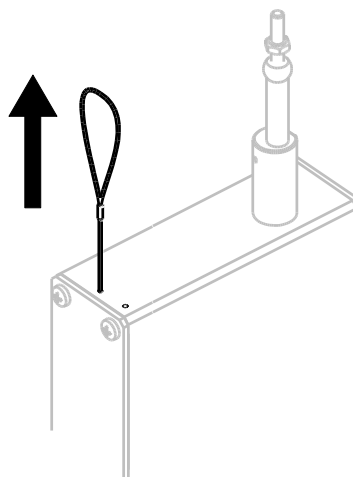


The kink protection prevents the cable fixing from buckling and damaging the cable. Remove in the direction of the cable.

1.



2.



Transport protection (for some sensor models) prevents the measuring cable from being extracted before mounting the sensor. Only remove immediately before mounting:

1. Carefully cut the crimped, short wire end directly at the sensor housing, without applying any axial force to the wire
2. Pull the wire out of the case at the loop

For further transport, use the original packaging (if available) to avoid transport damage.

### Shipment content

- Sensor
- Installation and operation manual

## 3 Installation and initial operation

### Mating connectors

Delivery does not include female connectors for electrical connection.

Appropriate mating connectors and preassembled connecting cables are available on request.

### 3.1 Mechanical installation

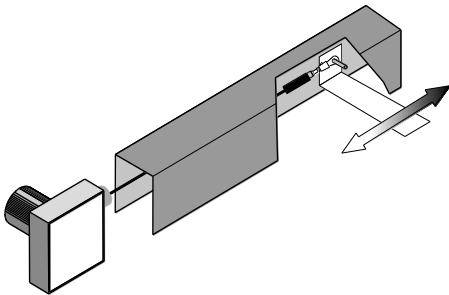
#### ⚠ CAUTION

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

- Operate the sensor only with a suitable protective device (e.g. cable cover) to prevent injury!

#### Choice of installation position

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



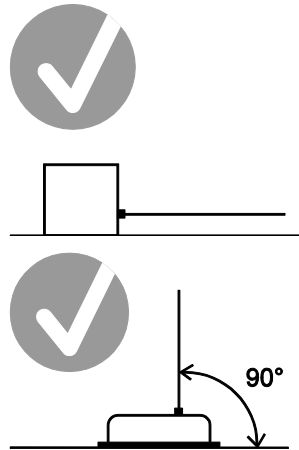


**NOTICE**

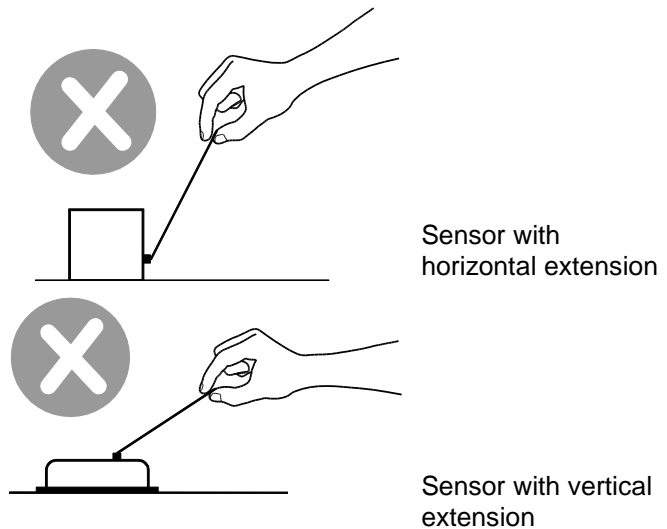
**Cable travel should only be axial to the cable outlet - no misalignment is allowed**

- Cable misalignment shortens service life of sensor and causes error in measurement. Warranty will not be granted for damage caused by misalignment.

**correct**



**incorrect**



- If the measuring cable cannot be extended in the axial direction of the cable outlet opening due to the measuring task, the SR2 cable pulley must be used to redirect the cable.
- For special applications, extension cables with cable clips attached on both ends are available.

**Fixing the sensor**

Depending upon the sensor model, holes in the base plate, threads, mounting brackets or T-slots in the sensor housing enable attachment of the sensor. Required dimensions are listed in the data sheet.

**Mount the sensor on flat surface.**

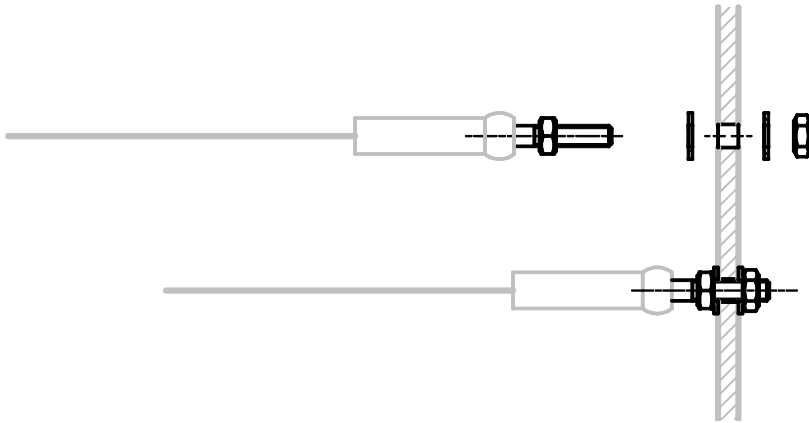
Use flat washers and/or thread locker if necessary.

The torques of the fixing screws depend on the material used (see p.12).

### Cable attachment device

The cable clip can be fastened as follows:

- M4 cable connection in cable outlet direction

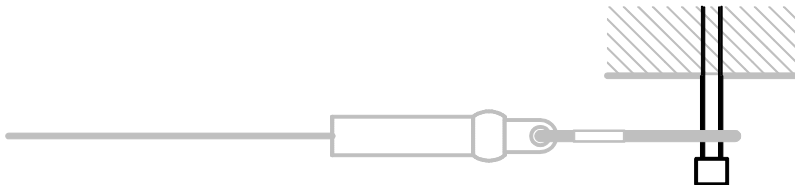


#### NOTICE

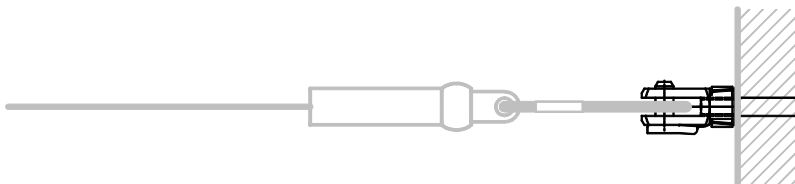
The M4 connection is mounted with a through hole, two washers and a M4 nut.

Do not rotate the M4 connection during assembly, otherwise the measuring cable will be twisted!

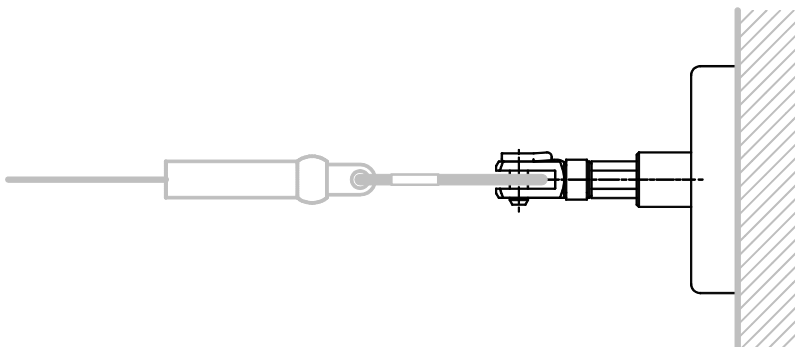
- Cable clip with Allen screw M5: standard fixing.



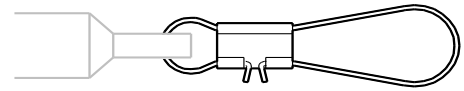
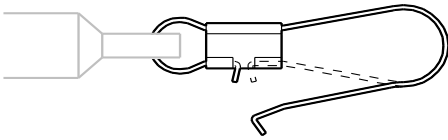
- Cable clip with attachment head (accessory GK1: metal, GK2: plastic): fast cable attachment, easy to remove



- Cable clip with magnetic clamp (accessory MAG1): with this device the sensor can be easily used at several measuring points with ferromagnetic surface.



### Cable clip attachment



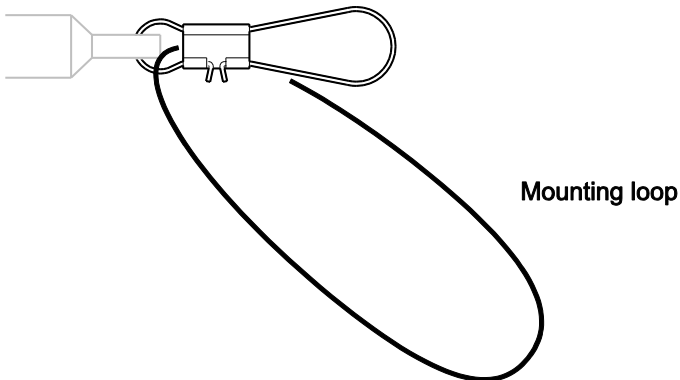
The cable clip (see drawing above) can be opened for easy attachment of the measuring cable. If possible, fasten cable fixing with cable in retracted position.

**▲ CAUTION**

**Danger of cutting injuries due to cable clips during cable connection**

- Before connecting the cable clip into the fixture read the mounting instructions.

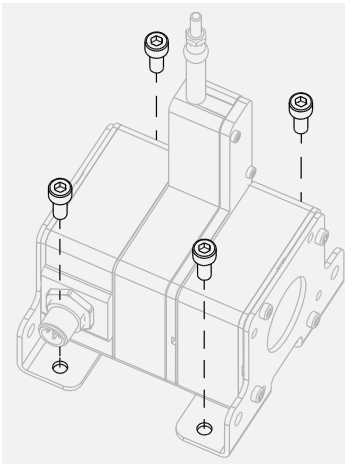
### Mounting aid for adverse installation conditions



For example, fit a mounting loop and put it around your wrist. Do not remove the mounting loop until after final installation.

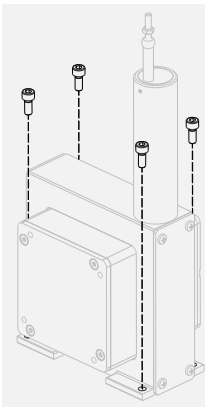
**Fixing screws**

**WST61, WST85**



Model	Screw	Screw material	Torque [Nm]
WST61 (oval hole)	M5	A2	2.0
WST85	M6	A2	4.0
WST85 (oval hole)	M6	A2	3.0

**WST21**



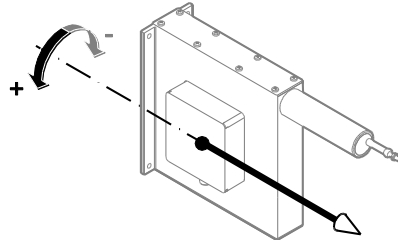
Model	Screw	Screw material	Torque [Nm]
WST21	M5	A2	2.5

**Mounting options for inclination measurement for WST21 sensor**

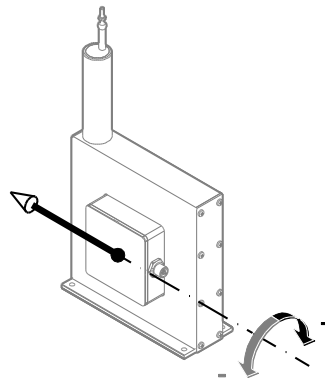
For CAN output, the mounting option can be set by the user via software.  
 Sensor position as shown equals 0°.

**WST21**

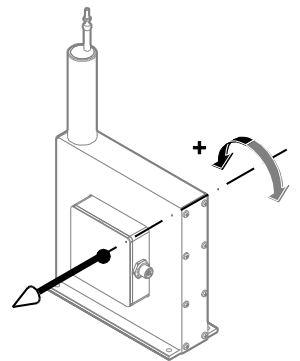
**Mounting option 1**



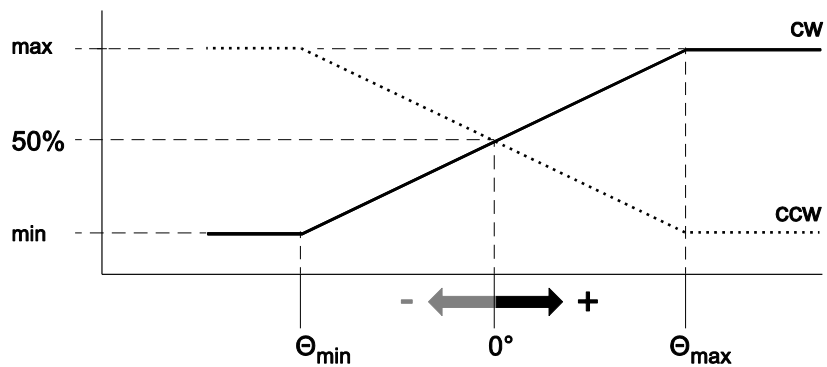
**Mounting option 2**



**Mounting option 3**



**Output signal**

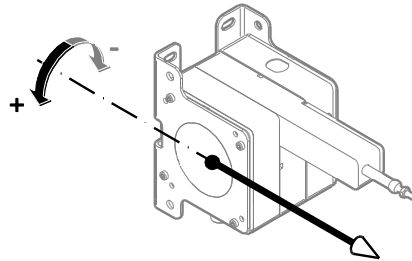


**Mounting options for inclination measurement for WST61 / WST85 sensors**

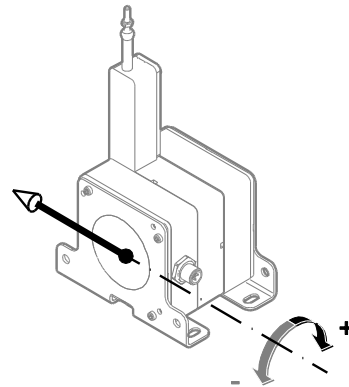
For CAN output, the mounting option can be set by the user via software.  
 Sensor position as shown equals 0°.

**WST61 / WST85**

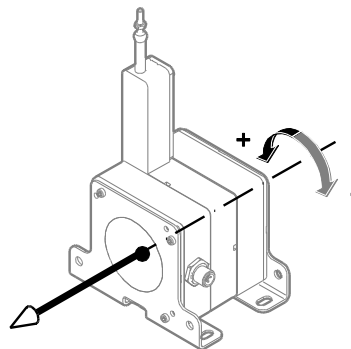
**Mounting option 1**



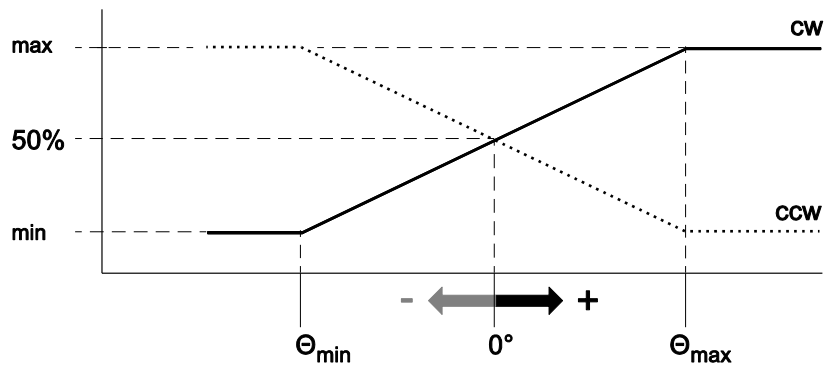
**Mounting option 2**



**Mounting option 3**



**Output signal**



---

## 3.2 Electrical connection

---

<b>NOTICE</b>
---------------

**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.



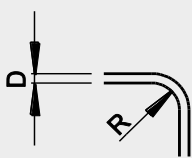

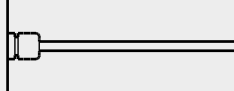



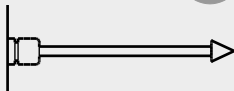

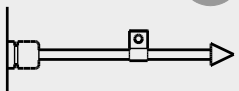







**Connector Pin assignment**

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: $R \sim 5 \times D$ $R \sim 10 \times D$ (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)

Electromagnetic compatibility of posiwire® Cable Extension Position Sensors is influenced by the sensor wiring.

### NOTICE

**Possible malfunction of the sensor when used in systems with highly electromagnetic interference emitting 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

The operating temperature of a sensor depends on the sensor type and encoder technology used:

posiwire®WST61	-40 ... +85°C
posiwire®WST85	-40 ... +85°C
posiwire®WST21	-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.

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
Cable	Damaged cable, spliced or bended cable: send sensor to ASM for repair

#### NOTICE

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

- posiwire®WST61
- posiwire®WST85
- posiwire®WST21

#### Calibration

The recommended calibration interval is 1 year.

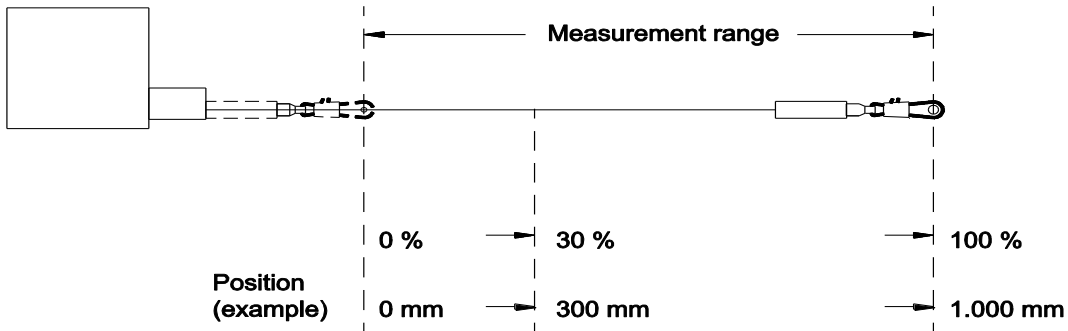
Test protocol and traceable calibration certificate (ISO9001 / ISO10012) is available on request.

### 4.2 Disposal

Disposal according to applicable government regulations.

## 5 Output specification

### 5.1 Measurement signal and range




#### Digital absolute

Absolute encoder

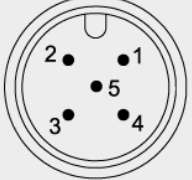
Measurement range corresponds to a digitally coded number (resolution eg. 10 steps / mm).

<b>Position</b>	0%	30%	100%
<b>Measurement value (example)</b>	0 steps	3,000 steps	10,000 steps

## 5.2 Digital interface CANopen

<b>MCANOP, CANOPR</b>		
	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 connector, 5 pin
	Integrated bus terminating resistor	120Ω adjustable by the customer
	Bus, galvanic isolated	no

<b>Specifications</b>		
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 <sup>-6</sup> /°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	Output signals	Connector pin no.
<b>Connector M12, 5 pin</b>  View to the sensor connector	Shield	1
	Excitation +	2
	GND	3
	CAN-H	4
	CAN-L	5

### 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](http://www.asm-sensor.com/en/downloads.html) > Configuration files

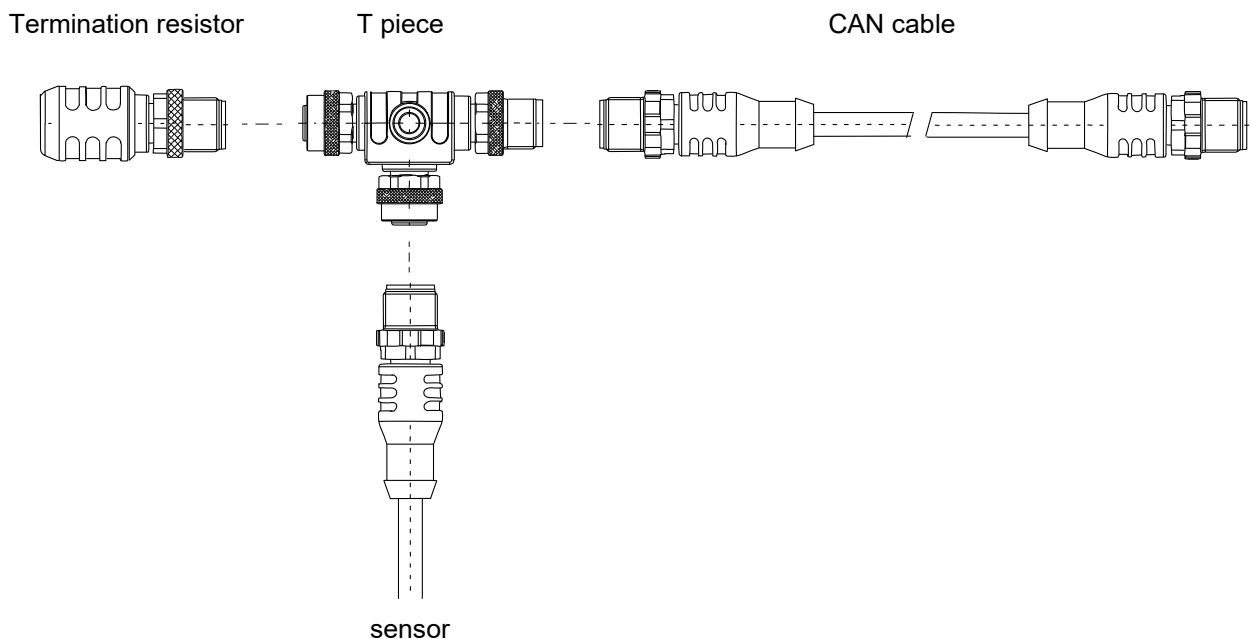


#### Risk of injury by unexpected machine movement

- 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

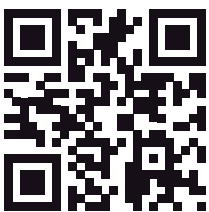
<b>Models with magnetic encoder</b>	<b>WST61, WST85, WST21</b>	
<b>Output</b>	<b>single-channel</b>	
	MCANOP	CAN-BUS (CANopen)
	<b>dual-channel</b>	
	MCANOPR	CAN-BUS, redundant (CANopen)
<b>Characteristics</b>	Device type	B
	Life period (electronics) MTTF <sub>d</sub>	320 years / channel <sup>*)</sup>
	Probability of failure PFH ( $\lambda_{DU}$ )	350 Fit / channel
	Life period (mechanics) B <sub>10</sub>	5*10 <sup>6</sup> cycles (draft)
	Probability of failure (mechanics) $\lambda_{MECH}$	0,1 * C <sub>h</sub> / B <sub>10</sub> C <sub>h</sub> = cycles per hour
	Working life	10 years
	Calibration intervall	annually
	<b>Operating conditions</b>	Pull-out speed (max)
Pull-in speed (max)		1 m/s
Assembly		No deflection
<b>Standards</b>	Failure rate of electronic components (Siemens)	SN 29500

<sup>\*)</sup> = Reference Conditions: Reference Supply Voltage  $U_{BREF} = 24 \text{ V}$ , Reference Temperature  $\vartheta_{REF} = 60 \text{ °C}$





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