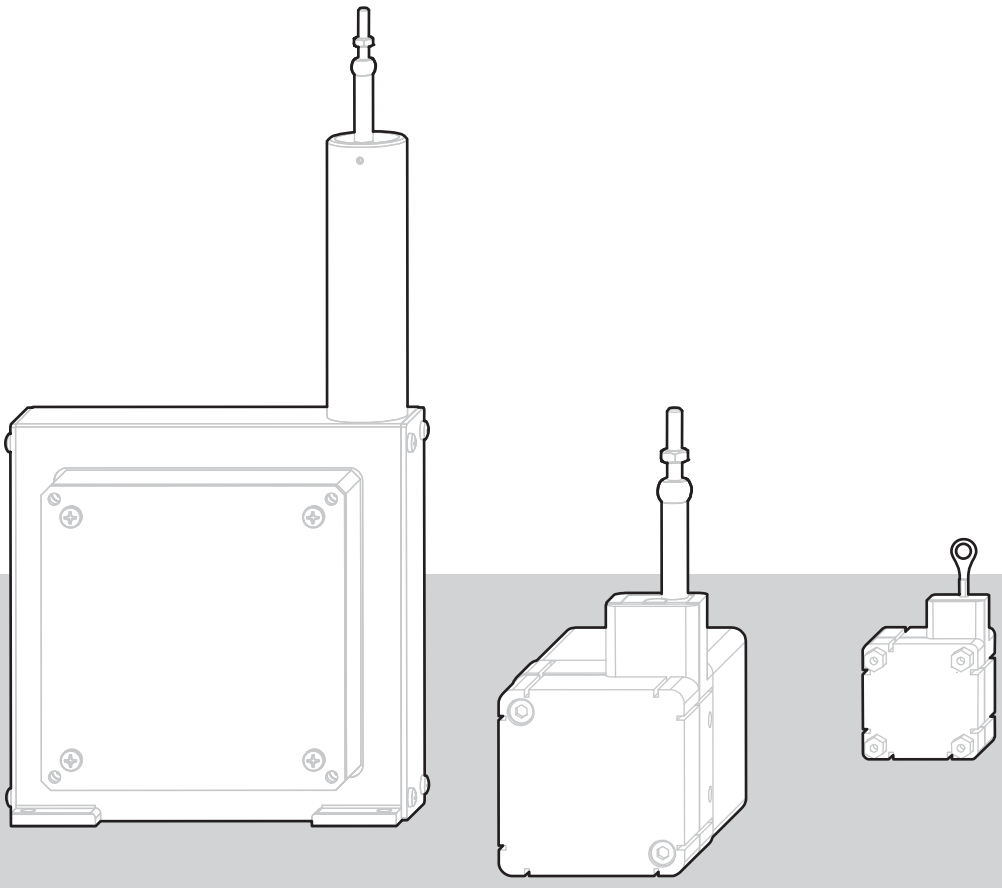
ASM®
perfect in sensors.

posi**wire**®

Cable Extension Position Sensors

Installation and operation manual EN



Please read carefully before installation and operation!

Am Bleichbach 18 - 24
85452 Moosinning
Germany

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

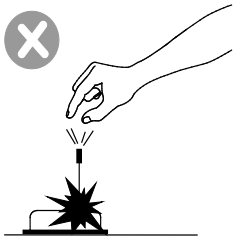
- Connection to power supply must be performed in accordance with safety instructions for electrical facilities and performed only by qualified personnel.
- Any alteration, reconstruction or extension of the sensor is not allowed!
- The sensor must be operated only within values specified in the datasheet.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

The sensors listed in the installation and operating instructions must not be operated in potentially explosive environments. Sensors intended for this environment (posiwire® EX) are described in their respective manuals.

2 Transport and storage

NOTICE

Risk of damage to the measuring cable or cable fixing

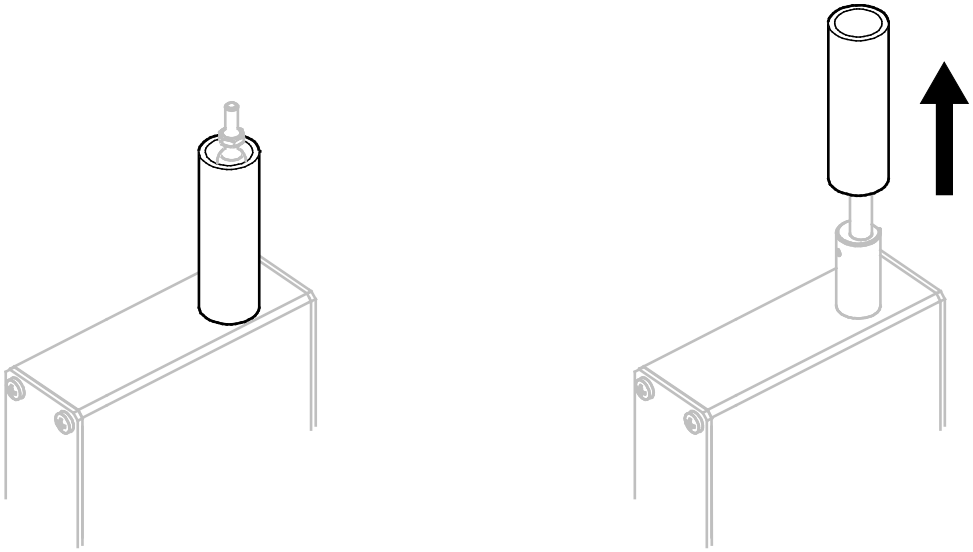
- Do not lift the sensor by the cable or cable attachment.

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.

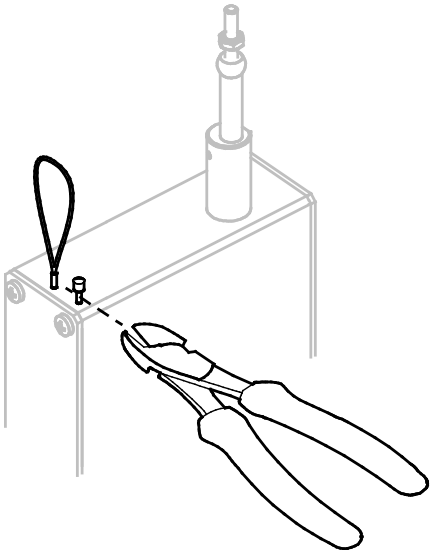
Shipment damages
Check sensor immediately for shipment damage. In case of any damage, please contact your supplier.

Removing kink protection / Shipment protection

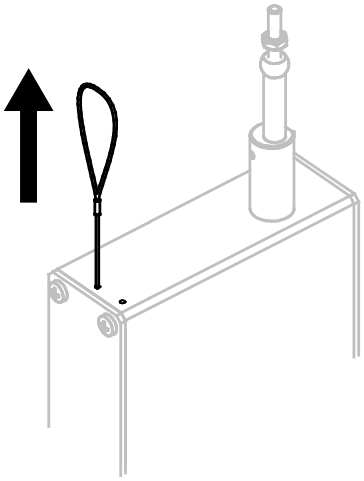


The kink protection prevents the cable fixing from buckling and damaging the cable. Remove in the direction of the cable.

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

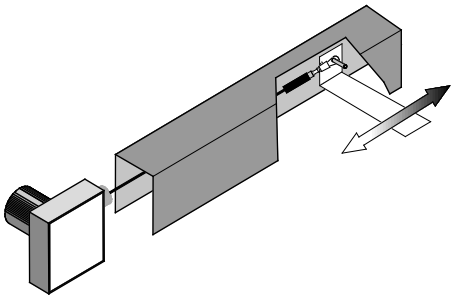
⚠ CAUTION

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

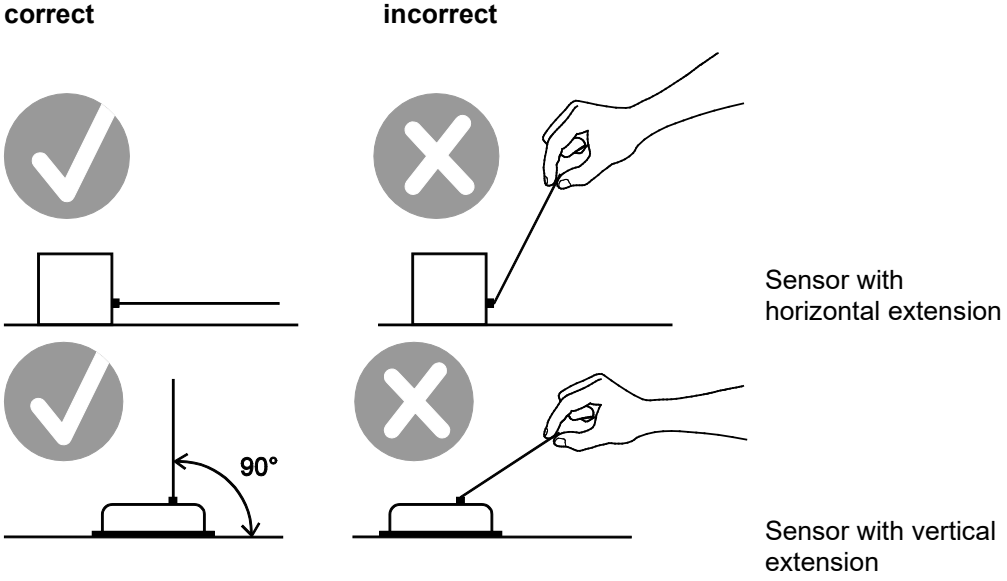
- Select a protected installation position for the measuring cable.
  This prevents damage of the measuring cable.
- Preferably mount the sensor with the cable outlet pointing downwards.
  This prevents liquids from entering through the cable outlet.
- Screw the sensor onto a flat surface or provide 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.



- 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.

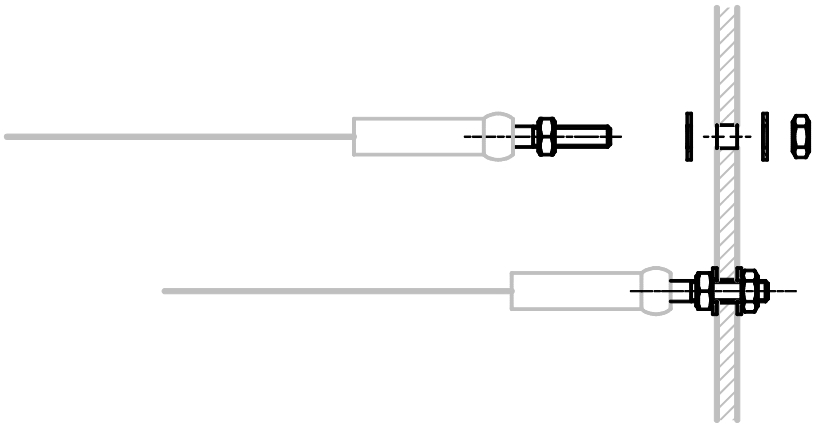
Use flat washers and/or thread locker if necessary.

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

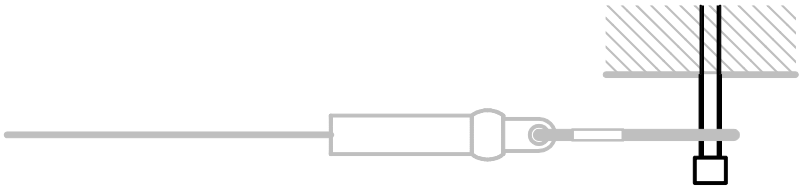


NOTICE

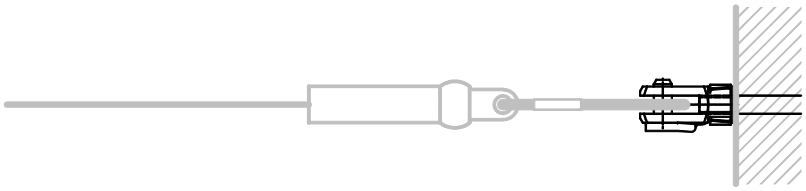
The M4 connection is mounted with a through hole, two washers and a M4 nut.

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

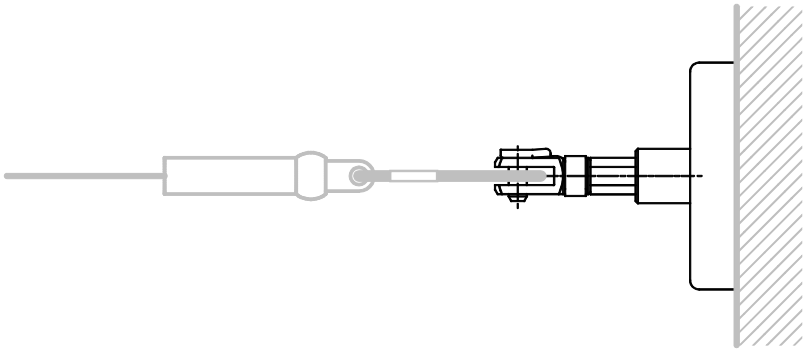
- Cable clip with Allen screw M5: standard fixing.



- 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

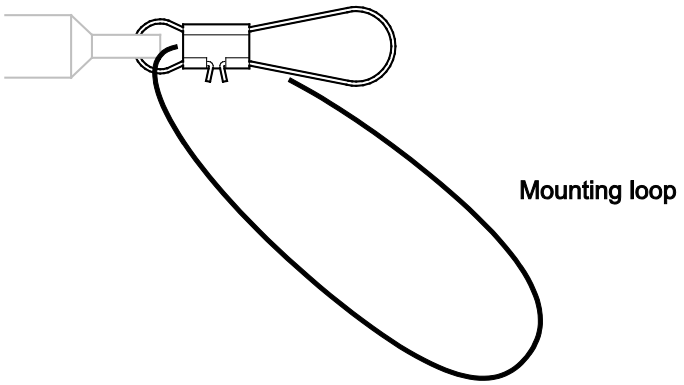
The cable clip (see drawing above) can be opened for easy attachment of the measuring cable. If possible, fasten cable fixing with cable in retracted position.

⚠ CAUTION

Danger of cutting injuries due to cable clips during cable connection

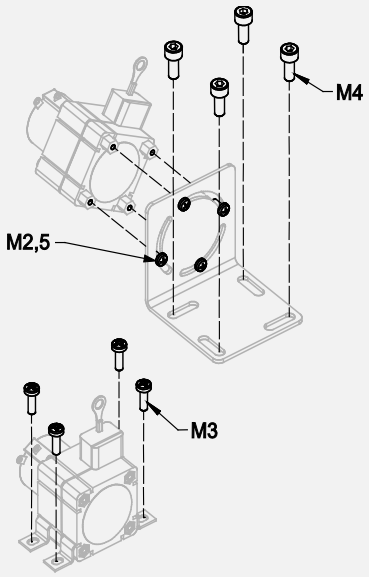
- Before connecting the cable clip into the fixture read the mounting instructions.

Mounting aid for adverse installation conditions



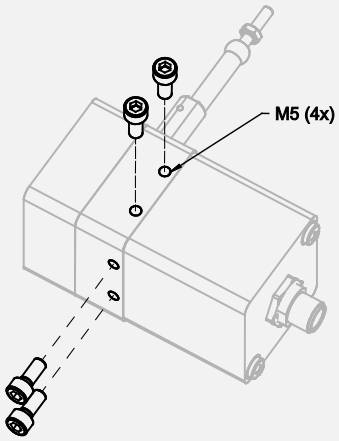
For example, fit a mounting loop and put it around your wrist. Do not remove the mounting loop until after final installation.

Fixing screws
WS31 / WS31C / WS42 / WS42C



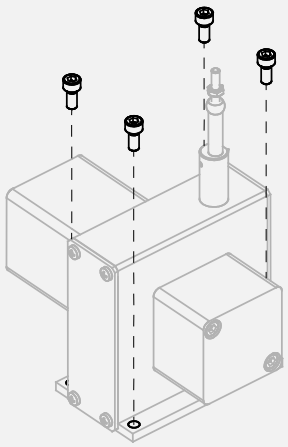
Model	Screw material	Material	Torque [Nm]
WS31 / WS31C	M2.5 Mounting brackets	A2	0.25
WS31 / WS31C	M3 Clamping claws	A2	0.5
WS31 / WS31C	M4 Mounting brackets	A2	0.65
WS42 / WS42C	M2.5 Mounting brackets	A2	0.25
WS42 / WS42C	M3 Clamping claws	A2	0.5
WS42 / WS42C	M4 Mounting brackets	A2	0.65

WS10, WS10ZG, WS10SG



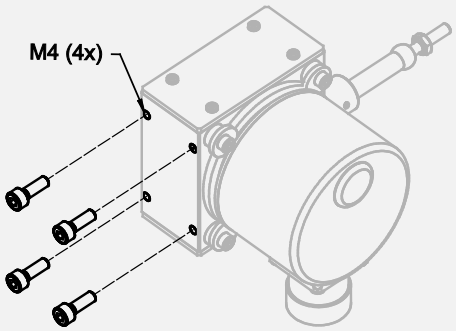
Model	Screw	Screw material	Torque [Nm]
WS10	M5, 8 mm deep	A2	2,0
WS10ZG	M5, 8 mm deep	A2	2,0
WS10SG	M5, 8 mm deep	A2	2,0

WS17KT, WS19KT, WS21



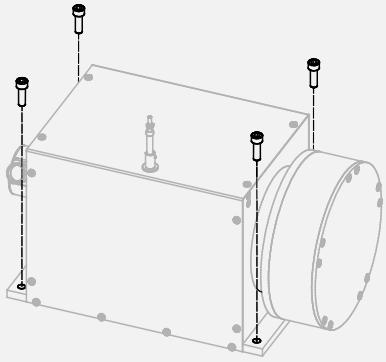
Model	Screw	Screw material	Torque [Nm]
WS17KT	M5	A2	2.5
WS19KT	M5	A2	2.5
WS21	M5	A2	2.5

WS58C



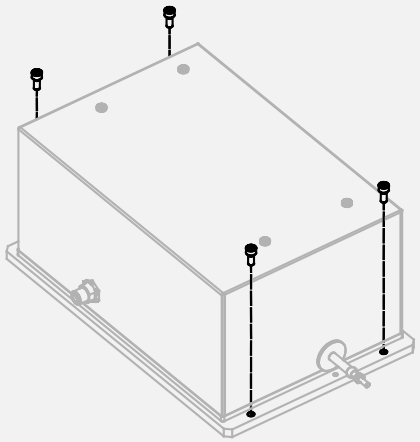
Model	Screw	Screw material	Torque [Nm]
WS58C	M4, 5 mm deep	A2	1.0

WS60



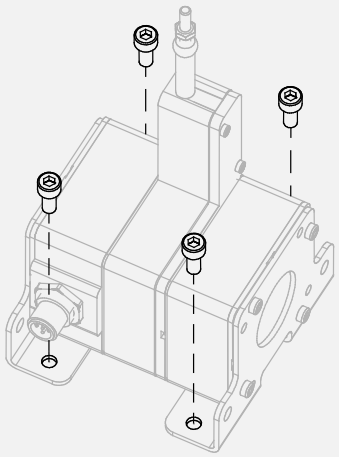
Model	Screw	Screw material	Torque [Nm]
WS60	M8	A2	10.0

WS7.5



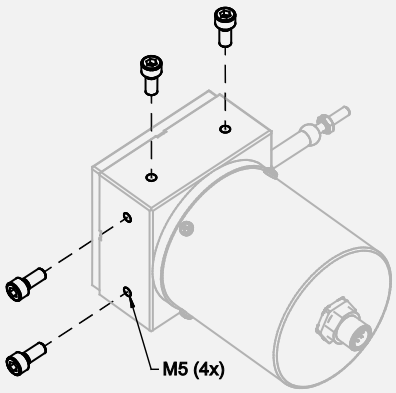
Model	Screw	Screw material	Torque [Nm]
WS7.5	M5	A2	2.5

WS61, WS85



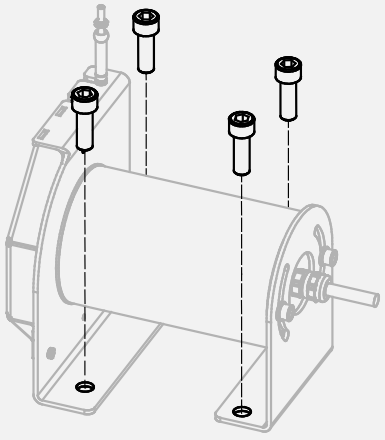
Model	Screw	Screw material	Torque [Nm]
WS61 (oval hole)	M5	A2	2.0
WS85	M6	A2	4.0
WS85 (oval hole)	M6	A2	3.0

WS12



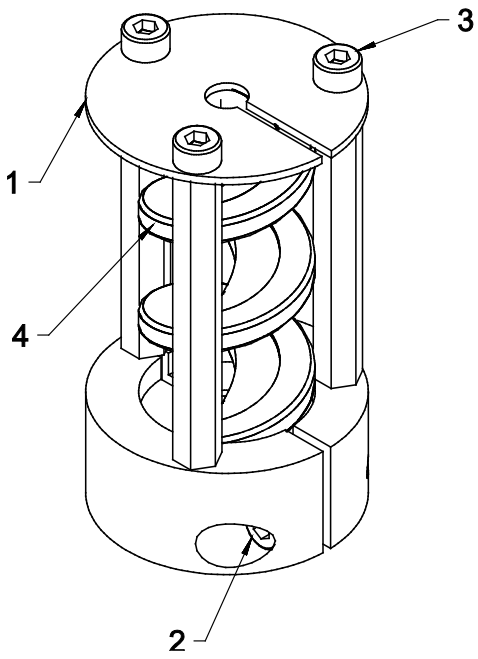
Model	Screw	Screw material	Torque [Nm]
WS12	M5, 10 mm deep	A2	2.0

WS100M



Model	Screw	Screw material	Torque [Nm]
WS100M	M10	A2	20

Cable dust wiper SAB5



Mounting:

1. Disassemble the aluminium washer (1) by removing the three M3 screws (3).
2. Remove the spiral wiper (4).
3. Fix the basic body at the cable outlet of the sensor by the set screw M3 (2).
   Make sure that the sensor measurement cable is in centric position.
4. Thread the measurement cable into the spiral wiper.
   Do not bend the measurement cable!
   Do not let the cable spring back uncontrolled!
5. Assemble the aluminium washer.

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 passing 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/M8 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:
  - M8-ASM connectors / couplings: 0.6 Nm
  - 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.

Special encoder

Special operating instructions for customized encoders must be observed.

The corresponding data sheets or encoder connection diagrams apply to output types not listed in the connection table.

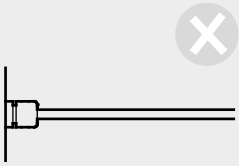
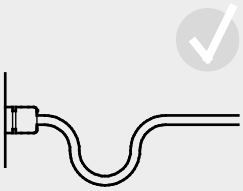
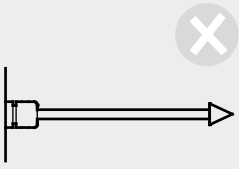
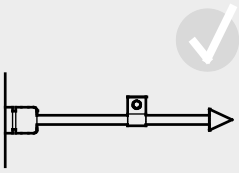
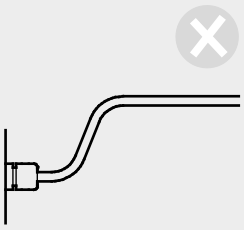
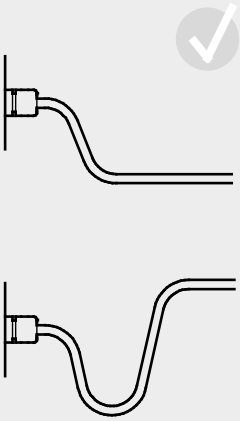
Connection example: current output 420A

To convert the 4 ... 20 mA signal into a voltage signal, it needs a load resistor R_M (measuring resistor) as shown in the diagram. The maximum value of R_M depends on the cable resistance R_L and the excitation voltage UB:

$$R_{Mmax} = ((UB – 12\ V)/0{,}02\ A) – R_L$$

With an excitation of 24 V DC and a cable resistance R_L = 500 Ω a maximum value of R_M = 100 Ω can be used (see page 55) .

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)

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® WS31 (Incremental encoder) posiwire® WS42 (Incremental encoder)	0 … +60°C
posiwire® WS31, WS31C (Potentiometer) posiwire® WS42, WS42C (Potentiometer)	-15 … +60°C
posiwire®WS10, WS10SG, WS10ZG (Incremental encoder) posiwire® WS12 (Incremental encoder)	-10 … +70°C
posiwire® WS61 posiwire® WS85 posiwire® WS21	-40 … +85°C
all other sensors	-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.

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® WS12
- posiwire® WS61
- posiwire® WS85
- posiwire® WS21

Calibration

The recommended calibration interval is 1 year.

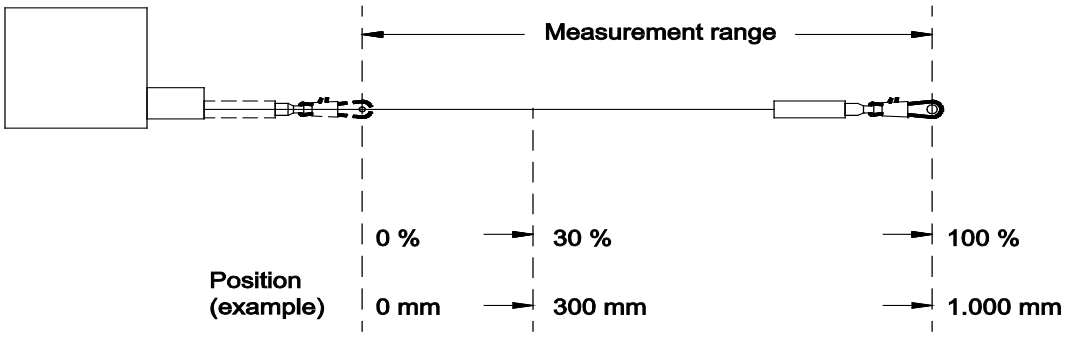
Test protocol and traceable calibration certificate (ISO9001 / ISO10012) is available on request.

4.2 Disposal

Disposal according to applicable government regulations.

5 Output specification

5.1 Measurement signal and range



Analog, potentiometric

Output: voltage divider, sensitivity not adjustable (individual sensitivity is specified on the label).

Resistance range is used from about 3% to 97%. 0% or 100% is not possible.

Position	0%	30%	100%
Measurement value	approx. 3%	approx. 30%	approx. 97%

Analog, transducer

Integrated signal conditioner, sensitivity adjusted

Measurement range corresponds to the electrical measurement range (e.g. 4...20 mA).

Position	0%	30%	100%
Measurement value (example)	4 mA	8.8 mA	20 mA

Digital incremental

Incremental encoder

Individual sensitivity is specified on the label in pulses or increments per millimeter (e.g. 10 pulses / mm).

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

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 Precision potentiometer

Voltage divider

R1K Potentiometer 	Excitation voltage	32 V DC max. at 1 kΩ (max. power 1 W)
	Potentiometer impedance	1 kΩ ±10 %
	Thermal coefficient	±25 x 10^{-6} / °C f.s.
	Sensitivity	Depends on the measuring range, individual sensitivity of the sensor is specified on the label
	Voltage divider utilization range	approx. 3 % … approx. 97 %
	Operating temperature	Refer to output specification
	EMC	DIN EN 61326-1:2013

NOTICE

The potentiometer must be connected as a voltage divider!

The sequential processing circuit has to be implemented according to the circuit scheme in the Appendix (see „Output information“)!

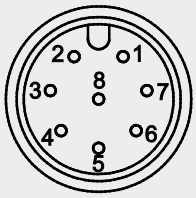
Electrical current flow impact on the wiper causes linearity errors and shortens the lifetime of the potentiometer

- The metal wiper of the potentiometer must be protected against current load

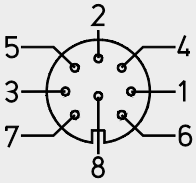
Additional information:
https://www.asm-sensor.com/en/downloads.html?file=files/asmTheme/pdf/ws_poti_technote_en.pdf

Signal wiring

Connector M12, 8 pin



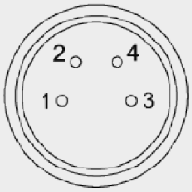
Connector DIN, 8 pin



View to the sensor connector

Output signals	Connector pin no.	Cable color
Poti +	1	white
Poti GND	2	brown
Poti slider	3	green
-	4	yellow
-	5	grey
-	6	pink
-	7	blue
-	8	red

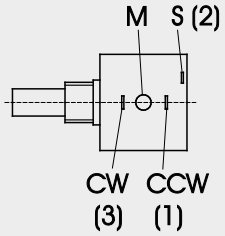
Signal wiring
Connector M8, 4 pin



(WS31C, WS42C only)
View to the sensor connector

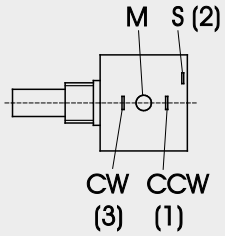
Output signals	Connector pin no.	Cable color
Poti +	1	white
Poti GND	2	brown
Poti slider	3	green
-	4	-

Signal wiring
CT-Poti / 5-Turn (WS31: 250 mm)



Output signals	Connection (Solder terminal on potentiometer)
Poti +	M
Poti GND	CW
Poti slider	S

Signal wiring WS31, WS42
Multi-Turn-Poti / 10-Turn (WS31: 500 mm, 750 mm)
(WS42: 750 mm, 1000 mm)

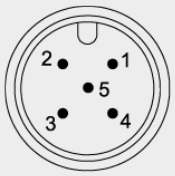


Output signals	Connection (Solder terminal on potentiometer)
Poti +	CCW
Poti GND	CW
Poti slider	S

Analog output

10V und 10V5 Voltage output	Excitation voltage	18 ... 27 V DC non stabilized
	Excitation current	20 mA max.
	Output voltage	**10V**: 0 ... 10 V DC; **10V5**: 0.5 ... 10 V DC
	Output current	2 mA max.
	Output load	> 5 kΩ
	Stability (temperature)	±50 x 10^{-6} / °C f.s.
	Protection	Reverse polarity, short circuit
	Output noise	0.5 mV_{RMS}
	Operating temperature	Refer to output specification
	EMC	DIN EN 61326-1:2013

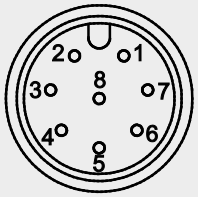
Signal wiring
Connector M12, 5 pin



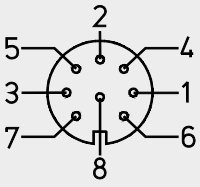
View to the soldering side of mating connector

Output signals	Connector pin no.	Cable color
Excitation +	1	brown
Signal	2	white
GND	3	blue
Not connected	4	black
Not connected	5	grey

Signal wiring
Connector M12, 8 pin



Connector D8, 8 pin



View to the soldering side of mating connector

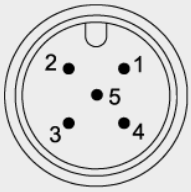
Output signals	Connector pin no.	Cable color
Excitation +	1	white
Excitation GND*	2	brown
Signal +	3	green
Signal GND*	4	yellow
Not connected	5	grey
Not connected	6	pink
Not connected	7	blue
Not connected	8	red

Check connector type:
M12: CONN-M12-8F
D8: CONN-DIN-8F

*: internally connected

420A Current output (2 wire) 	Excitation voltage	18 ... 27 V DC non stabilized, measured at the sensor terminals
	Excitation current	35 mA max.
	Output current	4 ... 20 mA equivalent for 0 ... 100 % range
	Stability (temperature)	±100 x 10^{-6} / °C f.s.
	Protection	Reversed polarity, short circuit
	Output noise	0.5 mV_{eff}
	Operating temperature	Refer to output specification
	EMC	DIN EN 61326-1:2013

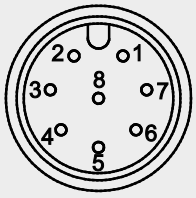
Signal wiring
Connector M12, 5 pin



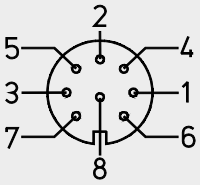
View to soldering side of mating connector

Output signals	Connector pin no.	Cable color
Signal+	1	brown
Not connected	2	white
Signal-	3	blue
Not connected	4	black
Not connected	5	grey

Signal wiring
Connector M12, 8 pin



Connector D8, 8 pin



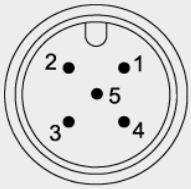
View to soldering side of mating connector

Output signals	Connector pin no.	Cable color
Signal +	1	white
Signal -	2	brown
Not connected	3	green
Not connected	4	yellow
Not connected	5	grey
Not connected	6	pink
Not connected	7	blue
Not connected	8	red

Check sensor type:
M12: CONN-M12-8F
D8: CONN-DIN-8F

420T Current output (3 wire) 	Excitation voltage	18 ... 27 V DC non stabilized
	Excitation current	40 mA max.
	Load resistor	350 Ω max.
	Output current	4 ... 20 mA equivalent for 0 ... 100 % range
	Stability (temperature)	±50 x 10^{-6} / °C f.s.
	Protection	Reverse polarity, short circuit
	Output noise	0.5 mV_{RMS}
	Operating temperature	Refer to output specification
	EMC	DIN EN 61326-1:2013

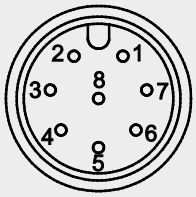
Signal wiring
Connector M12, 5 pin



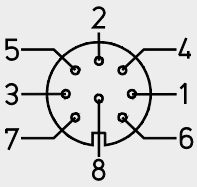
View to soldering side of mating connector

Output signals	Connector pin no.	Cable color
Excitation +	1	brown
Signal	2	white
GND	3	blue
Not connected	4	black
Not connected	5	grey

Signal wiring 8 pin
Connector M12, 8 pin



Connector D8, 8 pin



View to soldering side of mating connector

Output signals	Connector pin no.	Cable color
Excitation +	1	white
Excitation GND*	2	brown
Signal +	3	green
Signal GND*	4	yellow
Not connected	5	grey
Not connected	6	pink
Not connected	7	blue
Not connected	8	red

Check connector type:
M12: CONN-M12-8F
D8: CONN-DIN-8F

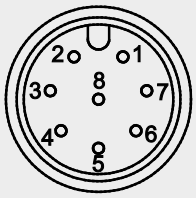
*: internally connected

PMUV Voltage output programmable **PMUI** Current output programmable 	Excitation voltage	18 … 27 V DC
	Excitation current	50 mA max.
	Voltage output **PMUV** Output current Output load	0 … 10 V 10 mA max. 1 kΩ min.
	Current output **PMUI** Working resistance	4 … 20 mA (3 wire) 500 Ω max.
	Scaling	
	Activation of offset and gain adjust	Connect with excitation GND (0 V)
	Scalable range	90 % max. f.s.
	Stability (temperature)	±50 x 10^{-6} / °C f.s.
	Operating temperature	Refer to output specification
	Protection	Reversed polarity, short circuit
	EMC	DIN EN 61326-1:2013

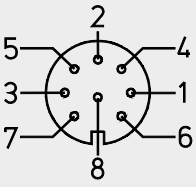
PMUV / PMUI

Signal wiring

Connector M12, 8 pin



Connector D8, 8 pin



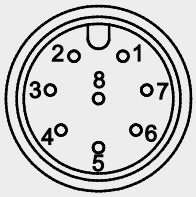
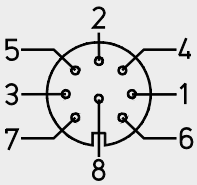
View to soldering side of mating connector

Output signals	Connector pin no.	Cable color 8 pin	Cable color 6 pin
Excitation +	1	white	white
Excitation GND*	2	brown	brown
Signal +	3	green	green
Signal GND*	4	yellow	yellow
Not connected	5	grey	-
Not connected	6	pink	-
ZERO	7	blue	grey
END	8	red	pink

Check sensor type:
M12: CONN-M12-8F
D8: CONN-DIN-8F

*: internally connected

PMUI2

Signal wiring	Output signals	Connector pin no.	Cable color
Connector M12, 8 pin	Excitation +	1	white
	Excitation GND*	2	brown
	Not connected	3	green
	Not connected	4	yellow
	Signal +	5	grey
Connector D8, 8 pin	Signal GND*	6	pink
	ZERO	7	blue
	END	8	red
View to soldering side of mating connector	Check sensor type: M12: CONN-M12-8F D8: CONN-DIN-8F		

*: internally connected

Outputs .../PMUV, PMUI, PMUI2

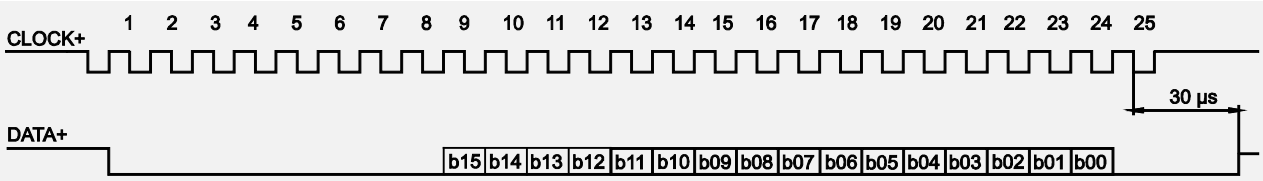
Programming of the start and end value by the customer

Teach-In of start and end value for the outputs PMUV, PMUV and PMUI2 is provided by two binary signals ZERO and END. At the start position connect signal ZERO for a short period to GND via push button. At the end position connect signal END for a short period to GND. The scaling range will be stored non-volatile. To reset the sensor to factory default both signals ZERO and END must be connected to ground while powering up the sensor.

Digital Interfaces

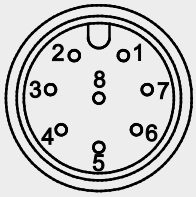
ADSI A/D converted synchronous serial	Excitation volatge	11 ... 27 V DC
	Excitation current	200 mA max.
	Interface	EIA RS422, RS485, short-circuit proof
	Clock frequency	70 ... 500 kHz
	Code	Gray-Code, continuous progression
	Delay between pulse trains	30 µs min.
	Resolution	ADSI16: 16 bit (65536 counts) f.s. ADSI14: 14 bit (16384 counts) f.s. ADSI: 12 bit (4096 counts) f.s.
	Stability (temperature)	±50 x 10^{-6} / °C f.s.
	Operating temperature	-20 ... +85 °C
	EMC	DIN EN 61326-1:2013

Data format
(train of 26 pulses)

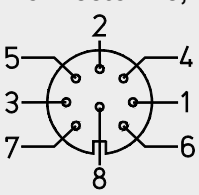


Transmission rate	Cable length	Baud rate	Note:
	< 50 m	< 300 kHz	Extension of the cable length will reduce the maximum transmission rate.
	< 100 m	< 100 kHz	

Signal wiring
Connector M12, 8 pin



Connector D8, 8 pin



View to soldering side of mating connector

Output signals	Connector pin no.	Cable color
Excitation +	1	white
Excitation GND (0 V)	2	brown
CLOCK	3	green
$\overline{\text{CLOCK}}$	4	yellow
DATA	5	grey
$\overline{\text{DATA}}$	6	pink
Not connected	7	blue
Not connected	8	red

Check sensor type:
M12: CONN-M12-8F
D8: CONN-DIN-8F

5.3 Incremental output

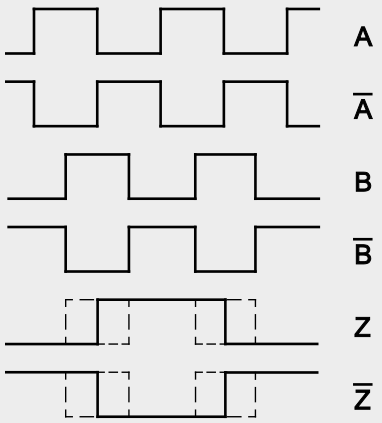
PP530 Incremental interface	Excitation voltage	5 ... 30 V DC
	Excitation current	25 mA typ. (w/o load), 200 mA max.
	Output frequency	200 kHz max.
	Output	Linedriver, Push-Pull, CMOS, TTL and HTL compatible
	Output current	30 mA max.
	Output voltage	Depends on the excitation voltage
	Saturation voltage high/low	I_a < 10 mA, U_b 5 V/24 V: < 0,5 V I_a < 30 mA, U_b 5 V/24 V: < 1 V
	Stability (temperature)	±20 x 10^{-6} / °C f.s. (sensor mechanism)
	Operation temperature	-10 … +70 °C
	Storage temperature	-30 … +80 °C
	Transition time positive edge	< 200 ns
	Transition time negative edge	< 200 ns
	Protection	Reverse polarity, short circuit *)
	EMC	DIN EN 61326-1:2013

NOTICE

***) Line driver may get damaged in case of shorted output for unlimited time**

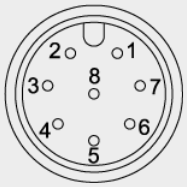
- Prevent unused output signals (e.g. A, B, Z) from unintentionally being shorted with each other or any other voltage like ground, excitation + or shield
- Isolate and secure unused output wires.

Output signals

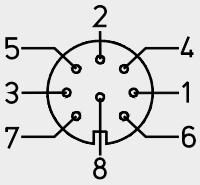


Signal wiring

Connector M12, 8 pin



Connector D8, 8 pin

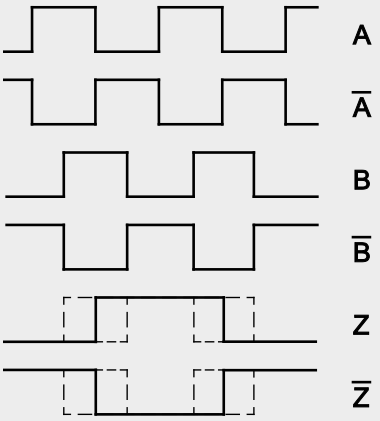


View to soldering side of mating connector

Signal	Connector pin no.	Cable color
Excitation +	1	white
Excitation GND	2	brown
Signal A	4	yellow
Signal $\overline{A}$	6	pink
Signal B (A + 90°)	3	green
Signal $\overline{B}$	5	grey
Signal Z (reference pulse)	7	blue
Signal $\overline{Z}$	8	red
Check sensor type: M12: CONN-M12-8F D8: CONN-DIN-8F		

IE24LI and IE24HI Incremental interface		**IE24LI**	**IE24HI**
	Excitation voltage	5 V DC ±10 %	10 … 30 V DC
	Excitation current	100 mA max.	
	Output frequency	200 kHz max.	
	Output	Push-Pull and inverted signals	
	Output current	10 mA max.	
	Output voltage	Depending on the excitation voltage	
	Stability (temperature)	±20 x 10^{-6} / °C f.s. (sensor mechanism)	
	Operating temperature	Refer to output specification of the sensor	
	Protection	Short circuit	
	EMC	DIN EN 61326-1:2013	

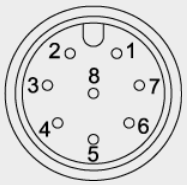
Output signals



Signal wiring	**Output signals**	**Cable color**
	Excitation +	brown
	Excitation GND	white
	Signal A	green
	Signal $\overline{A}$	yellow
	Signal B (A + 90°)	grey
	Signal $\overline{B}$	pink
	Signal Z (reference pulse)	blue
	Signal $\overline{Z}$	red

IE41LI and IE41HI Incremental interface		**IE41LI**	**IE41HI**
	Excitation voltage	5 V DC ±10 %	10 … 30 V DC
	Excitation current	150 mA max. (w/o load)	
	Output frequency	300 kHz max.	200 kHz max.
	Output	RS422	Push-pull antivalent
	Output current	±30 mA max.	30 mA
	Output voltage	Depending on the excitation voltage	
	Stability (temperature)	±20 x 10^{-6} / °C f.s. (sensor mechanism)	
	Operating temperature	-10 … +70 °C	
	Protection against short circuit	One channel for 1 s	yes
	EMC	DIN EN 61326-1:2013	

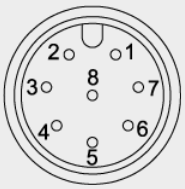
Signal wiring WS10
Connector M12, 8 pin



View to the sensor connector

Output signals	**Connector pin no.**	**Cable color**
Excitation +	1	white
Excitation GND	2	brown
Signal A	4	yellow
Signal $\overline{A}$	6	pink
Signal B (A + 90°)	3	green
Signal $\overline{B}$	5	grey
Signal Z (reference pulse)	7	blue
Signal $\overline{Z}$	8	red

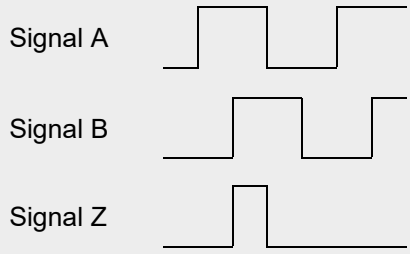
Signal wiring WS12
Connector M12, 8 pin



View to the sensor connector

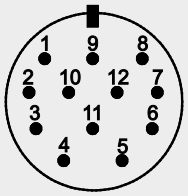
Output signals	**Connector pin no.**	**Cable color**
Excitation +	1	white
Excitation GND	2	brown
Signal A	3	green
Signal $\overline{A}$	5	grey
Signal B (A + 90°)	4	yellow
Signal $\overline{B}$	6	pink
Signal Z (reference pulse)	7	blue
Signal $\overline{Z}$	8	red

Output signals



LD5VC Incremental interface		
	Excitation voltage	5 V DC ±10 %
	Excitation current	150 mA max. w/o load
	Interface	Line driver RS422
	Output frequency	300 kHz max.
	Output current	20 mA per channel
	Signal level	
	U_d High bei I_d = 20 mA	≥ 2.5 V
	U_d Low bei I_d = 20 mA	≥ 0.5 V
	Transition time positive edge	< 100 ns
	Transition time negative edge	< 100 ns
	Stability (temperature)	±20 x 10^{-6} / °C f.s. (sensor-mechanism)
	Operation temperature	-20 … +85 °C
	Protection	Short circuit, overvoltage
	EMC	DIN EN 61326-1:2013

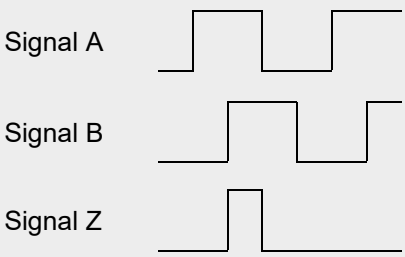
Signal wiring
CONN-CONIN-12F-G



View to soldering side of mating connector

Output signals	**Connector pin no.**	**Cable color**
Excitation +	12	white
Excitation GND	10	brown
Signal A	5	yellow
Signal $\overline{A}$	6	pink
Signal B (A + 90°)	8	green
Signal $\overline{B}$	1	grey
Signal Z (reference pulse)	3	blue
Signal $\overline{Z}$	4	red
Fault detection signal	7	-
Shield	housing	-

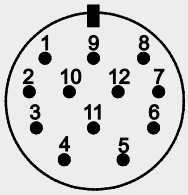
Output signals



PP24VC
Incremental interface

Excitation voltage	10 ... 30 V DC
Excitation current	150 mA max. w/o load
Interface	Push-pull line driver (24 V-HTL)
Output frequency	300 kHz max.
Output current	100 mA per channel
Signal level	
Ud High at Id = 20 mA, Ub = 24 V	≥ 21 V
Ud Low at Id = 20 mA, Ub = 24 V	≥ 2.8 V
Transition time positive edge	< 200 ns
Transition time negative edge	< 200 ns
Stability (temperature)	±20 x 10-6 / °C f.s. (sensor mechanism)
Operating temperature	Refer to output specification
Protection	Reverse polarity, short circuit, overvoltage
EMC	DIN EN 61326-1:2013

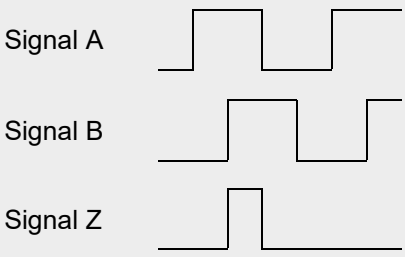
Signal wiring
CONN-CONIN-12F-G



View to soldering side of mating connector

Output signals	Connector pin no.	Cable color
Excitation +	12	white
Excitation GND	10	brown
Signal A	5	yellow
Signal $\overline{A}$	6	pink
Signal B (A + 90°)	8	green
Signal $\overline{B}$	1	grey
Signal Z (reference pulse)	3	blue
Signal $\overline{Z}$	4	red
Fault detection signal	7	-
Shield	housing	-

Output signals

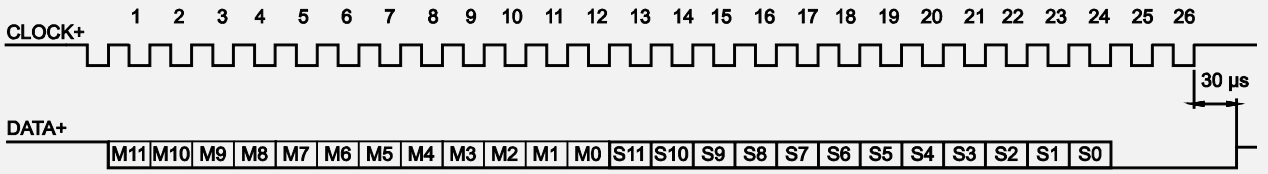


5.4 Absolute encoder output

Digital interfaces

HSSI synchronous serial	Excitation voltage	10 … 30 V DC
	Excitation current	100 mA
	Interface	Standard-SSI
	Lines / drivers	Clock and data / RS422
	Code	Gray
	Resolution	12 + 12 bit
	3 dB cutoff frequency	500 kHz
	Control input	$\overline{\text{DIRECTION}}$
	Preset key	Zero adjustment with optical response
	Alarm output	Alarm bit (SSI option), warning bit
	Status LED	Green = OK, red = alarm
	Connection	12 pin male socket

Data format



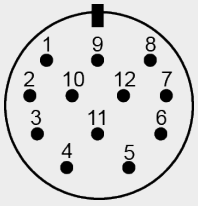
(Mx = Multiturn bits, Sx = Singleturn bits)

Transmission rate

Cable length	Baud rate
< 50 m	< 400 kHz
< 100 m	< 300 kHz
< 200 m	< 200 kHz
< 400 m	< 100 kHz

Note:
Extension of the cable length will reduce the maximum transmission rate.

Signal wiring
CONN-CONIN-12F-G



View to the sensor connector

Signal	Connector pin no.	Cable color
Excitation +	8	white
Excitation GND	1	brown
CLOCK	3	yellow
$\overline{\text{CLOCK}}$	11	green
DATA	2	pink
$\overline{\text{DATA}}$	10	grey
Direction*	5	blue
0 V Signal output	12	black

* unconnected or Excitation + = cw increasing code
0 V = cw decreasing code

HPROF Profibus	Interface	RS485
	Excitation voltage	10 ... 30 V DC
	Excitation current	250 mA
	Protocol	Profibus DP with encoder profile C2
	Resolution	12 (10 ... 14) + 12 bit
	Output code	Binary
	Baud rate	Automatically selected between 9,6 kBaud and 12 MBaud
	Programmability	Resolution, preset, direction
	Integrated special functions	Velocity, acceleration, operating time
	Bus terminating resistor	Selectable via DIP switch
	Connection	Bus cover with T manifold
	EMC	Din EN 61326: Class A

Signal wiring	**Output signals**	**Cable terminal no. (bus cover)**
	U_b in	1
	0 V in	2
	U_B out	3
	0 V out	4
	B in	5
	A in	6
	B out	7
	A out	8

HPROF – Set up

Download

- A GSD manual and a GSD file for this interface can be downloaded from the ASM website:

https://www.asm-sensor.com/en/support.html?file=files/asmTheme/pdf/hprof_de_en.zip

HINT Interbus  	Interface	Interbus, ENCOM profile K3 (configurable), K2
	Excitation voltage	10 ... 30 V DC
	Excitation current	250 mA
	Output code	32 Bit binary
	Baud rate	500 kBaud
	Data refresh	Every 600 µs
	Resoution	12 (10 ... 14) + 12 bit
	Programmability	Direction, preset, offset, resolution
	Connection	Bus cover with T manifold
	EMC	DIN EN 61326-1:2013

Data format K2 / K3					
	Differential signals (RS485) ENCOM profile K3, K2, 32 Bit, binary process data				
DÜ-Format	Sµpi-Adresse	0	1	2	3
(according to the Phoenix company)	Byte no.	3	2	1	0
ID-Code K2	36H (=54 dez.)				
ID-Code K3	37H (=55 dez.)				

Signal wiring	**Output signals**	**Cable terminal no. (bus cover)**
	U_b +	1
	GND	2
	DI1	4
	$\overline{DI1}$	6
	D01	3
	$\overline{D01}$	5
	D02	7
	$\overline{D02}$	8
	DI2	9
	$\overline{D02}$	10
	RBST	11
	GND	12

HDEV DeviceNet 	Interface	CAN highspeed according to ISO/DIS 11898 CAN specification 2.0 A (11 bit identifier)
	Excitation voltage	10 ... 30 V DC
	Excitation current	250 mA
	Protocol	DeviceNet according rev. 2.0, programmable encoder
	Resolution	12 (10 ... 14) + 12 bit
	Output code	Binary
	MAC-ID	Selectable via DIP switch
	Date refresh	Every 5 ms
	Baud rate	Selectable via DIP switch: 125 kBaud, 250 kBaud, 500 kBaud
	Programmability	Resolution, preset, direction
	Bus terminating resistor	Selectable via DIP switch
	Connection	Bus cover with T manifold
	EMC	DIN EN 61326-1:2013

Recommended transmission

Characteristic impedance	135 … 165 Ω (3 … 20 MHz)
Operating capacity	< 30 pF
Loop resistance	< 110 Ω/km
Wire diameter	> 0.63 mm
Wire width	> 0.34 mm^2

Transmission rate

Segment length	**Kbit/s**
500 m	125
250 m	250
100 m	500

Signal wiring	**Output signals**	**Cable terminal no. (bus cover)**
	U_b in	1
	0 V in	2
	CAN-L	3
	CAN-H	4
	Drain	5
	Drain	6
	CAN-H	7
	CAN-L	8
	0 V out	9
	U_b out	10

HDEV – Set up

Download

- An EDS manual and an EDS file for this interface can be downloaded from the ASM website:

https://www.asm-sensor.com/it/support.html?file=files/asmTheme/pdf/hdev_de_en.zip

HCAN / HCANOP CANopen / CAN Layer 2  	Interface	CAN highspeed according to ISO/DIS 11898
	Excitation voltage	10 ... 30 V DC
	Excitation current	250 mA
	Protocol	CANopen according DS301 with encoder profile DSP406, programmable encoder according class C2
	Resolution	12 (10 ... 14) + 12 bit
	Output code	Binary
	Data refresh	Every millisecond (selectable), on request
	Baud rate	Selectable 10 up to 1000 kbit/s
	Base identifier	Selectable via DIP switch
	Programmability	CANopen: direction, resolution, preset, offset CAN L2: direction, limit values
	Integrated special functions	CANopen: velocity, acceleration, rotary axis, limit values CAN L2: direction, limit values
	Connection	Bus cover with T manifold
	EMC	DIN EN 61326-1:2013

Signal wiring	**Output signals**	**Cable terminal no. (bus cover)**
	U_b in	1
	0 V in	2
	CAN in – (dominant L)	3
	CAN in + (dominant H)	4
	CAN GND in	5
	CAN GND out	6
	CAN out + (dominant H)	7
	CAN out – (dominant L)	8
	0 V out	9
	U_b out	10

HCAN / HCANOP – Set up

Download

- An EDS manual and an EDS file for this interface can be downloaded from the ASM website:

https://www.asm-sensor.com/en/support.html?file=files/asmTheme/pdf/hcanop_de_en.zip

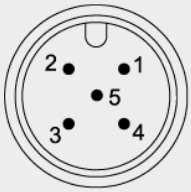
5.5 Magnetic encoder

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

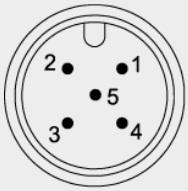
Signal wiring **Connector M12, 5 pin**	**Output signals**	**Connector pin no.**	**Cable color**
 View to the sensor connector	Excitation +	1	brown
	Signal	2	white
	GND	3	blue
	Do not connect!	4	black
	Do not connect!	5	(grey)

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.

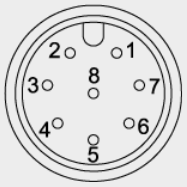
To reset the sensor to factory default ZERO/END must be connected to ground while powering up the sensor for 2 … 3 seconds.

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

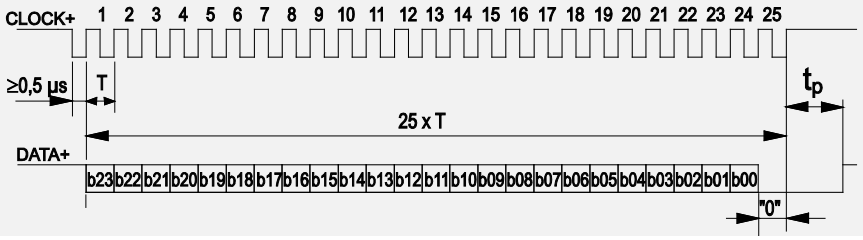
I1R Current output 4 … 20 mA, 3 wires 	Excitation voltage	8 … 36 V DC
	Excitation current	36 mA typical at 24 V DC 76 mA typical at 12 V DC max. 120 mA per channel
	Load R_L	500 Ω max.
	Output current	4 … 20 mA
	Measuring rate	1 kHz standard
	Stability (temperature)	±50 x 10^{-6} / °C f.s. (typical)
	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**	**Channel**	**Output signals**	**Connector pin no.**	**Cable color**
 View to the sensor connector	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

Digital interfaces

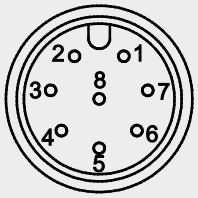
MSSI Synchronous serial SSI SSI	Interface	EIA RS-422
	Excitation voltage	8 ... 36 V DC
	Excitation current	19 mA typical at 24 V DC 35 mA typical at 12 V DC max. 80 mA
	Clock frequency	100 kHz ... 500 kHz
	Code	Gray-Code, continuous progression
	Delay between pulse trains (t_p)	30 µs min.
	Stability (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



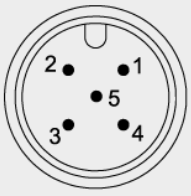
View to the sensor connector

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	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

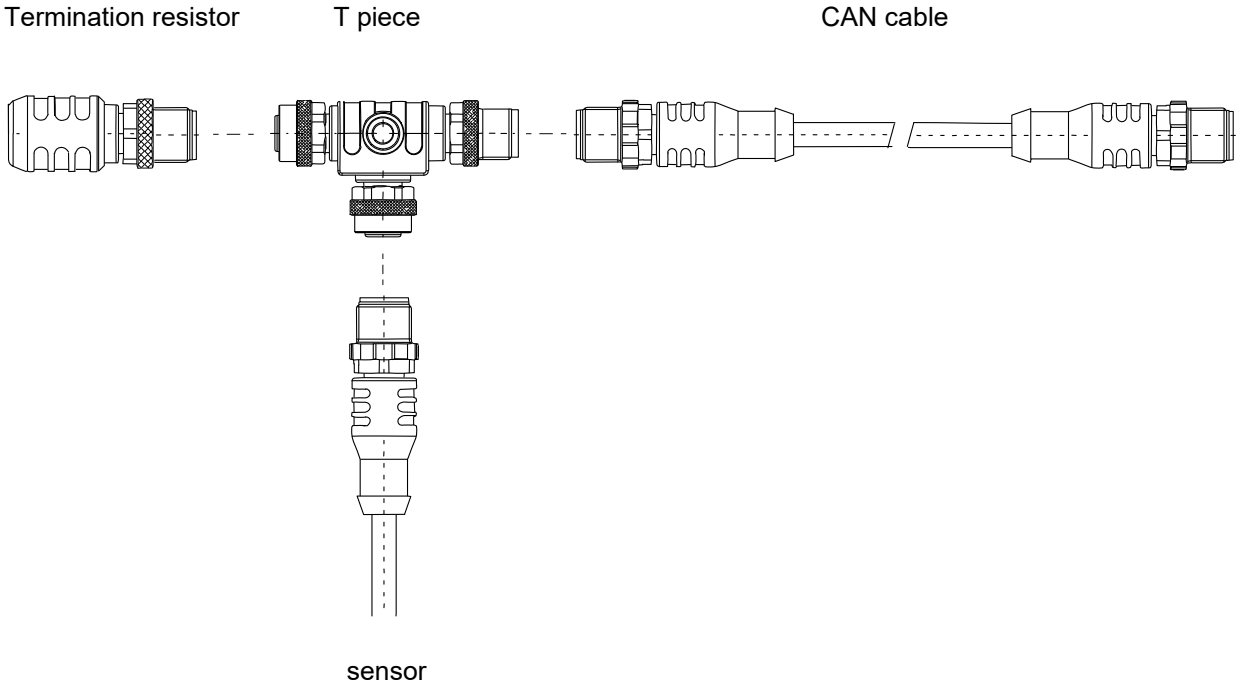
⚠ WARNING

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!

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.

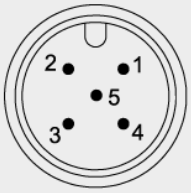


MCANJ1939 SAE J1939 	CAN Specification	ISO 11898, Basic and Full CAN 2.0 B	
	Transceiver	24V-compliant, not isolated	
	Communication profile	SAE J1939	
	Baud Rate	250 kbit/s	
	Internal termination resistor	120 Ω adjustable by the customer	
	Address	Default 247d, configurable	

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

- 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 due to unexpected machine movement

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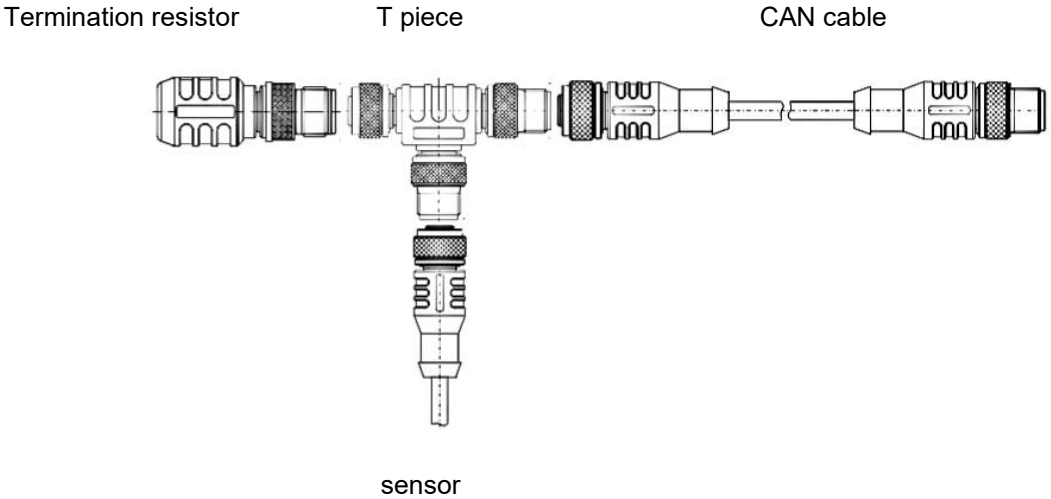
- Changing parameters may cause unexpected machine movement.
- Changing parameters may influence dependent parameters e.g. changing the resolution may have influence on position of CAM switches.
- Precautions have to be taken to avoid damage to human and machine parts!

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.



5.6 Output information

Voltage divider R1K

Potentiometer

NOTICE

Electrical current flow impact on the wiper causes linearity errors and shortens the lifetime of the potentiometer

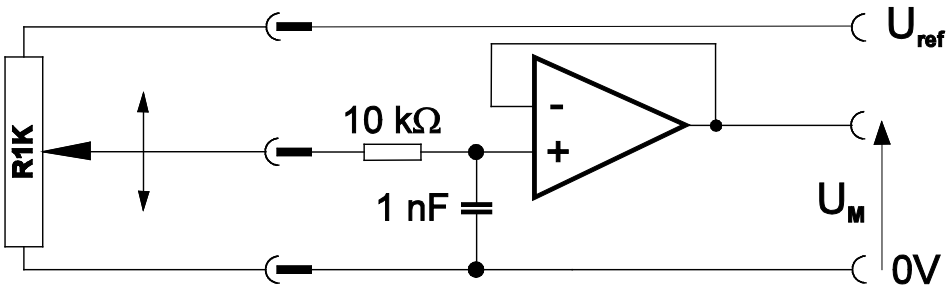
- The metal wiper of the potentiometer must be protected against current load!

Additional information:

https://www.asm-sensor.com/en/downloads.html?file=files/asmTheme/pdf/ws_poti_technote_en.pdf

The output signal is the ratiometric voltage of a potentiometer. The potentiometer is supplied by a reference voltage source. The ratio of the output signal to the reference voltage is proportional to the measuring cable extension. For optimum performance of the sensor 94% (3% to 97%) of the potentiometers total span is used for the specified measurement range. Provision for setting the electrical zero and voltage amplification must be made in the subsequent signal processing circuit.

Suggested output circuit

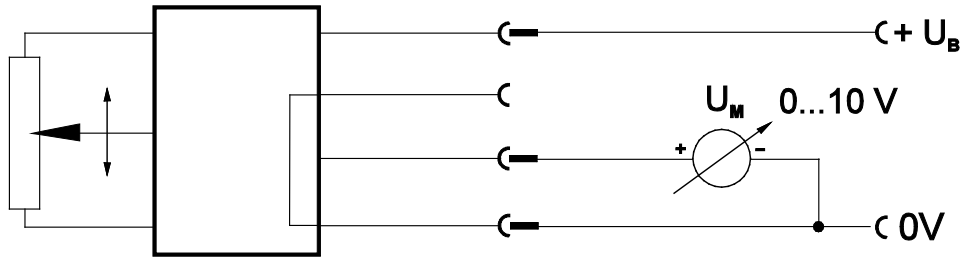


Voltage output 10V

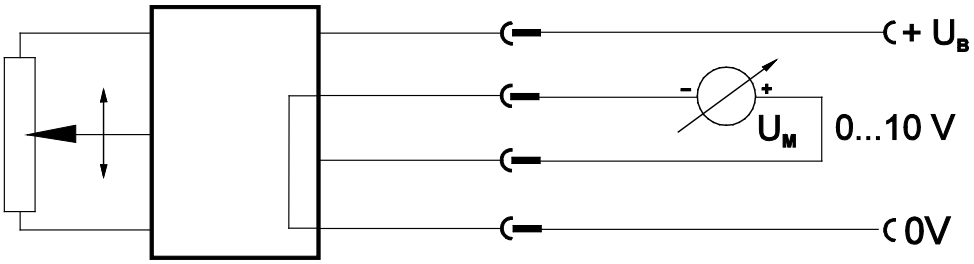
0 … 10 V

This output signal is 0 to 10 Volts proportional to the measuring cable extension of 0 to 100%. This is an industry standard output which is widely accepted because of its simple signal processing and suitability for all display, recording and automation systems. For analog signal processing the voltage output is the proven best choice, e.g. for Waveform Analyzers, Data Loggers and for analog and digital Oscilloscopes. ASM´s 0...10 V output supports a wide range of excitation voltages and is well protected against electromagnetic interference.

Suggested output circuit



3 wire



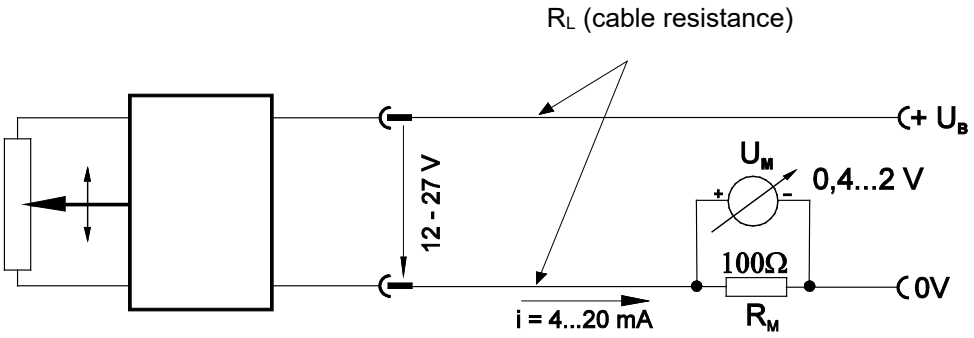
4 wire

Current output 420A

4 … 20 mA (2 wire)

This output signal is a 4 to 20 mA current loop proportional to the measuring cable extension of 0 to 100%. It is an industry standard two-wire system for the transmission of measured values. The current loop is both measurement signal and sensor excitation current. The measured value is represented as a voltage drop across a load resistor R_M. The current is constant and the signal cable resistance (R_L) will have no effect on the measured value. Therefore long signal cables can be used, limited only by the cable resistance (impedance). Signal cable disconnection or failure can be detected by a 0 mA current signal.

Suggested output circuit

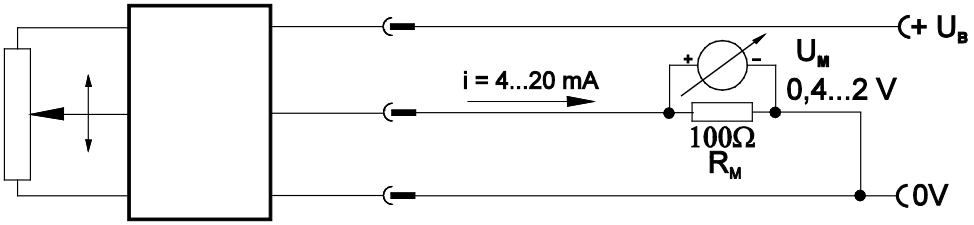


Current output 420T

4 … 20 mA (3 wire)

This output signal is a 4 to 20 mA current loop (alternatively 0 to 20 mA) proportional to the measuring cable extension of 0 to 100%. The 3 wire current loop system is especially resistant to electromagnetic interference because of the separate sensor excitation and the low resistance (impedance) of the signal processing electronics. As in the two-wire system the measured value is represented as a voltage drop across a load resistor R_M and is, within limits, independent of the cable resistance (impedance).

Suggested output circuit



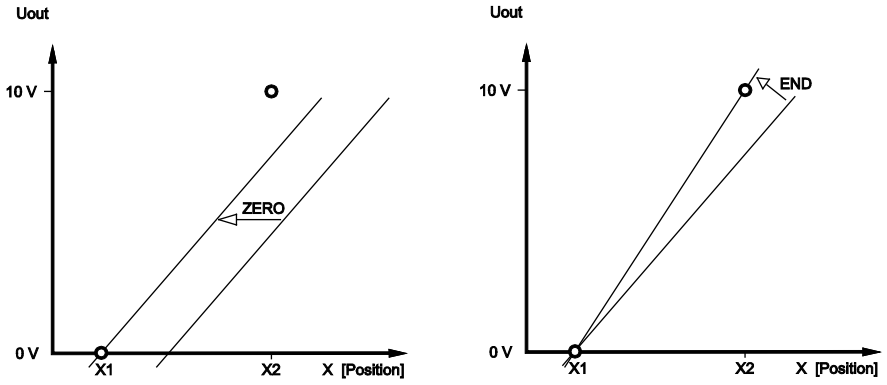
Output PMUV / PMUI, adjustable

Programming of the start and end value by the customer

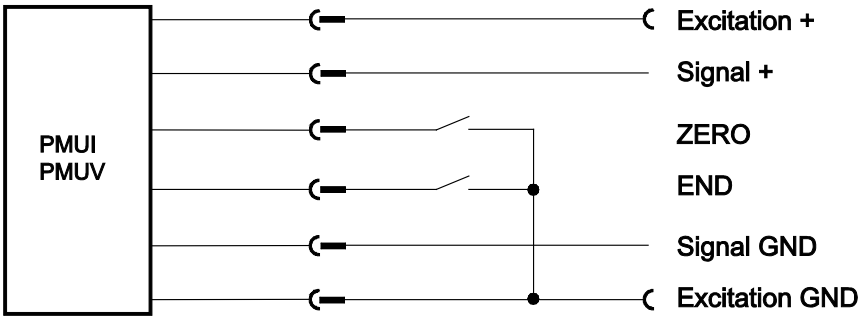
Voltage output
Current output

Teach-In of start and end value for the outputs PMUV, PMUI and PMUI2 is provided by two binary signals ZERO and END. At the start position connect signal ZERO for a short period to GND via push button. At the end position connect signal END for a short period to GND. The scaling range will be stored non-volatile. To reset the sensor to factory default both signals ZERO and SPAN must be connected to ground while powering up the sensor.

Adjustment of the -minimum and -maximum value



PMUV / PMUI (Two-wire programming)



Interfaces ADSI, IExxLI and IExxHI

ADSI

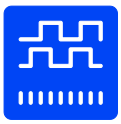
A/D converted synchronous serial output

The sensing device of the ADSI16 is a precision potentiometer. The position information is given by the analog/digital converter output as a data word. The data transmission takes place by means of the signals CLOCK and DATA. The processing unit (PLC, Microcomputer) sends pulse sequences which clock the data transmission at the required transfer rate. With the first falling edge of a pulse sequence the position of the sensor is recorded and stored. The following rising edges control the bit-by-bit A/D conversion, encoding and output of the data word. After a delay time the next new position information will be transmitted.

ADSI is the cost-effective solution where a synchronous serial interface with a high transmission rate is required. It can be connected to all automation systems with SSI input circuits.

Interface IExxLI and IExxHI

Incremental output



The cable extension is measured and incrementally transmitted as a sequence of square pulses. Output signals A, B in quadrature format are provided. After switching on the power the signal processing circuit can be synchronized by a periodic index (reference) pulse Z and/or a reference switch placed along the measurement range of the sensor. Because of the direct digitising and the delay-free transmission of the measured value this output is particularly good for positioning applications with high resolution requirements. Depending on the excitation voltage the output levels are compatible with TTL/RS-422 or HTL.

Reliability Characteristics

Models with magnetic encoder	**WS7.5, WS10, WS12, WS61, WS85, WS21, WS100M**	
Output	**single-channel (with magnetic encoder)**	
	U2	Voltage output 0.5 ... 10 V
	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 (with magnetic encoder)	
	U2R	Voltage output 0.5 ... 10 V, redundant
	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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