

POSIWIRE[®]

Cable Extension Position Sensors

WS10ZG
Position Sensor

Datasheet



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© ASM GmbH
Am Bleichbach 18-24
85452 Moosinning
Germany

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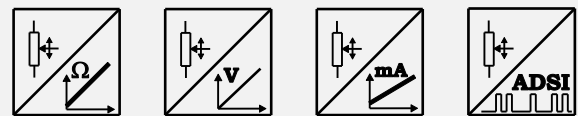
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Analog output, SSI output



Sensor features

- Measurement range up to 1250 mm
- Protection class IP65 (with mating connector only)
- Analog output, SSI output



Specifications

| | |
|--------------------------|---|
| Output | R1K = Potentiometer 1 kΩ 10V = Voltage 0 ... 10 V 420A = Current 4 ... 20 mA, 2 wire 420T = Current 4 ... 20 mA, 3 wire PMUI = Current output, programmable PMUV = Voltage output, programmable ADSI = Signal conditioner SSI 12 bit, replaced by MSS112 ADSI14 = Signal conditioner SSI 14 bit, replaced by MSS114 ADSI16 = Signal conditioner SSI 16 bit, replaced by MSS116 |
| Resolution | Analog: quasi infinite |
| Linearity | ±0.10% f.s. (standard) ±0.05% f.s. (optional) |
| Sensing device | Precision potentiometer |
| Housing material | Zinc diecast, aluminium measuring cable: stainless steel |
| Protection class | IP65 (with mating connector only) |
| Connection | Connector M12, 8 pin |
| Temperature range | -20 ... +85 °C |
| Weight | approx. 800 g |
| EMC | DIN EN 61326-1:2013 |

| Cable forces typical at = 20 °C | Measurement range | Maximum pull-out force | Minimum pull-in force |
|---|--------------------------|-------------------------------|------------------------------|
| | [mm] | [N] | [N] |
| | 100 | 4,7 | 3,0 |
| | 125 | 4,6 | 2,4 |
| | 375 | 7,4 | 3,9 |
| | 500 | 5,5 | 2,8 |
| | 750 | 7,6 | 3,8 |
| | 1000 | 5,3 | 2,9 |
| | 1250 | 4,6 | 2,4 |

Order code

WS10ZG – 1 – 2 – 3 – 4 – 5

1 Measurement range (in mm)

100 / 125 / 375 / 500 / 750 / 1000 / 1250

2 Output

- R1K** = Potentiometer 1 kΩ
- 10V** = Voltage 0 ... 10 V
- 420A** = Current 4 ... 20 mA, 2 wire
- 420T** = Current 4 ... 20 mA, 3 wire
- PMUI** = Current output, programmable
- PMUV** = Voltage output, programmable

- ADSI** = Signal conditioner SSI 12 bit, replaced by MSS112
- ADSI14** = Signal conditioner SSI 14 bit, replaced by MSS114
- ADSI16** = Signal conditioner SSI 16 bit, replaced by MSS116

3 Linearity

- L10** = ±0.10% f.s. (standard)
- L05** = ±0.05% f.s. (optional)

4 Cable fixing

- M4** = M4 cable fixing
- SB0** = cable clip

5 Connection

- M12** = Connector M12, 8 pin

Order example

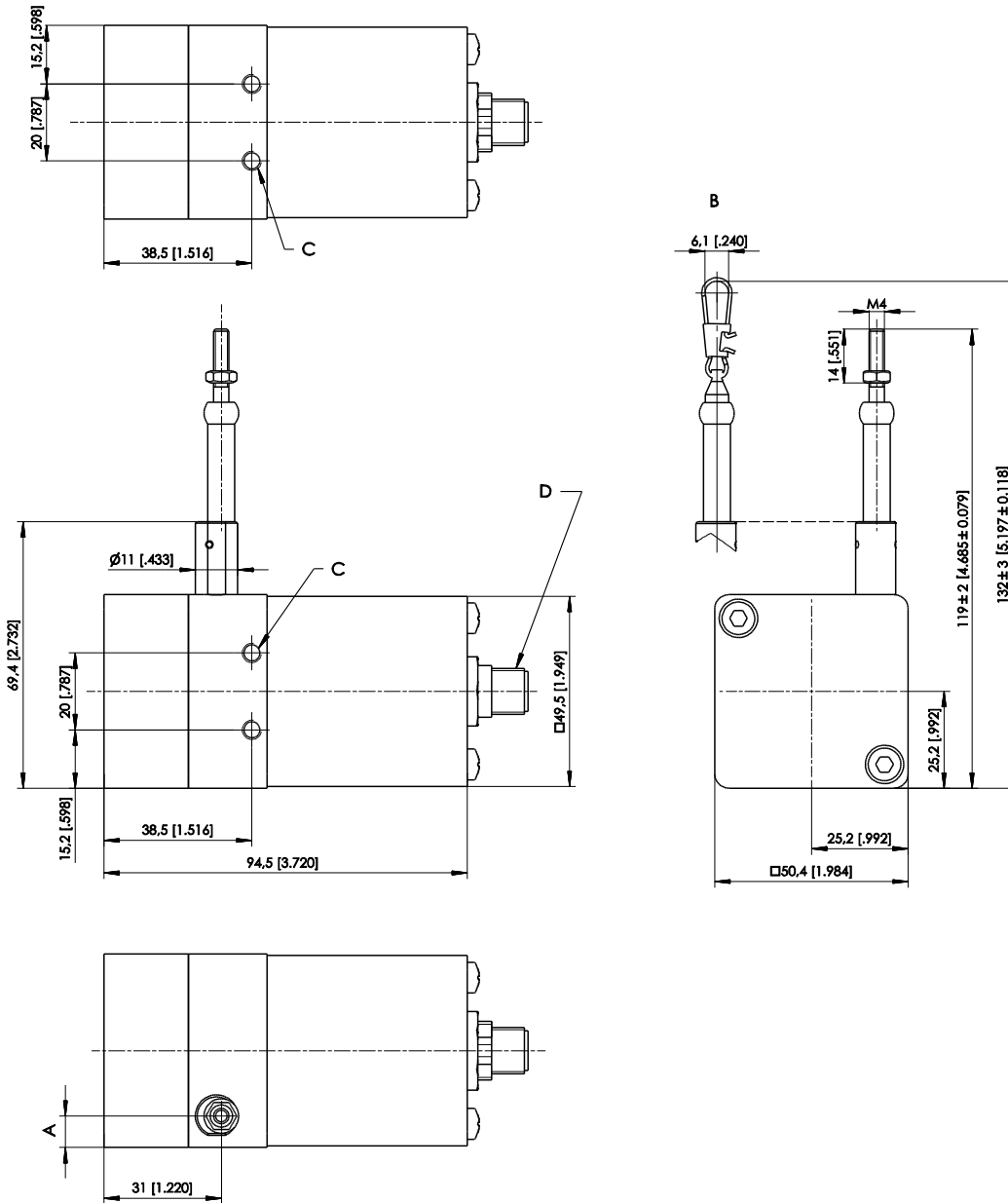
WS10ZG – 1250 – 10V – L10 – M4 – M12

Accessories:

Connector cable (see page 45)

Dimensions

Measurement range 100 ... 1250 mm, analog output, SSI output



| Dimensions in mm | Measurement range | A |
|------------------|---------------------------|------|
| | 375; 750 | 12.7 |
| | 100; 125; 500; 1000; 1250 | 8.2 |

B – Option SB0
C – M5 - 8 [0.315] deep
D – Connector M12

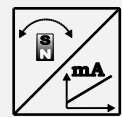
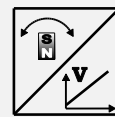
Dimensions in mm [inch]
Dimensions informative only.
For guaranteed dimensions consult factory.

Magnetic encoder, analog output



Sensor features

- With magnetic absolute encoder
- Measurement range up to 2000 mm
- Protection class IP65 (with mating connector only)
- Analog output
- Absolute measurement



Specifications

| | |
|--------------------------|--|
| Output | U2 = Voltage 0.5 ... 10 V U8 = Voltage 0.5 ... 4.5 V I1 = Current 4 ... 20 mA, 3 wire |
| Resolution | <0.002% f.s. |
| Linearity | ±0.10% f.s. (standard) ±0.05% f.s. (optional) |
| Sensing device | Magnetic absolute encoder |
| Housing material | Zinc diecast, aluminium measuring cable: stainless steel |
| Protection class | IP65 (with mating connector only) |
| Connection | Connector M12, 5 pin (standard) Connector M12, 8 pin (optional) |
| Shock | DIN EN 60068-2-27:2010, 100 g/11 ms, 100 shocks |
| Vibration | DIN EN 60068-2-6:2008, 20 g 10 Hz-2 kHz, 10 cycles |
| Temperature range | -20 ... +85 °C |
| Weight | approx. 800 g |
| EMC | DIN EN 61326-1:2013 |

Order code

WS10ZG – 1 – 2 – 3 – 4 – 5 – 6

1 Measurement range (in mm)

250 / 375 / 500 / 750 / 1000 / 1250 / 1500 / 2000

2 Output

U2 = Voltage 0.5 ... 10 V
U8 = Voltage 0.5 ... 4.5 V
I1 = Current 4 ... 20 mA, 3 wire

3 Signal characteristics

A = increasing signal (e.g. 4 ... 20 mA)
D = decreasing signal (e.g. 20 ... 4 mA)

4 Linearity

L10 = ±0.10% f.s. (standard)
L05 = ±0.05% f.s. (optional)

5 Cable fixing

M4 = M4 cable fixing
SB0 = cable clip

6 Connection

M12A5 = Connector M12, 5 pin (standard)
M12A8 = Connector M12, 8 pin (optional)

Order example

WS10ZG – 1250 – U2 – A – L10 – M4 – M12A5

Accessories:

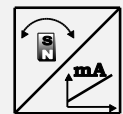
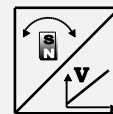
Connector cable (see page 43)

Magnetic encoder, analog output, programmable



Sensor features

- With magnetic absolute encoder
- Measurement range up to 2000 mm
- Protection class IP65 (with mating connector only)
- Analog output, programmable
- Absolute measurement



Specifications

| | |
|--------------------------|--|
| Output | U2/PMU = Voltage 0.5 ... 10 V, programmable U8/PMU = Voltage 0.5 ... 4.5 V, programmable I1/PMU = Current 4 ... 20 mA, 3 wire, programmable |
| Resolution | <0.002% f.s. |
| Linearity | ±0.10% f.s. (standard) ±0.05% f.s. (optional) |
| Sensing device | Magnetic absolute encoder |
| Housing material | Zinc diecast, aluminium measuring cable: stainless steel |
| Protection class | IP65 (with mating connector only) |
| Connection | Connector M12, 5 pin |
| Shock | DIN EN 60068-2-27:2010, 100 g/11 ms, 100 shocks |
| Vibration | DIN EN 60068-2-6:2008, 20 g 10 Hz-2 kHz, 10 cycles |
| Temperature range | -20 ... +85 °C |
| Weight | approx. 800 g |
| EMC | DIN EN 61326-1:2013 |

Order code

WS10ZG – 1 – 2 – 3 – 4 – 5 – 6

1 Measurement range (in mm)

250 / 375 / 500 / 750 / 1000 / 1250 / 1500 / 2000

2 Output

U2/PMU = Voltage 0.5 ... 10 V, programmable
U8/PMU = Voltage 0.5 ... 4.5 V, programmable
I1/PMU = Current 4 ... 20 mA, 3 wire, programmable

3 Signal characteristics

A = increasing signal (e.g. 4 ... 20 mA)
D = decreasing signal (e.g. 20 ... 4 mA)

4 Linearity

L10 = ±0.10% f.s. (standard)
L05 = ±0.05% f.s. (optional)

5 Cable fixing

M4 = M4 cable fixing
SB0 = cable clip

6 Connection

M12A5 = Connector M12, 5 pin

Order example

WS10ZG – 1250 – U2/PMU – A – L10 – M4 – M12A5

Accessories:

Connector cable (see page 44)

Magnetic encoder, digital output SSI



Sensor features

- With magnetic absolute encoder
- Measurement range up to 2000 mm
- Protection class IP65 (with mating connector only)
- Digital output SSI
- Absolute measurement



Specifications

| | |
|--------------------------|---|
| Output | MSSI = SSI synchronous serial interface |
| Resolution | 10 / 50 / 100 |
| Linearity | ±0.10% f.s. (standard) ±0.05% f.s. (optional) |
| Sensing device | Magnetic absolute encoder |
| Housing material | Zinc diecast, aluminium measuring cable: stainless steel |
| Protection class | IP65 (with mating connector only) |
| Connection | Connector M12, 8 pin |
| Shock | DIN EN 60068-2-27:2010, 100 g/11 ms, 100 shocks |
| Vibration | DIN EN 60068-2-6:2008, 20 g 10 Hz-2 kHz, 10 cycles |
| Temperature range | -20 ... +85 °C |
| Weight | approx. 800 g |
| EMC | DIN EN 61326-1:2013 |

Order code

WS10ZG – 1 – 2 – 3 – 4 – 5 – 6

1 Measurement range (in mm)

250 / 375 / 500 / 750 / 1000 / 1250 / 1500 / 2000

2 Resolution (in µm)

10 / 50 / 100

3 Output

MSSI = SSI synchronous serial interface

4 Linearity

L10 = ±0.10% f.s. (standard)
L05 = ±0.05% f.s. (optional)

5 Cable fixing

M4 = M4 cable fixing
SB0 = cable clip

6 Connection

M12A8 = Connector M12, 8 pin

Order example

WS10ZG – 1250 – 50 – MSSI – L10 – M4 – M12A8

Accessories:

Connector cable (see page 45)

Magnetic encoder, digital output CAN Bus



Sensor features

- With magnetic absolute encoder
- Measurement range up to 2000 mm
- Protection class IP65 (with mating connector only)
- Digital output CAN Bus
- Absolute measurement
- Optional redundant CAN Bus



Specifications

| | |
|--------------------------|---|
| Output | MCANOP = CANopen MCANJ1939 = CAN SAE J1939 |
| Resolution | setting via CAN Bus |
| Linearity | ±0.10% f.s. (standard) ±0.05% f.s. (optional) |
| Sensing device | Magnetic absolute encoder |
| Housing material | Zinc diecast, aluminium measuring cable: stainless steel |
| Protection class | IP65 (with mating connector only) |
| Connection | Connector M12, 5 pin |
| Temperature range | -20 ... +85 °C |
| Weight | approx. 800 g |
| EMC | DIN EN 61326-1:2013 |

Order code

WS10ZG – 1 – 2 – 3 – 4 – 5

1 Measurement range (in mm)

250 / 375 / 500 / 750 / 1000 / 1250 / 1500 / 2000

2 Output

MCANOP = CANopen
MCANJ1939 = CAN SAE J1939

3 Linearity

L10 = ±0.10% f.s. (standard)
L05 = ±0.05% f.s. (optional)

4 Cable fixing

M4 = M4 cable fixing
SB0 = cable clip

5 Connection

M12/CAN = Connector M12, 5 pin

Order example

WS10ZG – 1250 – MCANOP – L10 – M4 – M12/CAN

Accessories:

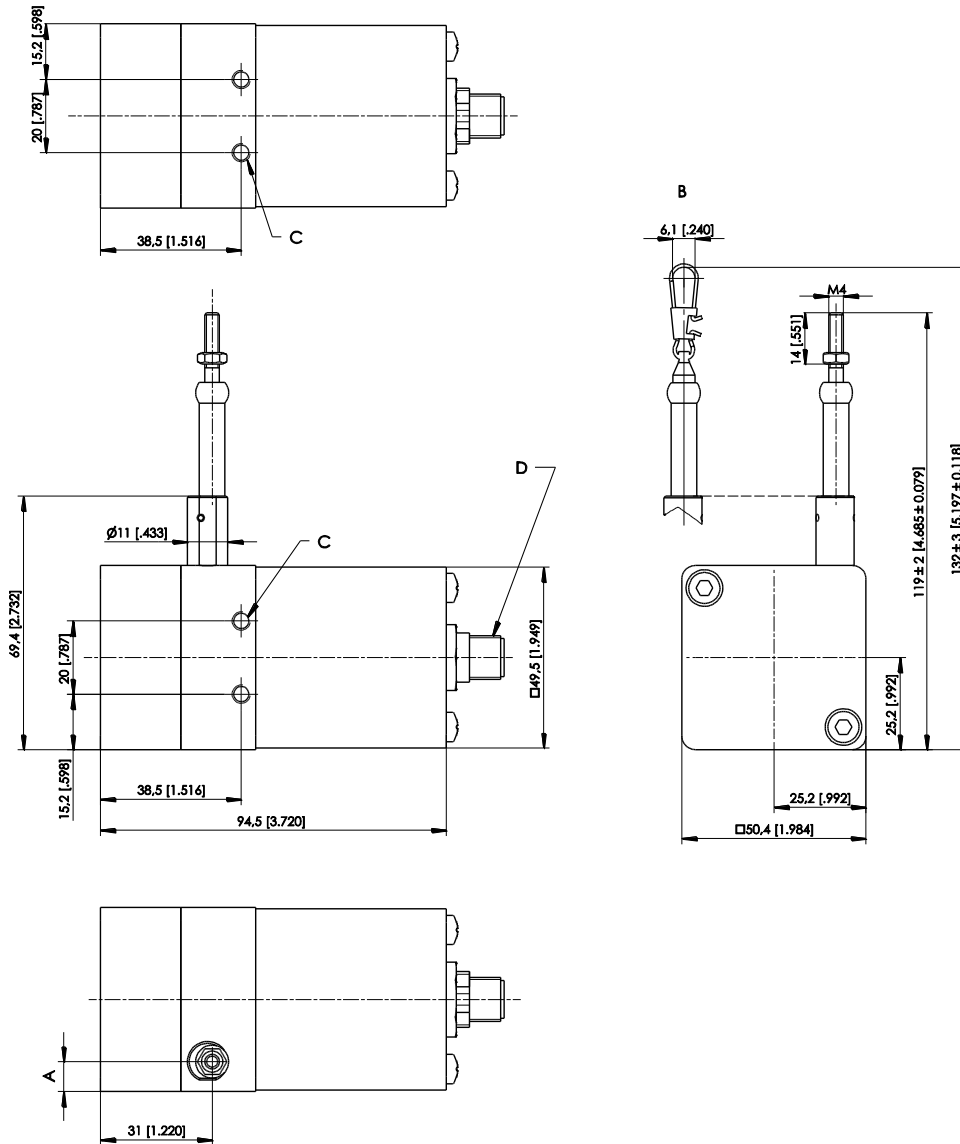
Connector cable (see page 46)

Cable forces for sensors with magnetic encoder

| Cable forces | Measurement range | Maximum pull-out force | Minimum pull-in force |
|---------------------|--------------------------|-------------------------------|------------------------------|
| typical at = 20 °C | [mm] | [N] | [N] |
| | 250 | 4.6 | 2.4 |
| | 375 | 7.4 | 3.9 |
| | 500 | 5.5 | 2.8 |
| | 750 | 7.6 | 3.8 |
| | 1000 | 5.3 | 2.9 |
| | 1250 | 4.6 | 2.4 |
| | 1500 | 3.8 | 2.4 |
| | 2000 | 3.8 | 2.4 |

Dimensions

Measurement range 250 ... 1250, mm, magnetic encoder output

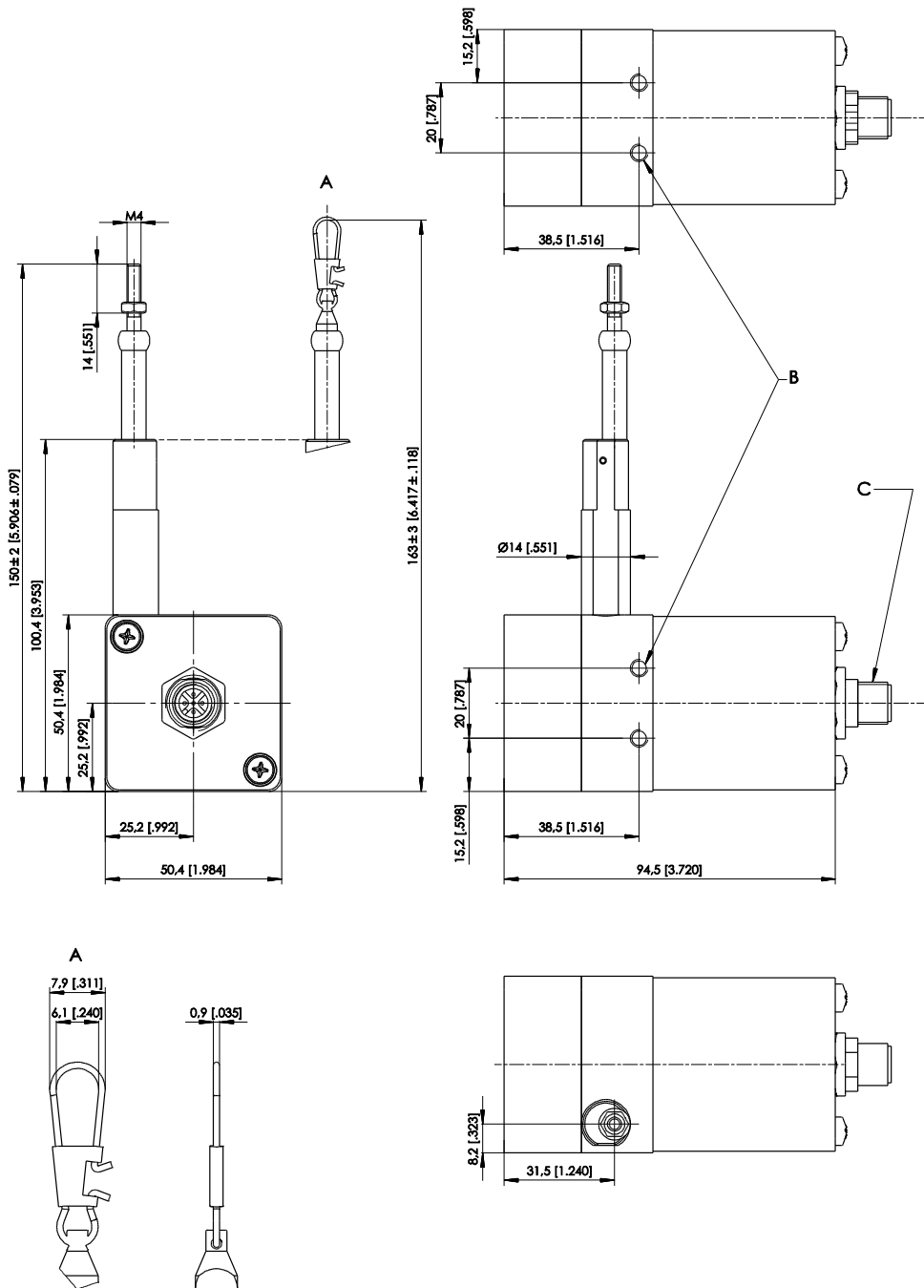


| Dimensions in mm | Measurement range | A |
|------------------|-------------------|------|
| | 250 | 16.7 |
| | 375; 750 | 12.4 |
| | 500; 1000; 1250 | 8 |

B – Option SB0
C – 4 x M5 - 8 [.315] deep
D – Connector M12

Dimensions in mm [inch]
Dimensions informative only.
For guaranteed dimensions consult factory.

Measurement range 1500 ... 2000 mm, magnetic encoder output



- A – Option SB0
- B – M5 - 8 [.315] deep
- C – Connector M12

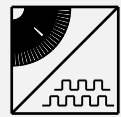
Dimensions in mm [inch]
 Dimensions informative only.
 For guaranteed dimensions consult factory.

Incremental encoder output



Sensor features

- Measurement range up to 1250 mm
- Protection class IP65 (with mating connector only)
- Incremental encoder output



Specifications

| | |
|--------------------------|--|
| Output | PP530 = Incremental output 5 ... 30 V IE41LI = Incremental encoder TTL compatible IE41HI = Incremental encoder HTL compatible |
| Resolution | 10 or 25 pulses / mm (40 or 100 edges / mm) |
| Linearity | ±0.05% f.s. |
| Sensing device | Incremental encoder |
| Housing material | Zinc diecast, aluminium measuring cable: stainless steel |
| Protection class | IP65 (with mating connector only) |
| Connection | Connector M12, 8 pin |
| Temperature range | -20 ... +85 °C |
| Weight | approx. 800 g |
| EMC | DIN EN 61326-1:2013 |

| Cable forces | Measurement range | Maximum pull-out force | Minimum pull-in force |
|--------------------|-------------------|------------------------|-----------------------|
| Typical at = 20 °C | [mm] | [N] | [N] |
| | 1250 | 5,8 | 3,0 |

Order code

WS10ZG – 1 – 2 – 3 – 4 – 5

1 Measurement range (in mm)

1250

2 Resolution

10 = 10 pulses / mm
25 = 25 pulses / mm
 other number of pulses on request

3 Output

PP530 = Incremental output 5 ... 30 V
IE41LI = Incremental encoder TTL compatible
IE41HI = Incremental encoder HTL compatible

4 Cable fixing

M4 = M4 cable fixing
SB0 = cable clip

5 Connection

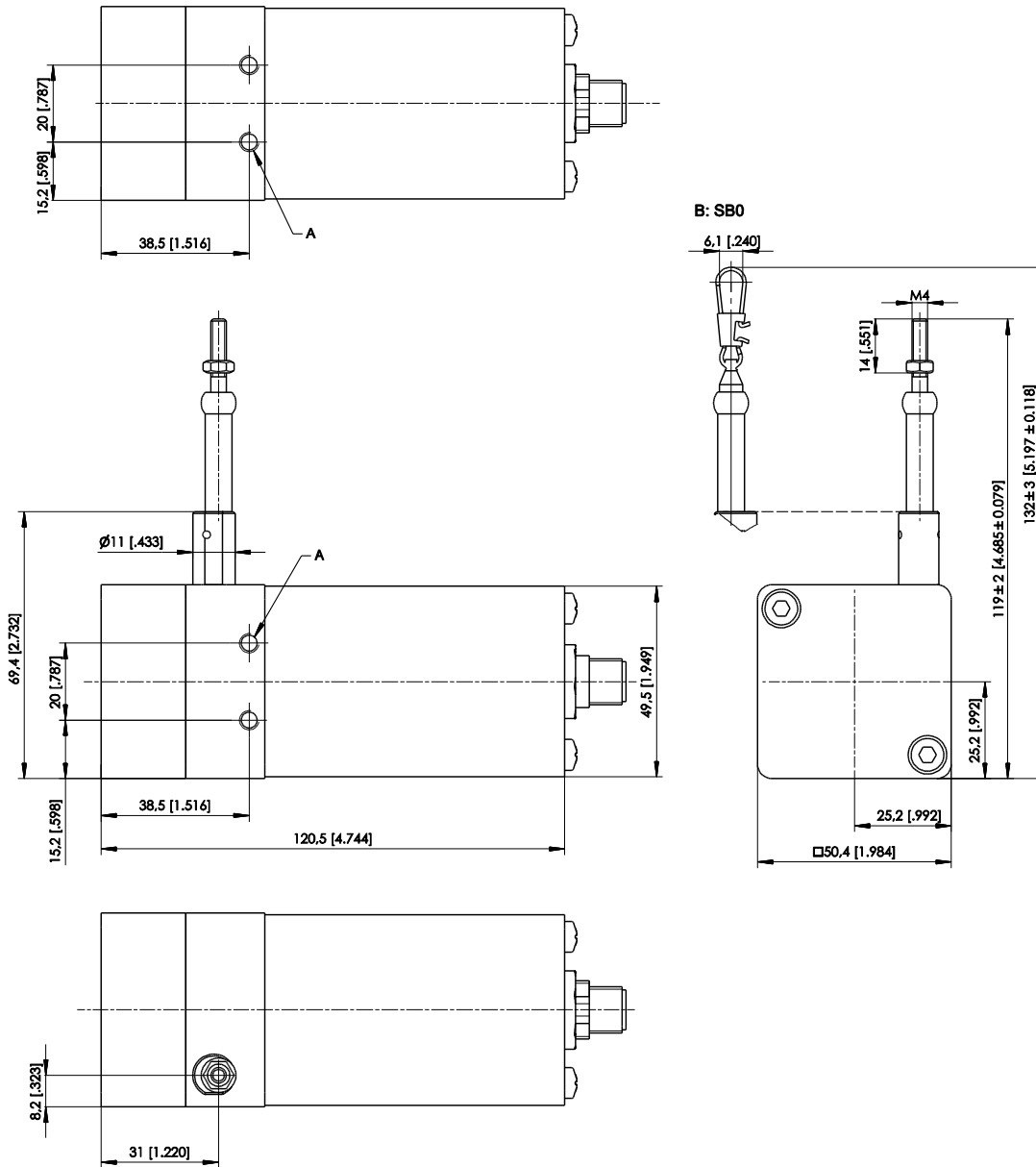
M12 = Connector M12, 8 pin

Order example

WS10ZG – 1250 – 10 – PP530 – M4 – M12

Dimensions

Measurement range 1250 mm



A – M5 - 8 [.315] deep

B – Option SB0

Dimensions in mm [inch]


Dimensions informative only.

For guaranteed dimensions consult factory.

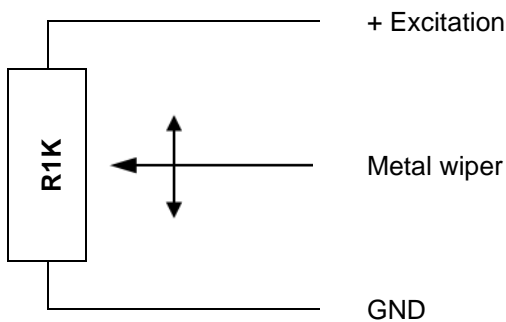
Output specifications

Analog outputs

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 % ... 97 % |
| | Operating temperature | Refer to output specification |
| | EMC | DIN EN 61326-1:2013 |

Output signals




Note:
The metal wiper of the potentiometer must be protected against current load!
 Electrical current flow impact on the wiper causes linearity errors and shortens the lifetime of the potentiometer.

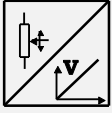
Additional information:
http://www.asm-sensor.com/asm/pdf/pro/ws_poti_technote_en.pdf

Signal wiring

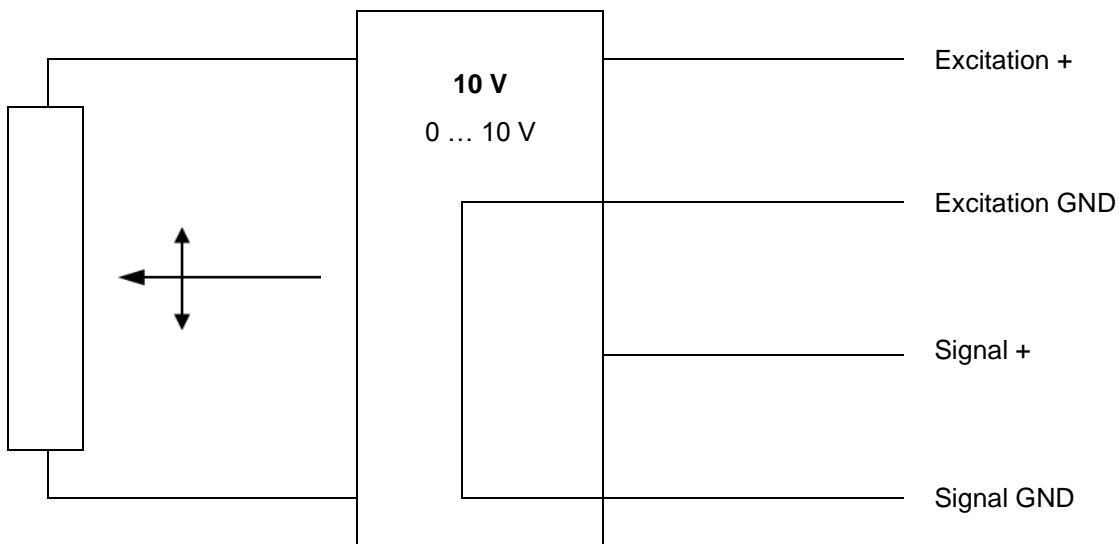
| Signal | Connector pin no. | Cable color | Cable color |
|-------------|-------------------|-------------|-------------|
| Poti + | 1 | white | brown |
| Poti GND | 2 | brown | white |
| Poti slider | 3 | green | blue |
| - | 4 | yellow | black |
| - | 5 | grey | - |
| - | 6 | pink | - |
| - | 7 |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

| | | |
|--------------------------|--|-------------|
| View to sensor connector |  | CONN-M12-8F |
|--------------------------|--|-------------|


Signal conditioner 10V and 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 |

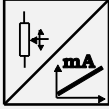
Output signals



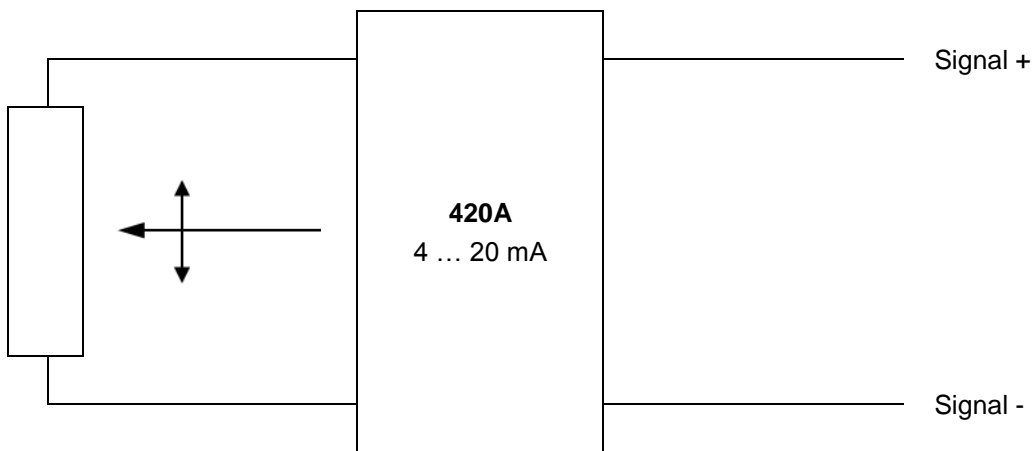
Signal wiring

| Signal | Connector pin no. | Cable color | View to sensor connector |
|----------------|-------------------|-------------|--|
| Excitation + | 1 | white |  CONN-M12-8F |
| 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 | |

Signal conditioner 420A

| | | |
|--|-------------------------|---|
| Current output (2 wire)  | Excitation voltage | 12 ... 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) | $\pm 100 \times 10^{-6} / ^\circ\text{C}$ 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 |

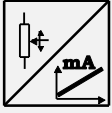
Output signals



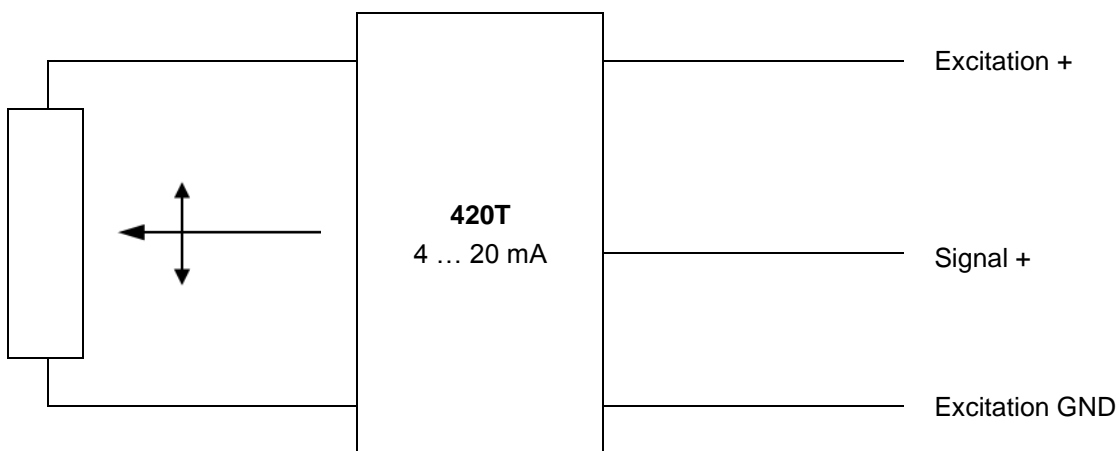
Signal wiring

| Signal | Connector pin no. | Cable color | View to sensor connector |
|---------------|-------------------|-------------|--|
| Signal + | 1 | white |  CONN-M12-8F |
| 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 | |

Signal conditioner 420T

| | | |
|--|-------------------------|--|
| Current output (3 wire)  | Excitation voltage | 18 ... 27 V DC non stabilized |
| | Excitation curren | 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 |

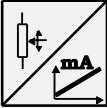
Output signals



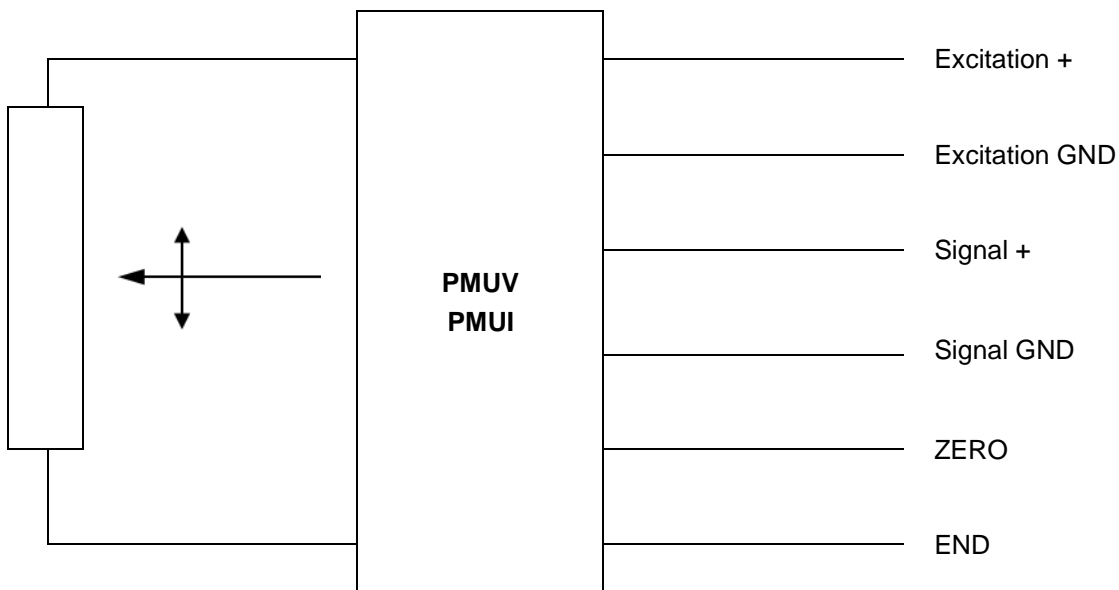
Signal wiring

| Signal | Connector pin no. | Cable color | View to sensor connector |
|----------------|-------------------|-------------|---|
| Excitation + | 1 | white |  |
| Excitation GND | 2 | brown | |
| Signal + | 3 | green | |
| Not connected | 4 | yellow | |
| Not connected | 5 | grey | |
| Not connected | 6 | pink | |
| Not connected | 7 | blue | |
| Not connected | 8 | red | |


Signal conditioner PMUI / PMUV

| | | |
|--|--------------------------------------|-----------------------------------|
| Voltage or current output (3 wire)  | Excitation voltage | 18 ... 27 V DC |
| | Excitation current | 50 mA max. |
| | Voltage output PMUV | 0 ... 10 V |
| | Output current | 10 mA max. |
| | Output load | 1 kΩ min. |
| | Current output PMUI | 4 ... 20 mA (3 wire) |
| | Working resistance | 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 |


Output signals



Signal wiring PMUV / PMUI

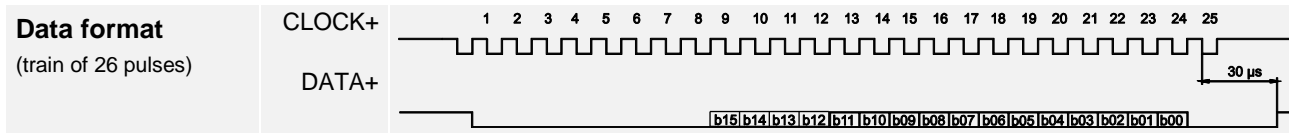
| Signal | Connector pin no. | Cable color | View to sensor connector |
|----------------|-------------------|-------------|--|
| Excitation + | 1 | white |  <p>CONN-M12-8F</p> |
| Excitation GND | 2 | brown | |
| Signal + | 3 | green | |
| Signal GND | 4 | yellow | |
| Not connected | 5 | grey | |
| Not connected | 6 | pink | |
| ZERO | 7 | blue | |
| END | 8 | red | |

Signal wiring PMUI2

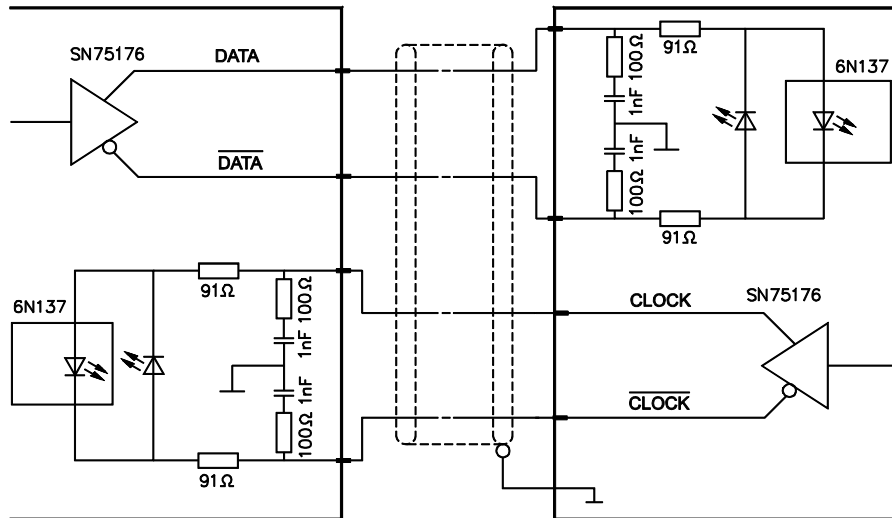
| Signal | Connector pin no. | Cable color | View to sensor connector |
|----------------|-------------------|-------------|--|
| Excitation + | 1 | white |  <p>CONN-M12-8F</p> |
| Excitation GND | 2 | brown | |
| Not connected | 3 | green | |
| Not connected | 4 | yellow | |
| Signal + | 5 | grey | |
| Signal GND | 6 | pink | |
| ZERO | 7 | blue | |
| END | 8 | red | |

Signal conditioner 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 |



Recommended processing circuit



| Transmission rate | Cable length | Baud rate |
|-------------------|--------------|-----------|
| | < 50 m | < 300 kHz |
| | < 100 m | < 100 kHz |

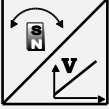
Note:
Extension of the cable length will reduce the maximum transmission rate.

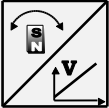
Signal wiring

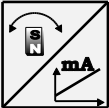
| Signal | Connector pin no. | Cable color | View to sensor connector |
|---------------------------|-------------------|-------------|---|
| Excitation + | 1 | white |  |
| Excitation GND (0 V) | 2 | brown | |
| CLOCK | 3 | green | |
| $\overline{\text{CLOCK}}$ | 4 | yellow | |
| DATA | 5 | grey | |
| $\overline{\text{DATA}}$ | 6 | pink | |
| Shield, not connected | 7 | blue | |
| Not connected | 8 | red | |

CONN-M12-8F

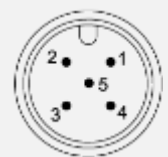
Magnetic encoder, analog output

| | | |
|---|-------------------------|--|
| <p>U2</p> <p>Voltage output 0.5 ... 10 V</p>  | 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) | $\pm 50 \times 10^{-6}$ / °C f.s. (typical) |
| | Protection | Reverse polarity, short circuit |
| | Operating temperature | See specification of the respective sensor |
| | EMC | DIN EN 61326-1:2013 |

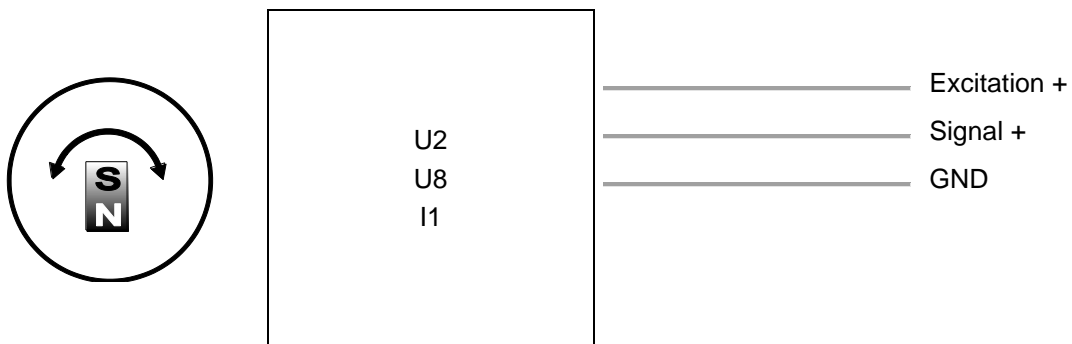
| | | |
|--|-------------------------|--|
| <p>U8</p> <p>Voltage output 0.5 ... 4.5 V</p>  | Excitation voltage | 8 ... 36 V DC |
| | Excitation current | 17 mA typical at 24 V DC 32 mA typical at 12 V DC 50 mA max. |
| | Output voltage | 0.5 ... 4.5 V DC |
| | Output current | 2 mA max. |
| | Measuring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

| | | |
|---|-------------------------|---|
| <p>I1</p> <p>Current output 4 ... 20 mA, 3 wires</p>  | 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) | $\pm 50 \times 10^{-6}$ / °C f.s. (typical) |
| | Protection | Reverse polarity, short circuit |
| | Operating temperature | See specification of the respective sensor |
| | EMC | DIN EN 61326-1:2013 |

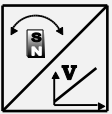
Signal wiring

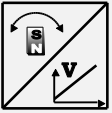
| Signal | Connector pin no. | Cable connection | View to the sensor connector |
|-----------------|-------------------|------------------|---|
| Excitation + | 1 | brown |  |
| Signal | 2 | white | |
| GND | 3 | blue | |
| Do not connect! | 4 | black | |
| Do not connect! | 5 | (grey) | |

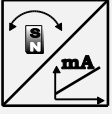
Signal diagram




Magnetic encoder, analog output, programmable

| | | |
|---|-------------------------|--|
| <p>U2/PMU</p> <p>Voltage output 0.5 ... 10 V</p>  | 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) | $\pm 50 \times 10^{-6} / ^\circ\text{C}$ f.s. (typical) |
| | Protection | Reverse polarity, short circuit |
| | Operating temperature | See specification of the respective sensor |
| | EMC | EN 61326-1:2013 |

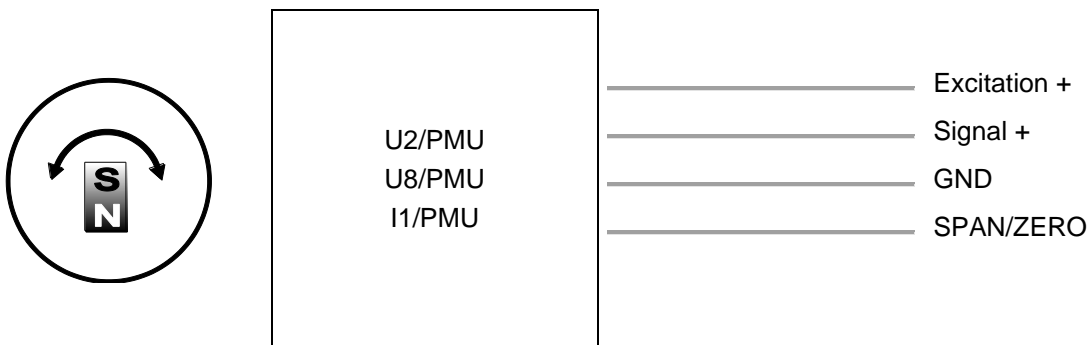
| | | |
|--|-------------------------|--|
| <p>U8/PMU</p> <p>Voltage output 0.5 ... 4.5 V</p>  | Excitation voltage | 8 ... 36 V DC |
| | Excitation current | 17 mA typical at 24 V DC 32 mA typical at 12 V DC max. 50 mA |
| | Output voltage | 0.5 ... 4.5 V DC |
| | Output current | 2 mA max. |
| | Measuring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

| | | |
|---|-------------------------|---|
| <p>I1/PMU</p> <p>Current output 4 ... 20 mA, 3 wires</p>  | 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) | $\pm 50 \times 10^{-6} / ^\circ\text{C}$ f.s. (typical) |
| | Protection | Reverse polarity, short circuit |
| | Operating temperature | See specification of the respective sensor |
| | EMC | DIN EN 61326-1:2013 |

Signal wiring

| Signal | Connector pin no. | Cable color | View to sensor connector |
|-----------------|-------------------|-------------|---|
| Excitation + | 1 | brown |  |
| Signal | 2 | white | |
| GND | 3 | blue | |
| Do not connect! | 4 | black | |
| SPAN/ZERO | 5 | grey | |

Signal diagram



Option -PMU

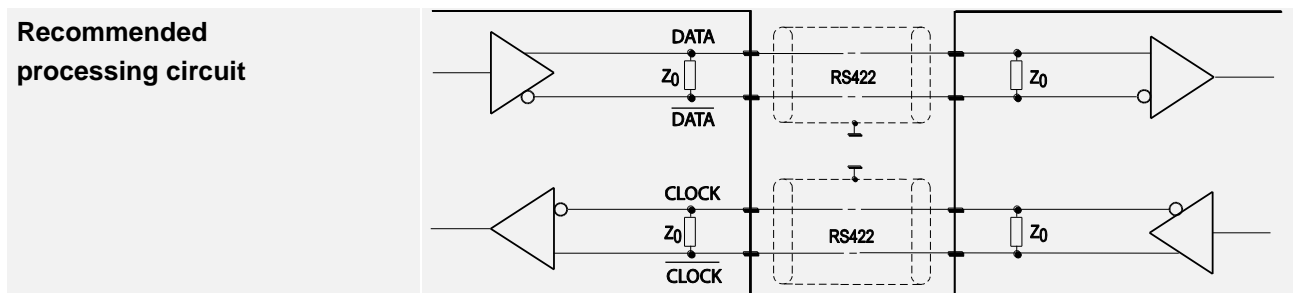
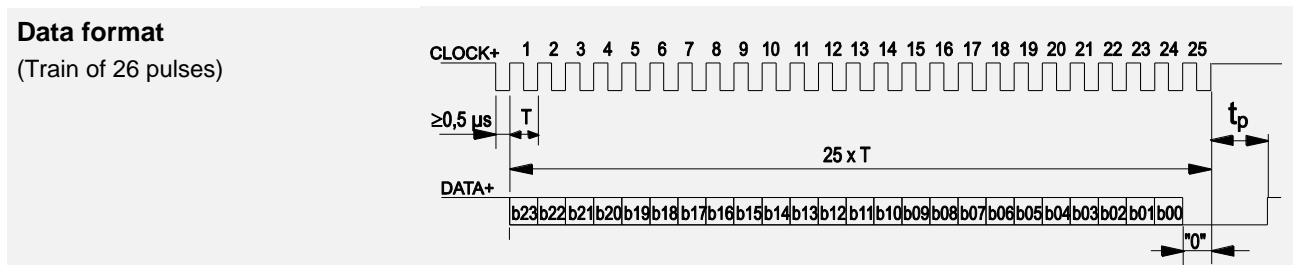
Programming of the start and end value by the customer

Teach-In of start and end value for the options U2/PMU, I1/PMU, U8/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 taught in that way will be stored non-volatile.

To reset the sensor to factory default signal ZERO/END must be connected to ground while powering up the sensor for 2 ... 3 seconds. For the option PMZ only teach-in of ZERO position is possible.

Magnetic encoder, digital output SSI


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




| Transmission rate | Cable length | Baud rate |
|-------------------|--------------|-------------|
| | 50 m | 100-400 kHz |
| | 100 m | 100-300 kHz |

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


Signal wiring

| Signal | Connector pin no. | Cable color | View to sensor connector |
|---------------------------|-------------------|-------------|---|
| 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 | |

Magnetic encoder, digital output CANopen

| | | |
|---|-------------------------------------|--|
| MCANOP, CANOPR CANopen  | CAN specification | ISO 11898, Basic and Full CAN 2.0 B |
| | Communication profile | CANopen CiA 301 V 4.02, Slave |
| | Encoder profile | Encoder CiA 406 V 3.2 |
| | Error Control | Node Guarding, Heartbeat, Emergency Message |
| | Node ID | Adjustable via LSS or SDO, default: 127 |
| | PDO | 3 TxPDO, 0 RxPDO, no linking, static mapping |
| | PDO Modes | Event-/Time triggered, Remote-request, Sync cyclic/acyclic |
| | SDO | 1 Server, 0 Client |
| | CAM | 8 cams |
| | Certified | Yes |
| | Transmission rate | 50 kBit bis 1 Mbit, adjustable via LSS or SDO, default: 125 kBit |
| | Bus connection | M12 connector, 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 | Signal | Connector pin no. | View to the sensor connector |
|---------------|--------------|-------------------|---|
| | Shield | 1 |  |
| | Excitation + | 2 | |
| | GND | 3 | |
| | CAN-H | 4 | |
| | CAN-L | 5 | |


Magnetic encoder, digital output CAN SAE J1939

| | | |
|--|-------------------------------|-------------------------------------|
| MCANJ1939/R CAN 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 | |

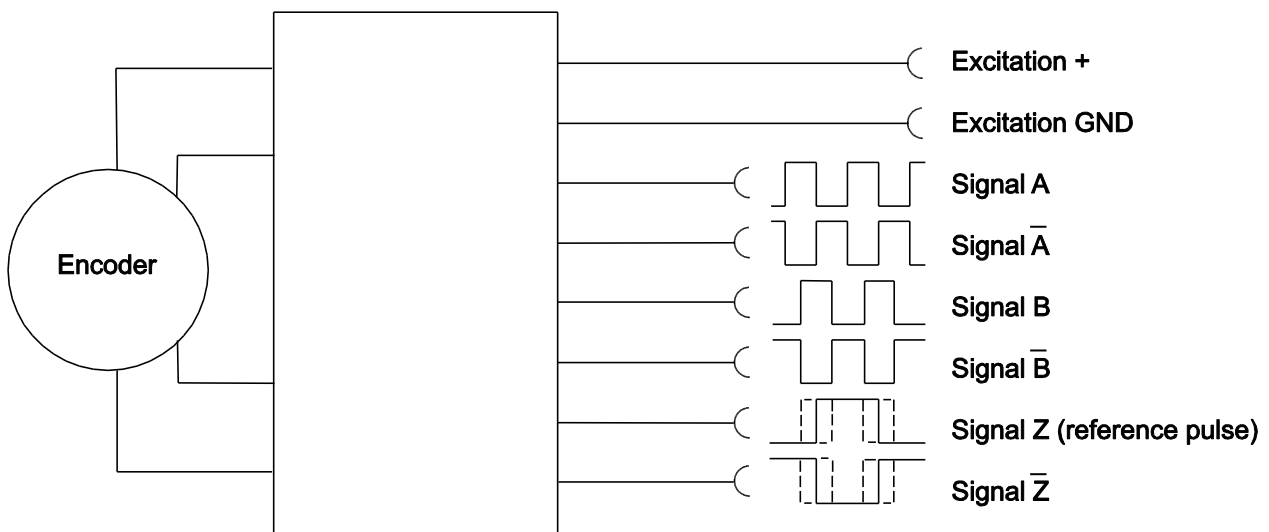
| Signal wiring | Signal | Connector pin no. | View to the sensor connector |
|---------------|--------------|-------------------|---|
| | Shield | 1 |  |
| | Excitation + | 2 | |
| | GND | 3 | |
| | CAN-H | 4 | |
| | CAN-L | 5 | |

Incremental outputs

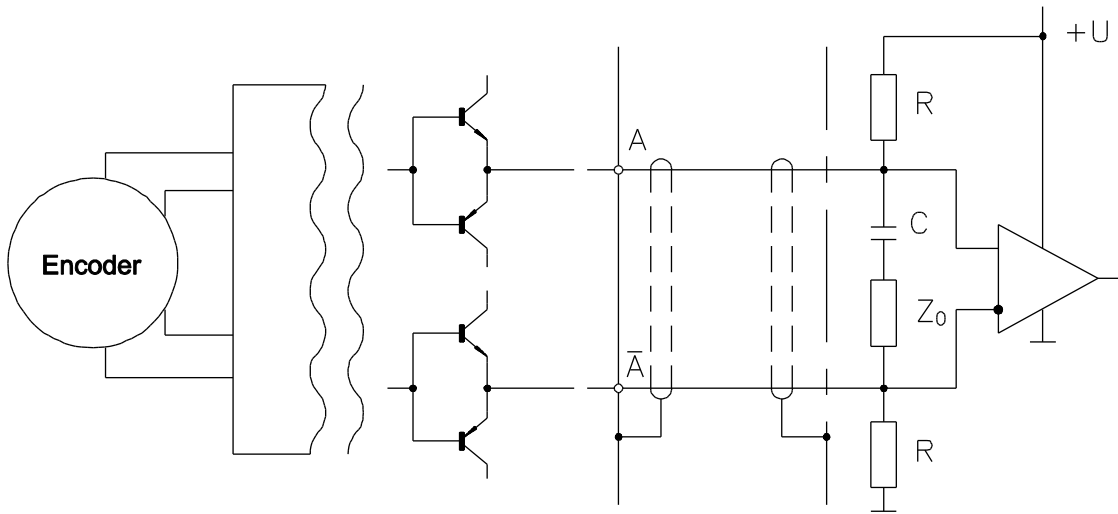
Signal conditioner PP530

| | | |
|--|-------------------------------|--|
| Incremental  | 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 | $I_a < 10 \text{ mA}, U_b 5 \text{ V}/24 \text{ V}: < 0,5 \text{ V}$ $I_a < 30 \text{ mA}, U_b 5 \text{ V}/24 \text{ V}: < 1 \text{ V}$ |
| | Stability (temperature) | $\pm 20 \times 10^{-6} / ^\circ\text{C}$ 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 |

Output signals




Recommended processing circuit




Signal wiring

| Signal | Connector pin no. | Cable color | View to sensor connector |
|----------------------------|-------------------|-------------|--|
| Excitation + | 1 | white |  <p>CONN-M12-8F</p> |
| Excitation GND | 2 | brown | |
| Signal A | 4 | yellow | |
| Signal \bar{A} | 6 | pink | |
| Signal B (A + 90°) | 3 | green | |
| Signal \bar{B} | 5 | grey | |
| Signal Z (reference pulse) | 7 | blue | |
| Signal \bar{Z} | 8 | red | |

Signal conditioner IE41LI and IE41HI

| | | | |
|--|----------------------------------|---|----------------------|
| Incremental  | | 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 | | |

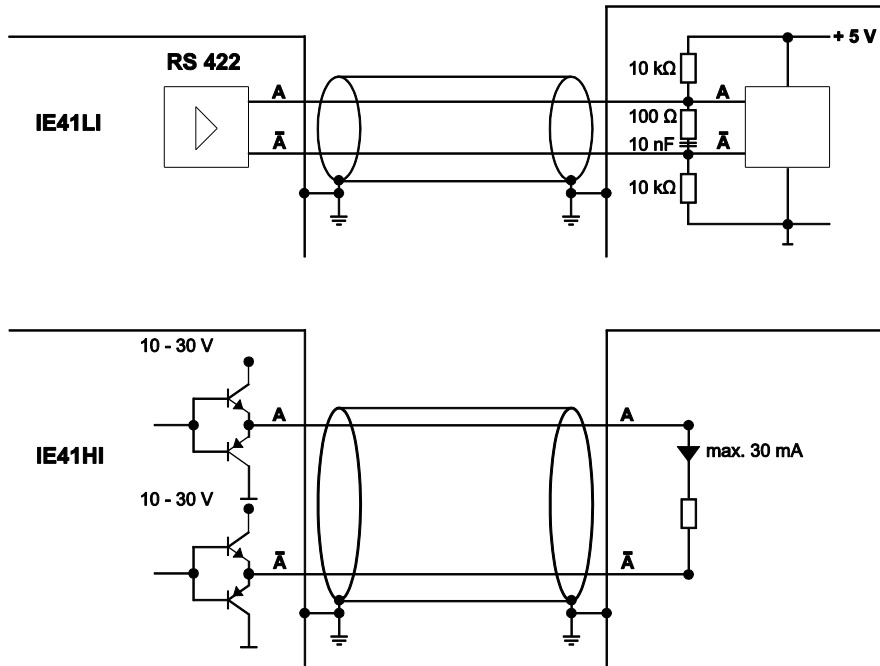
Signal wiring WS10

| Signal | Connector pin no. | Cable color | View to sensor connector |
|----------------------------|-------------------|-------------|---|
| Excitation + | 1 | white |  <p>CONN-M12-8F</p> |
| Excitation GND | 2 | brown | |
| Signal A | 4 | yellow | |
| Signal \bar{A} | 6 | pink | |
| Signal B (A + 90°) | 3 | green | |
| Signal \bar{B} | 5 | grey | |
| Signal Z (reference pulse) | 7 | blue | |
| Signal \bar{Z} | 8 | red | |

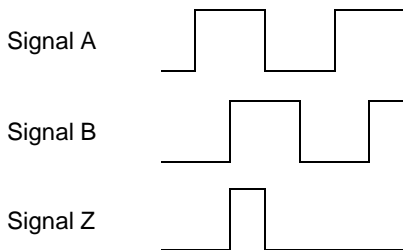
Signal wiring WS12

| Signal | Connector pin no. | Cable color | View to sensor connector |
|----------------------------|-------------------|-------------|--|
| Excitation + | 1 | white |  <p>CONN-M12-8F</p> |
| Excitation GND | 2 | brown | |
| Signal A | 3 | green | |
| Signal \bar{A} | 5 | grey | |
| Signal B (A + 90°) | 4 | yellow | |
| Signal \bar{B} | 6 | pink | |
| Signal Z (reference pulse) | 7 | blue | |
| Signal \bar{Z} | 8 | red | |

Recommended processing circuit



Output signals



Accessories

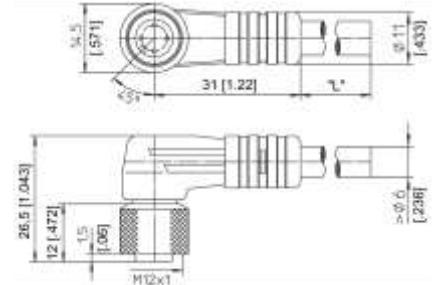
Connector cable M12, 4 pin

(angular coupling)

shielded connector

Suitable for 5-pin sensor connectors

The 4-core screened cable is supplied with a mating 4-pin 90° M12 connector at one end and 4 wires at the other end. Available lengths are 2 m, 5 m and 10 m. Wire: cross sectional area 0.34 mm² Cable diameter: 5.6 ±0.2 mm



Order code

KAB - xM - M12/4F/W - LITZE

IP69: **KAB - xM - M12/4F/W/69K - LITZE**

xM = length in m

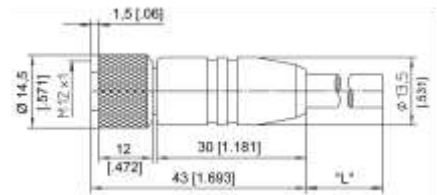
Connector cable M12, 4 pin

(straight coupling)

shielded connector

Suitable for 5-pin sensor connectors

The 4-core screened cable is supplied with a mating 4-pin M12 connector at one end and 4 wires at the other end. Available lengths are 2 m, 5 m and 10 m. Wire: cross sectional area 0.34 mm² Cable diameter: 5.6 ±0.2 mm



Order code

KAB - xM - M12/4F/G - LITZE

IP69: **KAB - xM - M12/4F/G/69K - LITZE**

xM = length in m

| Signal wiring | Plug connection / cable color | | | |
|---------------|-------------------------------|-------|------|-------|
| | M12, 4 pin | 1 | 2 | 3 |
| | brown | white | blue | black |

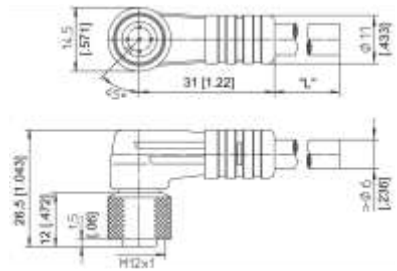
Applicable for cable carriers

| | |
|------------------------|---------------------|
| Maximum movement speed | 3 m/s |
| Maximum acceleration | 5 m/s ² |
| Minimum bending radius | 10 x cable diameter |

**Connector cable M12, 5 pin
(angular coupling)**

shielded connector

The 5-core screened cable is supplied with a mating 5-pin 90° M12 connector at one end and 4 wires at the other end. Available lengths are 2 m, 5 m and 10 m.
Wire: cross sectional area 0.34 mm²
Cable diameter: 5.6 ±0.2 mm



Order code

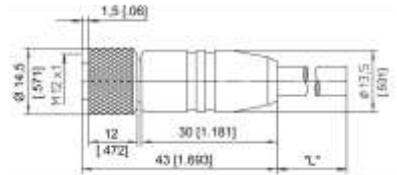
| | |
|-------|--|
| | KAB - xM - M12/5F/W - LITZE |
| IP69: | KAB - xM - M12/5F/W/69K - LITZE |

xM = length in m

**Connector cable M12, 5 pin
(straight coupling)**

shielded connector

The 5-core screened cable is supplied with a mating 5-pin M12 connector at one end and 4 wires at the other end. Available lengths are 2 m, 5 m and 10 m.
Wire: cross sectional area 0.34 mm²
Cable diameter: 5.6 ±0.2 mm



Order code

| | |
|-------|--|
| | KAB - xM - M12/5F/G - LITZE |
| IP69: | KAB - xM - M12/5F/G/69K - LITZE |

xM = length in m

| Signal wiring M12, 5 pin | Plug connection / Cable color | | | | |
|-----------------------------|-------------------------------|-------|------|-------|------|
| | 1 | 2 | 3 | 4 | 5 |
| | brown | white | blue | black | grey |

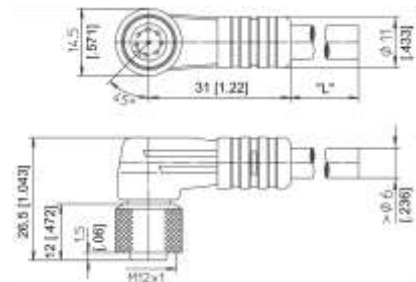
Applicable for cable carriers

| | |
|------------------------|---------------------|
| Maximum movement speed | 3 m/s |
| Maximum acceleration | 5 m/s ² |
| Minimum bending radius | 10 x cable diameter |

**Connector cable M12, 8 pin
(angular coupling)**

shielded connector

The 8-lead shielded cable is supplied with a mating 8-pin 90° M12 connector at one end and 8 wires at the other end. Available lengths are 2 m, 5 m and 10 m. Wire: cross sectional area 0.25 mm² Cable diameter: 6.3 ±0.2 mm



Order code

KAB - xM - M12/8F/W - LITZE

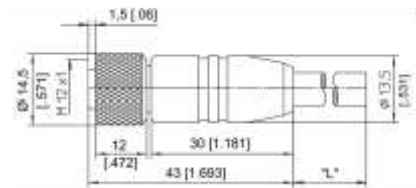
IP69: **KAB - xM - M12/8F/W/69K - LITZE**

xM = length in m

**Connector cable M12, 8 pin
(straight coupling)**

shielded connector

The 8-lead shielded cable is supplied with a mating 8-pin M12 connector at one end and 8 wires at the other end. Available lengths are 2 m, 5 m and 10 m. Wire: cross sectional area 0.25 mm² Cable diameter: 6.3 ±0.2 mm



Order code

KAB - xM - M12/8F/G - LITZE

IP69: **KAB - xM - M12/8F/G/69K - LITZE**

xM = length in m

| Signal wiring | Plug connection / cable color | | | | | | | |
|---------------|-------------------------------|-------|-------|--------|------|------|------|-----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| M12, 8 pin | white | brown | green | yellow | grey | pink | blue | red |

Applicable for cable carriers

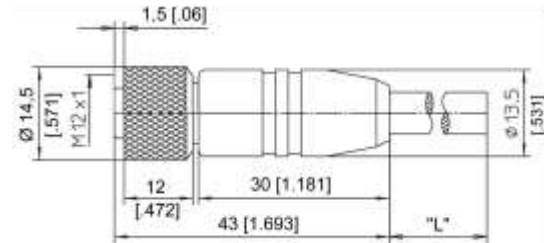
| | |
|------------------------|---------------------|
| Maximum movement speed | 3 m/s |
| Maximum acceleration | 5 m/s ² |
| Minimum bending radius | 10 x cable diameter |

Connector/bus cable M12, 5 pin CAN-Bus

The 5-lead shielded cable is supplied with a female 5 pin M12 connector at one end and a male 5 pin M12 connector at the other end.

Available lengths are 0.3 m, 2 m, 5 and 10 m.

Cable diameter: 6.7 ±0.2 mm



Order code

KAB - xM - M12/5F/G - M12/5M/G - CAN

IP69: **KAB - xM - M12/5F/G/69K - M12/5M/G/69K - CAN**

xM = length in m

T-connector for bus cable M12, 5 pin CAN-Bus

Order code

KAB - TCONN - M12/5M - 2M12/5F - CAN



Terminating resistor M12, 5 pin CAN-Bus

Order code

KAB - RTERM - M12/5M/G - CAN



Applicable for cable carriers

| | |
|------------------------|---------------------|
| Maximum movement speed | 3 m/s |
| Maximum acceleration | 5 m/s ² |
| Minimum bending radius | 10 x cable diameter |

Plug-in connector M12, 8 pin (straight coupling)

Order code:

CONN-M12-8F-G

Cable diameter
max. 6 ... 8 mm

