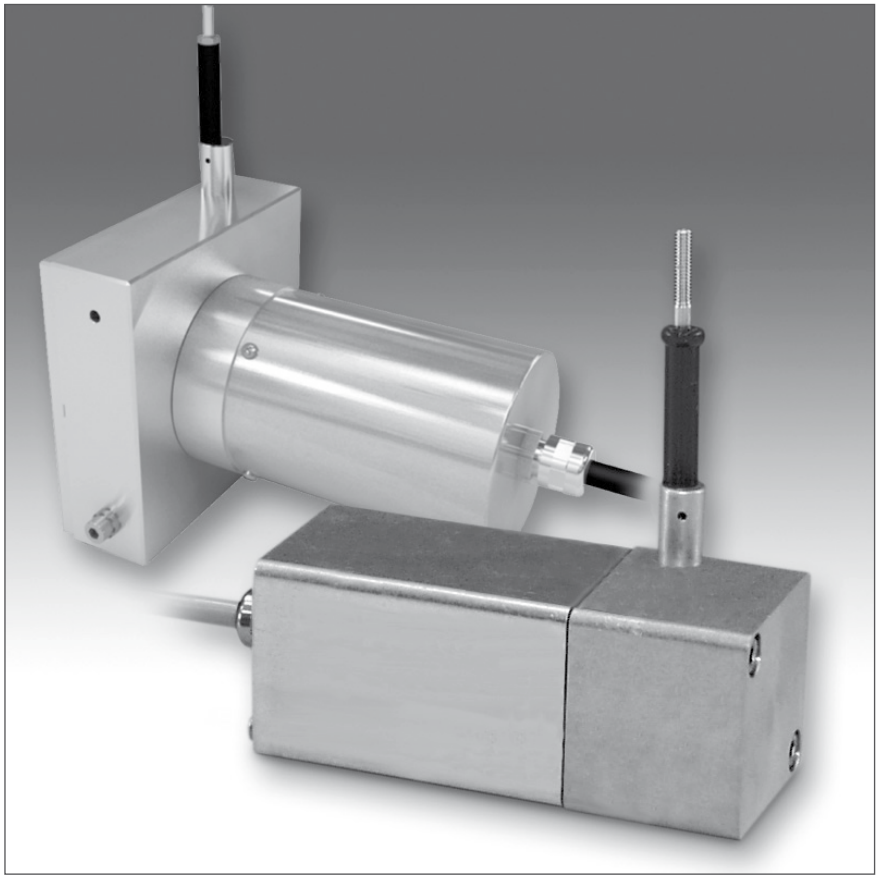
ASM®

POSIWIRE® Ex

Position Sensors

WS10EX, WS12EX

Installation and operation manual



Please read carefully before installation and operation!
Save these instructions for future reference.

POSIWIRE® EX
Installation and operation manual

Contents

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Marking

Marker:

WS10EX **II 3D Ex tc IIIC T80°C Dc X**

WS12EX **II 3D Ex tc IIIC T80°C Dc**

II = Equipment Category II
3 = Danger Category 3
D = applicable in Zone 22; D = dust
tc = Protection by enclosure: dust, zone 22
IIIC = conductive dust
T80°C = The maximum allowed housing temperature is 80 °C (+176 °F)
X = Tested with low impact energy 4 J

Ambient temperature: -20 °C … +40 °C
-4 °F … +104 °F

Year of construction: 2016

Explanation of used safety signs and signal words

WARNING, Risk of Injury:
Indicates a potentially hazardous situation, which, if not avoided, could 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.

Safety instructions

If total failure or malfunction of the sensor can cause danger or injury to the operator or damage to the machinery or equipment it is recommended that additional safety measures should be incorporated into the system.

DANGER

Any alteration, reconstruction or extension of the sensor is not allowed.

Sensor must be operated only within values specified in the datasheet.

Connection to power supply must be performed in accordance with safety instructions for electrical facilities and performed only by trained staff.

Do not connect or disconnect the sensor under tension!

Disregard of this advice can lead to malfunctions, damage to property or personal injury and releases the manufacturer from product liability.

CAUTION

Do not open sensor
- Release of spring under tension can result in injury!

Do not let snap the cable
- Uncontrolled cable retraction can break off cable fixing (cable clip or M4 connection). Broken cable fixing and cable can result in injury. Also sensor will be damaged!

Do not travel over range
- Uncontrolled cable retraction can result in injury. Also sensor will be damaged!

NOTICE

Do not exceed maximum operating voltage listed in the catalog
- Risk of injury. Sensor will be damaged!

Avoid shocks to sensor case
- Sensor may be damaged!

Intended use

The cable extension sensor was intended for linear position measurement via the extension of the measurement cable, when used in the properly rated ambient explosive atmospheric conditions for which the sensor is designated.

Unintended use

The unintended use is when the application has an explosive gas atmosphere or higher explosive dust atmosphere that requires a higher rated device.

Do not use the sensor in the following environmental conditions:
- abrasive dust e.g. dust including metal or metaloxid, stone dust, glas dust, ceramic dust
- corrosive and aggressive media e.g. atmosphere with content of chloride.

Usage and Description

The purpose of position sensors is to transform position of a linear and guided movement into an electrical signal. Specifications of measuring range, environment, handling and connections as specified in the catalog, must be followed.
The catalog is part of this instruction manual. If the catalog is not available it may be requested by stating the respective model number.

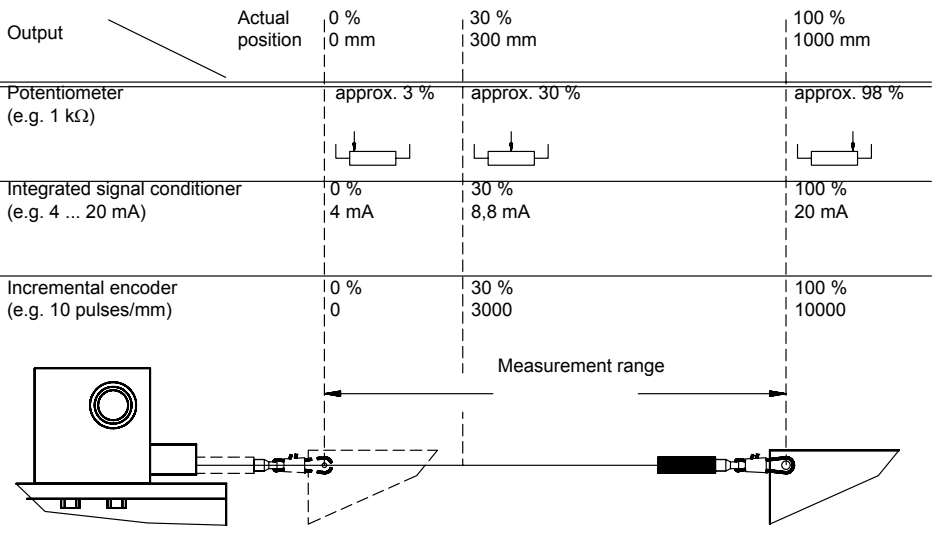
The Operating Principle

Linear motion of the measuring cable (flexible stainless steel) is converted into rotation by means of a precision cable drum. A spring motor provides torque for the cable retraction. Special design assures precise and reproducible winding of the measuring cable.
Cable extraction or retraction is transformed into an electrical signal. Depending on application different sensing elements are used.
Optional: Subsequent signal conditioners convert the signal of the sensing element into voltage, current, or digital pulses suitable for standard interfaces.

Measurement Signal and Range

Measurement signal:

Analog, not adjusted Potentiometer Sensitivity not adjustable	Resistance range is used from about 3% to 98%. 0% or 100% are not possible. Individual sensitivity is specified on the label.
Analog, adjusted Integrated signal conditioner Sensitivity adjusted	Measuring range corresponds to the electrical measuring range (e.g. 4 ... 20 mA).



Option cable dust wiper SAB2

A seal which minimizes the ingress of dust into the sensor.

Delivery/ Shipment

Unpacking	Do not unpack sensor by pulling cable or cable clip.
Shipment damages	Check sensor immediately for shipping damage.

In case of any damage or equipment not operating appropiately, please contact supplier or ASM GmbH Moosinning. To avoid shipment damages, use original protection facilities and original packing for further shipment.

Return consignment

Return consignment for calibration or repair: only with the RMA number (Return Material Authorization). Please contact ASM and request the RMA number:

ASM Automation Sensorik Messtechnik GmbH
Service&Repair

Am Bleichbach 18-24
D-85452 Moosinning

Tel. +49 8123 986-0
Fax +49 8123 986-500

service@asm-sensor.de
www.asm-sensor.com

Installation

DANGER

Explosion Risk!
Installation may only be performed when no explosive atmospheric conditions are present.

General information

- **Install the sensor according to the specifications of the manufacturer and the valid standards and directives**
- **Please note the installation and safety instructions of the instruction and reference manual**
- **Do not operate the sensor outside of the electrical, mechanical and thermal parameters**
- **Crossing the dew point must be avoided**
- **During installation no explosive atmosphere may be present**

WARNING

Cable shall be properly secured and protected against damage.
Cable shall be protected from UV-radiation!
Installation according to DIN EN 60079-14.
Dust deposits are to be avoided!
Do not mount the sensor in the dust particle stream!
Protect the sensor against damage!
The housings have been examined with the impact energy DIN EN 60079-1 for WS10EX: 4 Joules, WS12EX: 7 Joules.
The sensor, the wire shield and the wire must be connected to the local potential equalizer.
The connection cross-section of the sensor must be at least 4 mm².

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Installation

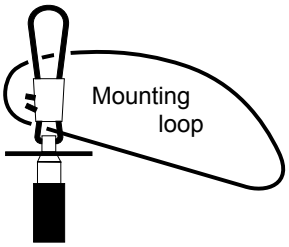
Measuring cable

Do not damage cable!
Cable must not be oiled or lubricated!
Do not snap cable!
Do not travel over range!
Do not kink cable!
Cable travel should be axial to the cable outlet
- no misalignment allowed!
Do not drag cable along objects!

Precautions

Do not let snap the cable fixing clip

Uncontrolled retraction of cable may damage sensor.
No warranty will be granted for snapped cables.



Mounting hints for unfavourable conditions

If possible fasten cable fixing with cable in retracted position.
For example, fit a mounting loop (see diagram) and put it around your wrist.
Do not remove the mounting loop before the cable ist fastened.
The cable clip may be opened for easy attachment.

Mounting

To ensure proper operation, install the sensor only as described in this manual.

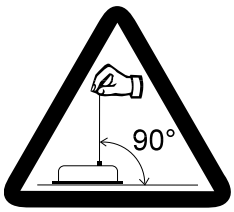
Installation position

Covered or shielded travel of cable is preferred.	This prevents cable from damage, soiling and manipulation.
Cable outlet is preferred pointing downwards.	Soaking of liquids into the cable outlet is impossible, concentration of condensing water will be avoided.
Fit sensor on plain base or use three-point mounting on uneven surfaces.	This prevents sensor from bending and damage.

Installation

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 cable travel axial to the cable outlet is not possible, the cable guide wheel SR2 (accessories) must be used in order to turn the cable.

For special applications extension cables with clips on both ends are available.

Fitting the sensor
Depending upon the sensor model, drillings in the base plate, threads or T-slots in the sensor housing enable attachment of the sensor. Dimensions required are listed in the catalog.

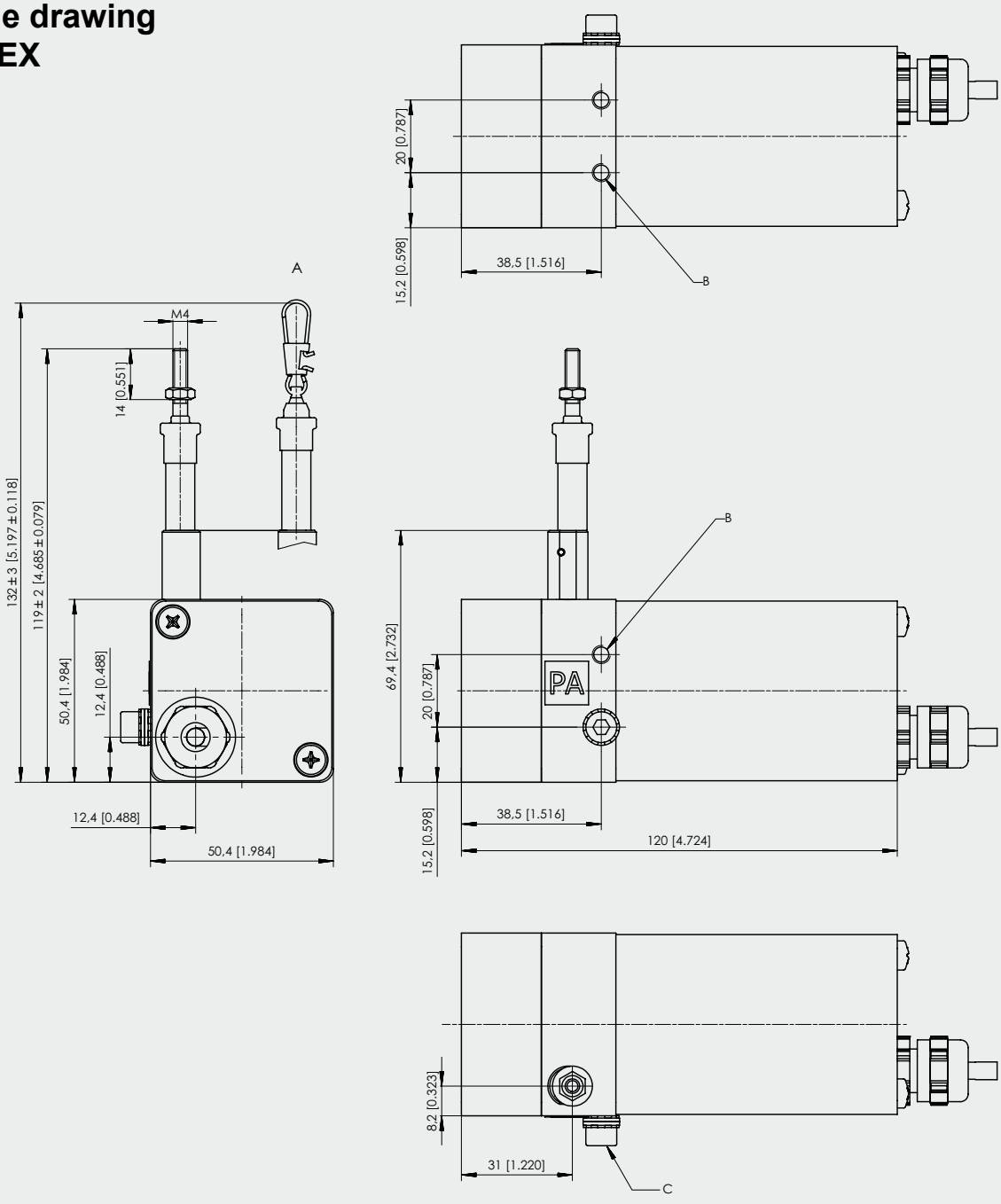
Cable attachment device
For fastening the cable clip SB0 the following solutions are available. For example:

a) Set screw M5: (Allen screw)	Standard fixing.
b) Attachment head GK1/GK2: (accessory)	Fast cable attachment, easy to remove.
c) Magnetic clamp MAG1: (accessory)	An easy way to fasten the cable to ferromagnetic materials.

The mounting of the M4 connection is made with a through hole and a M4 nut. Note: Do not screw the M4 connection itself into a stationary object, otherwise the measuring cable will be twisted!

Cable clip attachment
When fastening the cable clip take notice of the chapter *Installation / Precautions* (page 9).

Outline drawing WS10EX

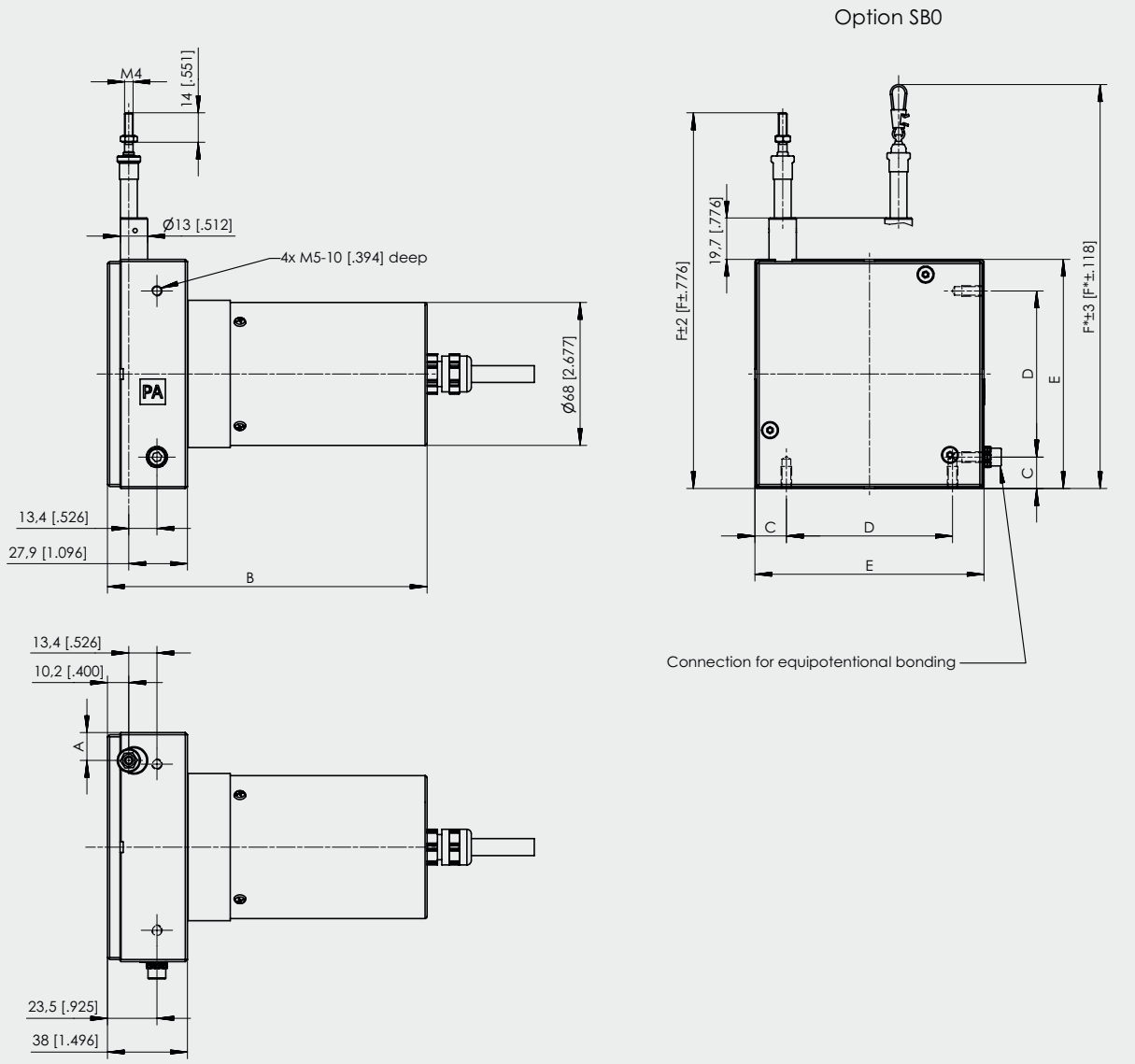


A – Optional cable clip SB0
B – M5 - 8 [.315] deep
C – Connection for potential equalization

Dimensions in mm [inch]

Model	Screw	Material	Torque [Nm]
WS10EX	M5, 8 mm deep	A2	2.0

Outline drawing
WS12EX



Dimensions in mm [inch]

Model	Screw	Material	Torque [Nm]
WS12EX	M5, 10 mm deep	A2	2.0

Dimensions in mm

Range	A	B	C	D	E	F	F*
100; 500; 1000	18.3	137	14	43	71	141	154
125; 1250	14.5	137	14	43	71	141	154
1500	10.7	152	14	43	71	141	154
2000	21.5	152	15	79	109	179	192
2500	13.3	152	15	79	109	179	192
3000	9.2	152	15	79	109	179	192

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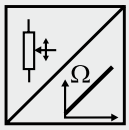
Connection

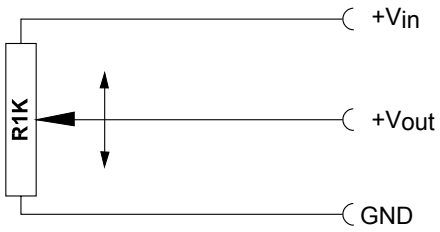
Connect the cable according to the following tables.

Voltage divider R1K
Potentiometer



Excitation voltage	24 V DC (max. 32 V DC 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 % ... 97 %
EMC	According to DIN EN 61326-1:2013

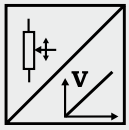
Output signals



NOTICE

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

Signal conditioner 10V
Voltage output



Excitation voltage	24 V DC non stabilized, (18 ... 27 V DC)
Excitation current	20 mA max.
Output voltage	0 ... 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}
EMC	According to DIN EN 61326-1:2013

Output signals

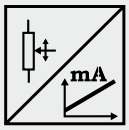
Signal wiring

Signal name R1K	10V	Cable color
+Vin	Excitation +	white
GND	Excitation GND	brown
+Vout	Signal +	green
	Signal GND	yellow

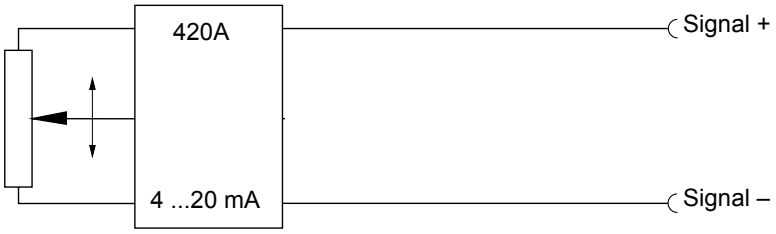
Cable: UL / cUL – LIYCY 8xAWG24 Style 2464/1061

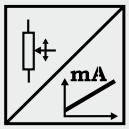
Connection

Connect the cable according to the following tables.

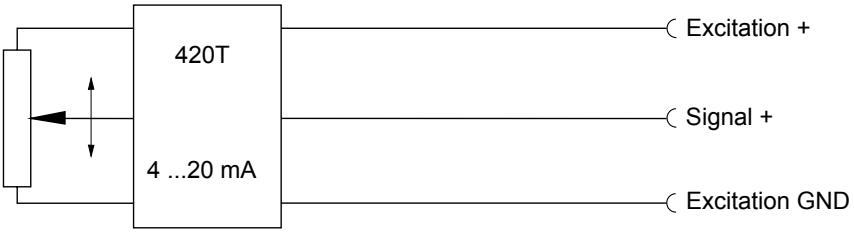
Signal conditioner 420A Current output (2 wire) 	Excitation voltage	24 V DC non stabilized (12 ... 27 V DC), measured at the sensor terminals
	Excitation current	35 mA max.
	Output current	4 ... 20 mA equivalent for 0 ... 100 % range
	Stability (temperature)	±100 x 10^{-6} / °C f.s.
	Protection	Reversed polarity, short circuit
	Output noise	0.5 mV_{RMS}
	EMC	According to DIN EN 61326-1:2013

Output signals



Signal conditioner 420T Current output (3 wire) 	Excitation voltage	24 V DC non stabilized, (18 ... 27 V DC)
	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}
	EMC	According to DIN EN 61326-1:2013

Output signals



Signal wiring	**Signal name 420A**	**420T**	**Cable color**
	Signal +	Excitation +	white
	Signal –	Excitation GND	brown
		Signal +	green

Cable: UL / cUL – LIYCY 8xAWG24 Style 2464/1061

Installation

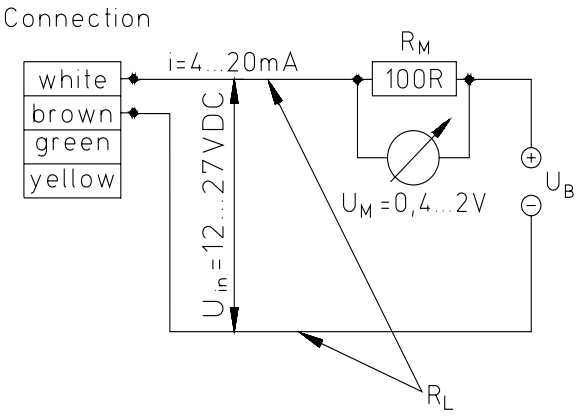
Connection example: current output 420A

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 U_B:

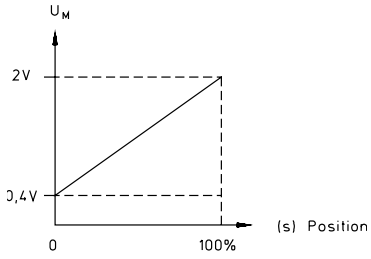
$$R_{Mmax} = ((U_B – 12\ V)/0.02\ A) – R_L$$

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.

External circuit



Voltage drop at the precision resistor



Operation

Ambient temperature: -20°C up to 40°C
Maximum cable speed: v_{max} = 2m/s

Do not use the sensor in the following environmental conditions:
- abrasive dust e.g. dust including metal or metaloxid, stone dust, glas dust, ceramic dust
- corrosive and aggressive media e.g. atmosphere with content of chloride.

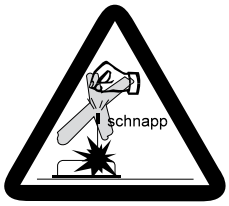
The unintended use is when the application has an explosive gas atmosphere or higher explosive dust atmosphere that requires a higher rated device.

Dismounting

DANGER

Explosion Risk!
De-installation may only be performed when no explosive atmospheric conditions are present.

Precautions



Do not let snap the cable fixing clip
Uncontrolled retraction of cable may damage sensor.
No warranty will be granted for snapped cables.

NOTICE

Measuring cable

Do not damage cable!

Do not kink cable!

Do not drag cable along objects!

Disconnect electrical connections.

Disconnect measurement cable and slowly guide it back into the sensor housing.

De-install sensor.

Maintenance

Maintenance interval: The measurement cable must be replaced at the latest 100 000 operation cycles. One operation cycle consist of a movement set including a turnaround

DANGER

Explosion Risk!
Maintenance may only be performed when no explosive atmospheric conditions are present.

	Check for dust deposit	Integrity of housing	Integrity of connector, cable	Mounting elements	Cable
WS10EX	x	x	x	x	x
WS12EX	x	x	x	x	x
Activity	Dust deposit: Remove dust	Damaged parts: Put sensor out of service Send sensor to ASM for repair	Damaged parts: Put sensor out of service, replace damaged parts resp. send sensor to ASM for repair	Loose mounting parts: Screw tight mounting parts with recommended torque, if applicable use bolt adhesive	Damaged cable, spliced or bended cable: Send sensor to ASM for repair

	Cable dust wiper SAB2
WS10EX	x
WS12EX	x
Activity	Dust deposit: clean the sensor and check the wear, replace damaged parts resp. send sensor to ASM for repair

Calibration

The recommended calibration interval is 1 year.

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

Electromagnetic Compatibility (EMC)

The electromagnetic compatibility depends on wiring practice. Recommended wiring:

- Use shielded twisted pair sensor cable.
- Ground shield single ended at switch cabinet. Connect shield directly before or at cable inlet of switch cabinet by low impedance ground cable bond. On delivery of preassembled sensor cables the shield is not connected to the sensor housing.
- Keep sensor signal well separated from power wiring e.g. AC wiring, motor or relay. Use separate conduit or ducts for each.

If application includes highly electromagnetic interference emitting equipment like switch converter drives additional measures are recommended:

- Use a twisted pair cable, shielded per pair and common.
- Use shielded conduits or ducts connected to ground potential.

Repair and Disposal

DANGER

Sensors and accessories have to be repaired and adjusted at ASM in Moosinning.

In order to avoid risk of injury and improper handling do not try to repair. No warranty or liability will be granted for opened sensors.
Damaged sensors must be shut down immediately and sent to the factory for repair.

Send metal parts for recycling!
Disposal according to applicable government regulations.

EU Declaration of Conformity

We — ASM GmbH
Am Bleichbach 18 - 24
D-85452 Moosinning

Declare under our sole responsibility that the product

Name: **Position sensor**

Type: WS10EX — ⟨Ex⟩ II 3D Ex tc IIIC T80°C Dc X
WS12EX — ⟨Ex⟩ II 3D Ex tc IIIC T80°C Dc

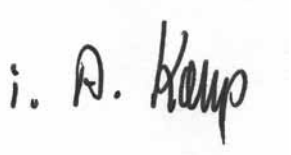
Options: - R1K, - 10V, - 420A, - 420T

to which this declaration relates is in conformity with the following standards or other normative documents:

Directives: 2004/108/EG (EMC)
94/9/EG (up to 19th April 2016)
2014/34/EU (from 20th April 2016)

Standards: EN 61326-1:2013
EN 60079-1 (June 2014)
EN 60079-31 (December 2014)

Moosinning, 15th February 2016



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