










 **WS10ZG**

Displacement sensor with  
measurement length up to  
2,000 mm



- Protection class IP65
- Zinc die cast/aluminum housing
- Optional with magnetic absolute encoder

### Product versions

 $\Omega$	 V / mA	 ADSSI	• Analog output, SSI output
 V / mA			• Analog output with magnetic encoder
 V / mA			• Analog output with magnetic encoder, programmable
 SSI			• Digital output SSI with magnetic encoder
 CAN			• Digital output CAN Bus with magnetic encoder
			• Incremental encoder output



WS10ZG - Cable Extension Position Sensor  
Version with analog output, SSI output

Specifications

		Order options
Measurement range	100 / 125 / 375 / 500 / 750 / 1000 / 1250 mm	<b>1</b> 100 / 125 / 375 / 500 / 750 / 1000 / 1250
Resolution	Analog: quasi infinite	
Output	Potentiometer 1 kΩ Voltage 0 ... 10 V Current 4 ... 20 mA, 2 wire Current 4 ... 20 mA, 3 wire Current output, programmable Voltage output, programmable Signal conditioner SSI 12 bit Signal conditioner SSI 14 bit Signal conditioner SSI 16 bit	<b>2</b> R1K 10V 420A 420T PMUI PMUV ADSI ADSI14 ADSI16
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)	<b>3</b> L10 L05
Sensing device	Precision potentiometer	
Material	Zinc diecast, aluminum measuring cable: stainless steel	
Protection class	IP65 (with mating connector only)	
Cable fixing	M4 cable fixing Cable clip	<b>4</b> M4 SB0
Connection	Connector M12, 8 pin	<b>5</b> M12
Temperature range	-20 ... +85 °C	
Weight	approx. 800 g	
EMC	DIN EN 61326-1:2013	

Order code

WS10ZG – **1** – **2** – **3** – **4** – **5**

Order example: WS10ZG – 1250 – 10V – L10 – M4 – M12

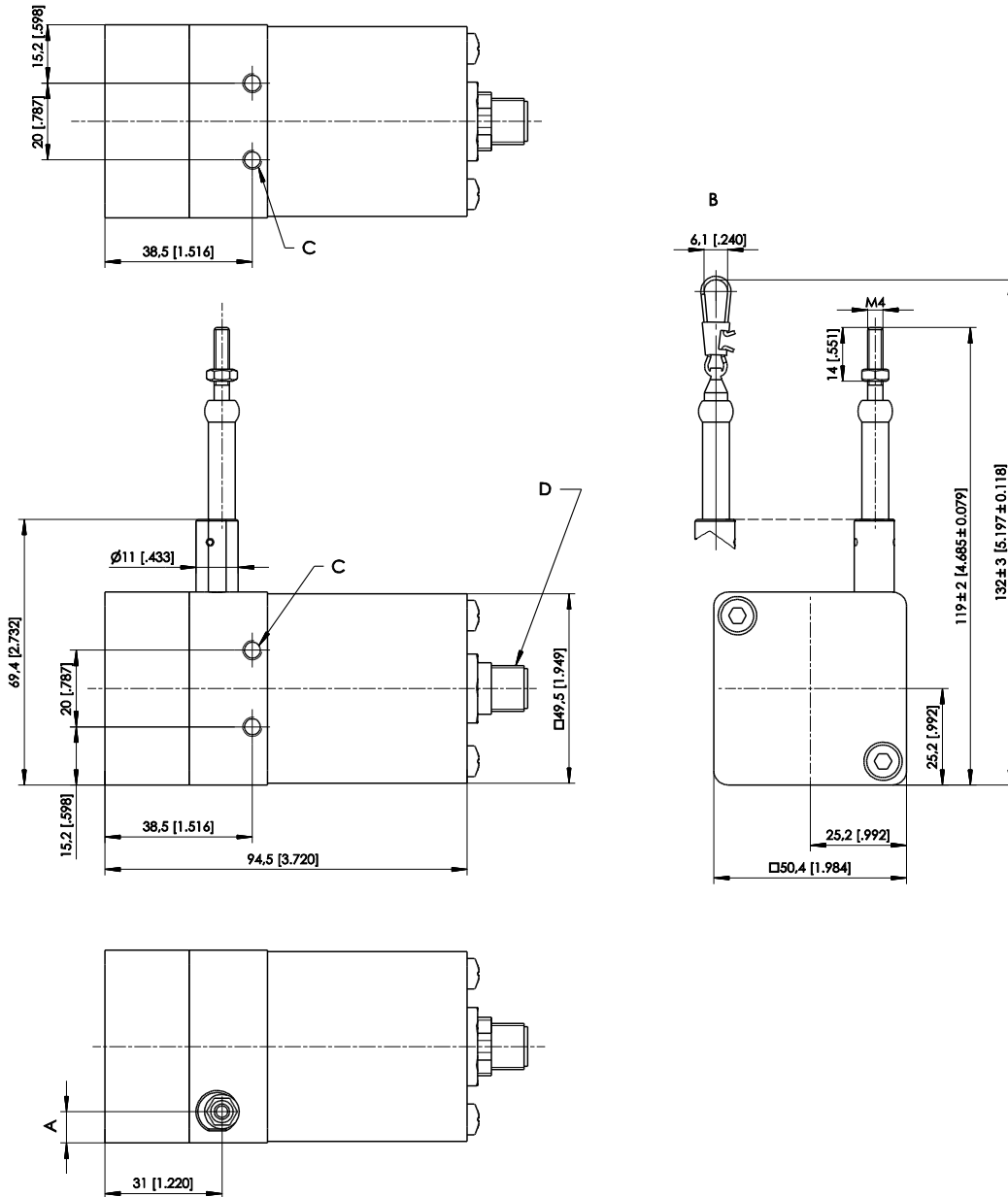
Accessories:

Connector cable (see page 34)

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

## 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 [.315] deep
- D – Connector M12

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



WS10ZG - Cable Extension Position Sensor  
Version with analog output with magnetic encoder

Specifications

		Order options
Measurement range	250 / 375 / 500 / 750 / 1000 / 1250 / 1500 / 2000 mm	<b>1</b> 250 / 375 / 500 / 750 / 1000 / 1250 / 1500 / 2000
Resolution	<0.002% f.s.	
Output	Voltage 0.5 ... 10 V Voltage 0.5 ... 4.5 V Current 4 ... 20 mA, 3 wire	<b>2</b> U2 U8 I1
Signal characteristics	Increasing signal (e.g. 4 ... 20 mA) Decreasing signal (e.g. 20 ... 4 mA)	<b>3</b> A D
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)	<b>4</b> L10 L05
Sensing device	Magnetic absolute encoder	
Material	Zinc diecast, aluminum measuring cable: stainless steel	
Protection class	IP65 (with mating connector only)	
Cable fixing	M4 cable fixing Cable clip	<b>5</b> M4 SB0
Connection	Connector M12, 5 pin (standard) Connector M12, 8 pin ( optional)	<b>6</b> M12A5 M12A8
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**

Order example: WS10ZG – 1250 – U2 – A – L10 – M4 – M12A5

Accessories:

Connector cable (see page 32)



WS10ZG - Cable Extension Position Sensor  
Version with analog output with magnetic encoder, programmable

Specifications

		Order options
Measurement range	250 / 375 / 500 / 750 / 1000 / 1250 / 1500 / 2000 mm	<b>1</b> 250 / 375 / 500 / 750 / 1000 / 1250 / 1500 / 2000
Resolution	<0.002% f.s.	
Output	Voltage 0.5 ... 10 V, programmable Voltage 0.5 ... 4.5 V, programmable Current 4 ... 20 mA, 3 wire, programmable	<b>2</b> U2/PMU U8/PMU I1/PMU
Signal characteristics	Increasing signal (e.g. 4 ... 20 mA) Decreasing signal (e.g. 20 ... 4 mA)	<b>3</b> A D
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)	<b>4</b> L10 L05
Sensing device	Magnetic absolute encoder	
Material	Zinc diecast, aluminum measuring cable: stainless steel	
Protection class	IP65 (with mating connector only)	
Cable fixing	M4 cable fixing Cable clip	<b>5</b> M4 SB0
Connection	Connector M12, 5 pin	<b>6</b> M12A5
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	-	<b>1</b>	-	<b>2</b>	-	<b>3</b>	-	<b>4</b>	-	<b>5</b>	-	<b>6</b>
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Order example: WS10ZG – 1250 – U2/PMU – A – L10 – M4 – M12A5

Accessories:

Connector cable (see page 33)



WS10ZG - Cable Extension Position Sensor  
Version with digital output SSI with magnetic encoder

Specifications

			Order options
Measurement range	250 / 375 / 500 / 750 / 1000 / 1250 / 1500 / 2000 mm	<b>1</b>	250 / 375 / 500 / 750 / 1000 / 1250 / 1500 / 2000
Resolution	10 µm 50 µm 100 µm	<b>2</b>	10 50 100
Output	SSI synchronous serial interface	<b>3</b>	MSSI
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)	<b>4</b>	L10 L05
Sensing device	Magnetic absolute encoder		
Material	Zinc diecast, aluminum measuring cable: stainless steel		
Protection class	IP65 (with mating connector only)		
Cable fixing	M4 cable fixing Cable clip	<b>5</b>	M4 SB0
Connection	Connector M12, 8 pin	<b>6</b>	M12A8
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**

Order example: WS10ZG – 1250 – 50 – MSSI – L10 – M4 – M12A8

Accessories:

Connector cable (see page 34)



WS10ZG - Cable Extension Position Sensor  
Version with digital output CAN Bus with magnetic encoder

Specifications

		Order options	
Measurement range	100 / 125 / 375 / 500 / 750 / 1000 / 1250 / 2000 mm	<b>1</b>	100 / 125 / 375 / 500 / 750 / 1000 / 1250 / 2000
Resolution	setting via CAN Bus		
Output	CANopen CAN SAE J1939	<b>2</b>	MCANOP MCANJ1939
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)	<b>3</b>	L10 L05
Sensing device	Magnetic absolute encoder		
Material	Zinc diecast, aluminum measuring cable: stainless steel		
Protection class	IP65 (with mating connector only)		
Cable fixing	M4 cable fixing Cable clip	<b>4</b>	M4 SB0
Connection	Connector M12, 5 pin	<b>5</b>	M12/CAN
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**

Order example: WS10ZG – 1250 – MCANOP – L10 – M4 – M12/CAN

Accessories:

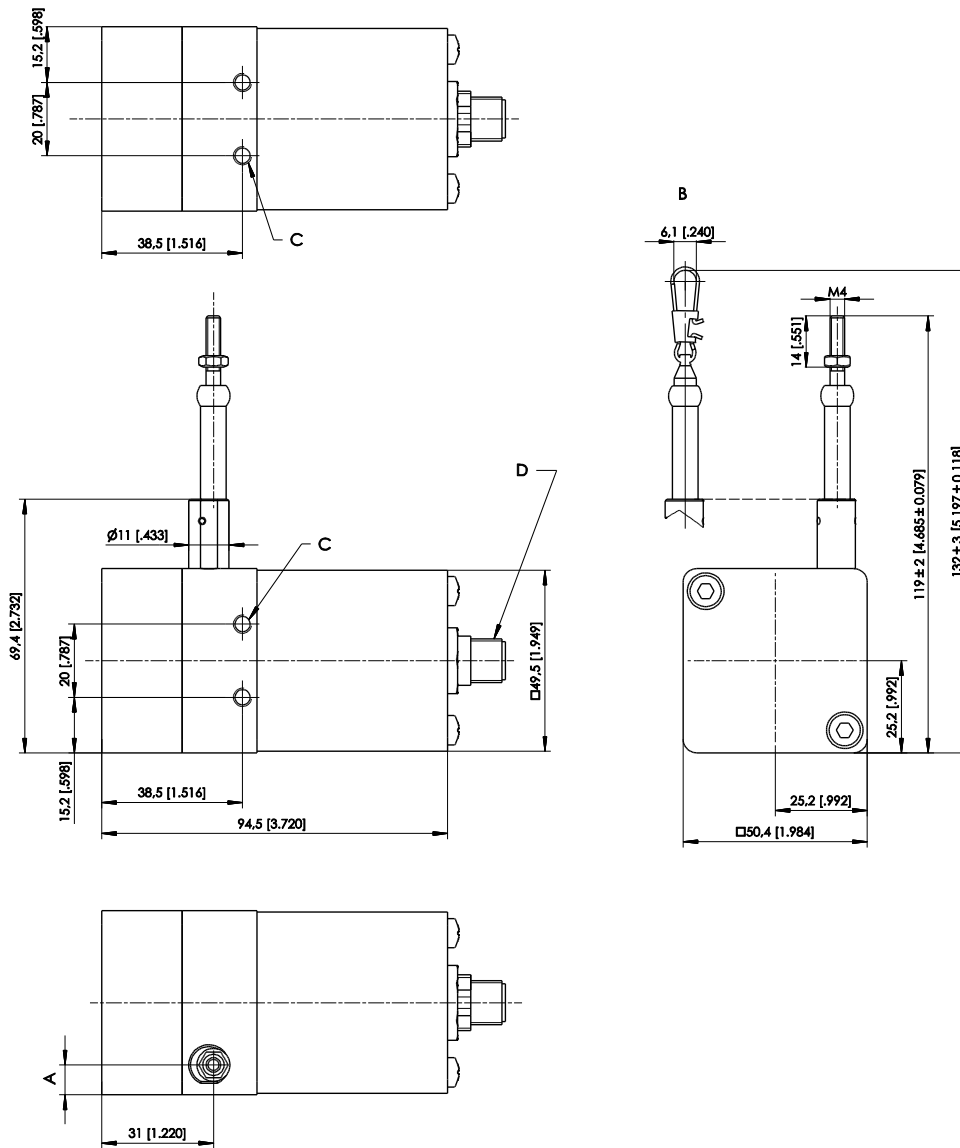
Connector cable (see page 35)



Cable forces typical at = 20 °C	Measurement range	Maximum pull-out force	Minimum pull-in force
	[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

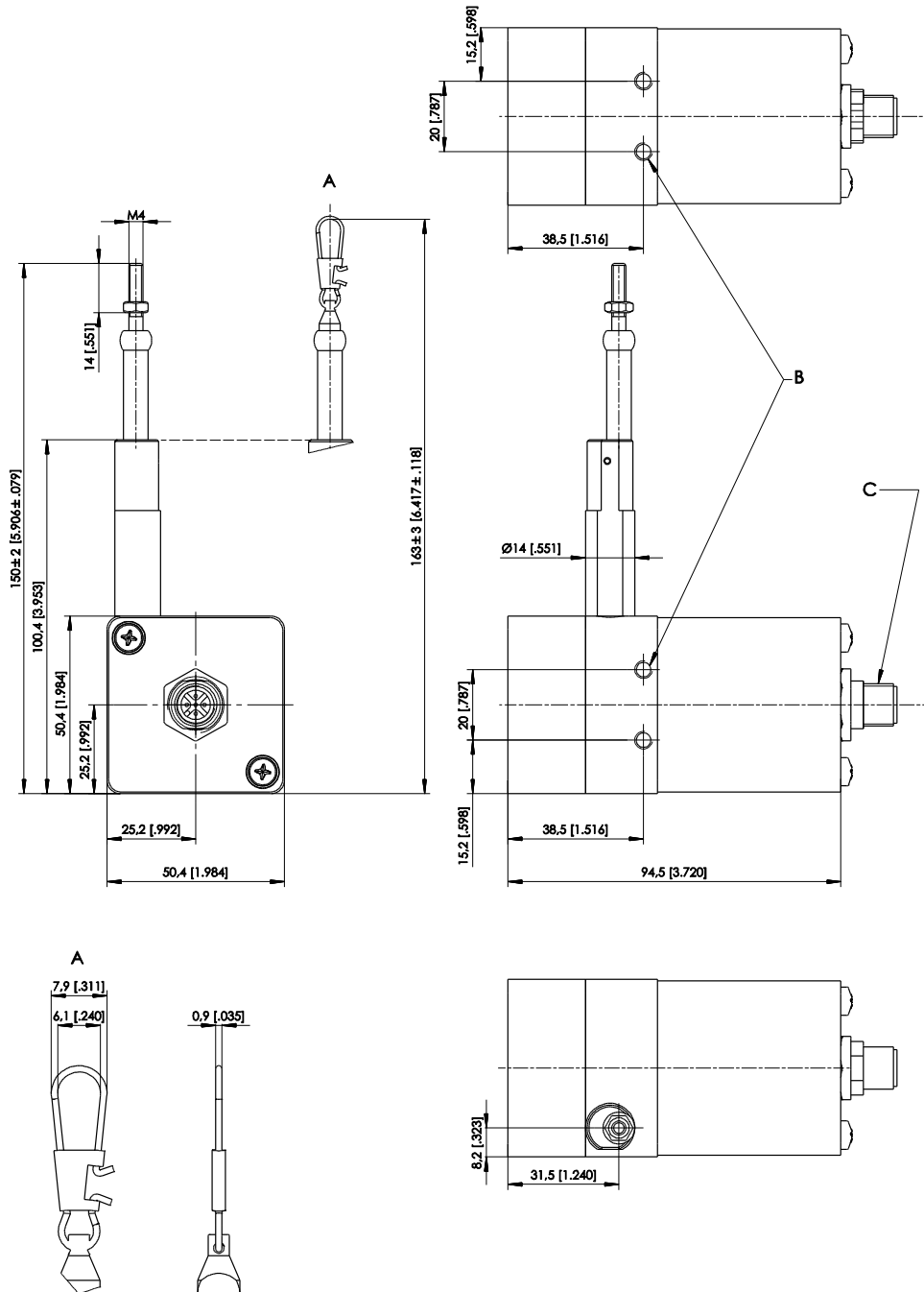


Dimensions in mm	Measurement range	A
	250	16.7
	375; 750	12.4
	500; 1000; 1250	8

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

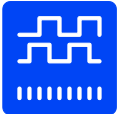
Dimensions in mm [inch]  
Dimensions informative only.  
For guaranteed dimensions consult factory.

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.  
For guaranteed dimensions consult factory.



WS10ZG - Cable Extension Position Sensor  
Version with incremental encoder output

Specifications

		Order options
Measurement range	1250 mm	<b>1</b> 1250
Resolution	10 pulses/mm or 40 edges/mm 25 pulses/mm or 100 edges/mm (other numbers of pulses on request)	<b>2</b> 10 25
Output	Incremental output 5 ... 30 V Incremental encoder TTL compatible Incremental encoder HTL compatible	<b>3</b> PP530 IE41L IE41HI
Linearity	±0.05% f.s.	
Sensing device	Incremental encoder	
Material	Zinc diecast, aluminum measuring cable: stainless steel	
Protection class	IP65 (with mating connector only)	
Cable fixing	M4 cable fixing Cable clip	<b>4</b> M4 SB0
Connection	Connector M12, 8 pin	<b>5</b> M12
Temperature range	-20 ... +85 °C	
Weight	approx. 800 g	
EMC	DIN EN 61326-1:2013	

Order code

WS10ZG – **1** – **2** – **3** – **4** – **5**

Order example: WS10ZG – 1250 – 10 – PP530 – M4 – M12

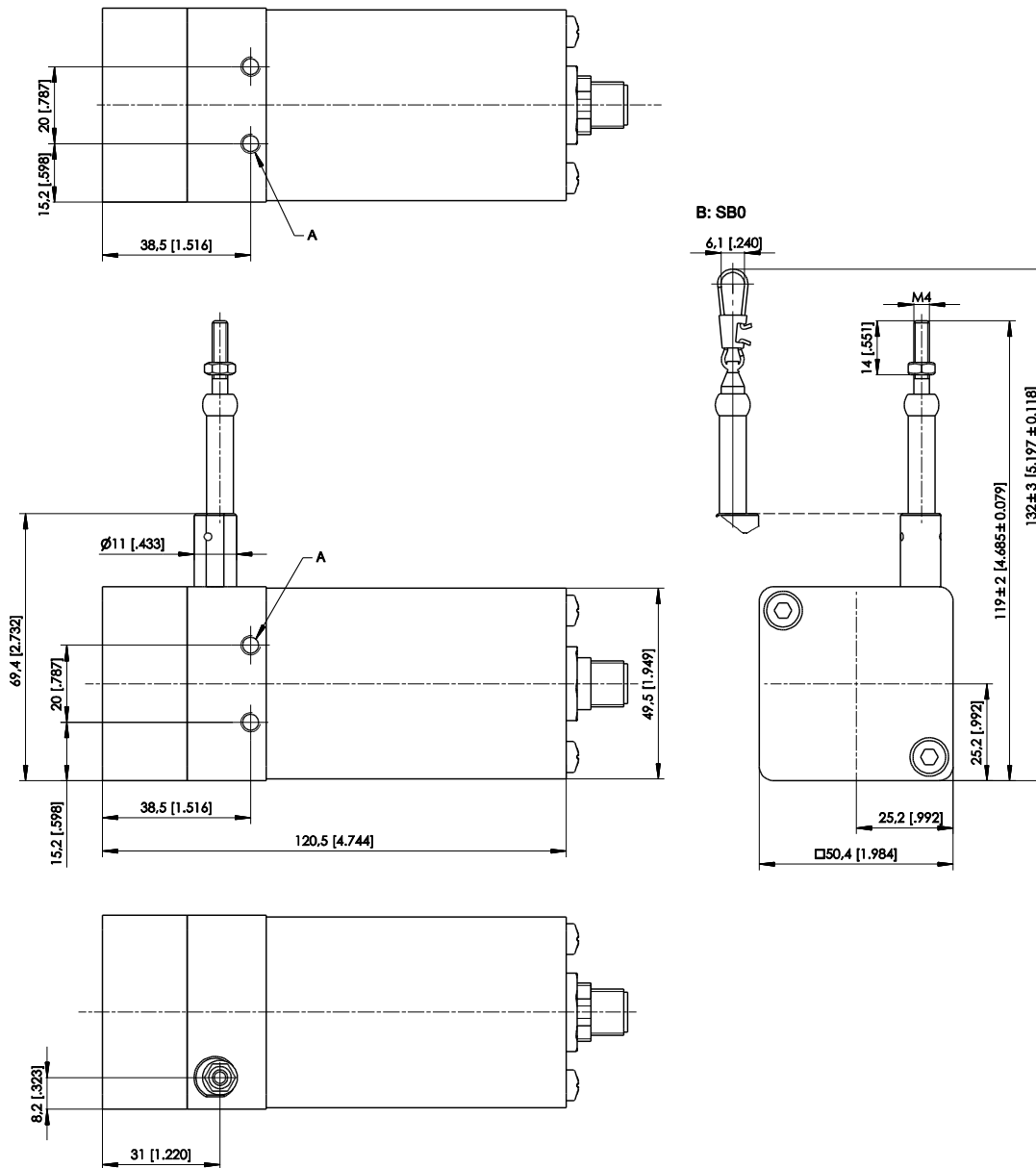
Accessories:

Connector cable (see page 34)

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

## 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

<b>R1K</b> Potentiometer 	Excitation voltage	32 V DC max. at 1 kΩ (max. power 1 W)
	Potentiometer impedance	1 kΩ ±10 %
	Thermal coefficient	±25 x 10 <sup>-6</sup> / °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 following 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

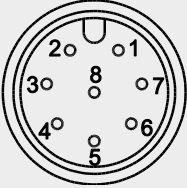
- The metal wiper of the potentiometer must be protected against current load

Additional information:


[https://www.asm-sensor.com/en/downloads.html?file=files/asmTheme/pdf/ws\\_poti\\_technote\\_en.pdf](https://www.asm-sensor.com/en/downloads.html?file=files/asmTheme/pdf/ws_poti_technote_en.pdf)

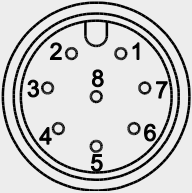
Signal wiring	Signal	Connector pin no.	Cable color
<b>Connector M12, 8 pin</b>  View to the sensor connector	Poti +	1	white
	Poti GND	2	brown
	Poti slider	3	green
	-	4	yellow
	-	5	grey
	-	6	pink
	-	7	blue
	-	8	red

<b>10V</b> Voltage output 	Excitation voltage	18 ... 27 V DC non stabilized
	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 <sup>-6</sup> / °C f.s.
	Protection	Reverse polarity, short circuit
	Output noise	0.5 mV <sub>RMS</sub>
	Operating temperature	Refer to output specification
	EMC	DIN EN 61326-1:2013


Signal wiring	Output signals	Connector pin no.	Cable color
<b>Connector M12, 8 pin</b>  View to the soldering side of mating connector	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

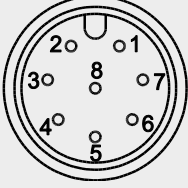
\*: internally connected

<b>420A</b> 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 <sub>eff</sub>
	Operating temperature	Refer to output specification
	EMC	DIN EN 61326-1:2013


Signal wiring	Output signals	Connector pin no.	Cable color
<b>Connector M12, 8 pin</b>  View to the sensor connector	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



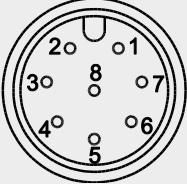
<b>420T</b> Current output (3 wire) 	Excitation voltage	18 ... 27 V DC non stabilized
	Excitation current	40 mA max.
	Load resistor	350 Ω max.
	Output current	4 ... 20 mA equivalent for 0 ... 100 % range
	Stability (temperature)	±50 x 10 <sup>-6</sup> / °C f.s.
	Protection	Reverse polarity, short circuit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

Signal wiring	Output signals	Connector pin no.	Cable color
<b>Connector M12, 8 pin</b>  View to soldering side of mating connector	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

\*: internally connected

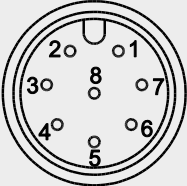
<b>PMUV</b> Voltage output programmable <b>PMUI</b> Current output programmable 	Excitation voltage	18 ... 27 V DC
	Excitation current	50 mA max.
	Voltage output <b>PMUV</b>	0 ... 10 V
	Output current	10 mA max.
	Output load	1 kΩ min.
	Current output <b>PMUI</b>	4 ... 20 mA (3 wire)
	Working resistance	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 <sup>-6</sup> / °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	Output signals	Connector pin no.	Cable color
 <p>View to soldering side of mating connector</p>	Excitation +	1	white
	Excitation GND*	2	brown
	Signal +		3
	Signal GND*	4	yellow
	Not connected	5	grey
	Not connected	6	pink
	ZERO	7	blue
	END	8	red

\*: internally connected

### PMUI2

Signal wiring Connector M12, 8 pin	Output signals	Connector pin no.	Cable color
 <p>View to soldering side of mating connector</p>	Excitation +	1	white
	Excitation GND*	2	brown
	Not connected		3
	Not connected	4	yellow
	Signal +	5	grey
	Signal GND*	6	pink
	ZERO	7	blue
	END	8	red

\*: internally connected


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## Outputs .../PMUV, PMUI, PMUI2

### Programming of the start and end value by the customer

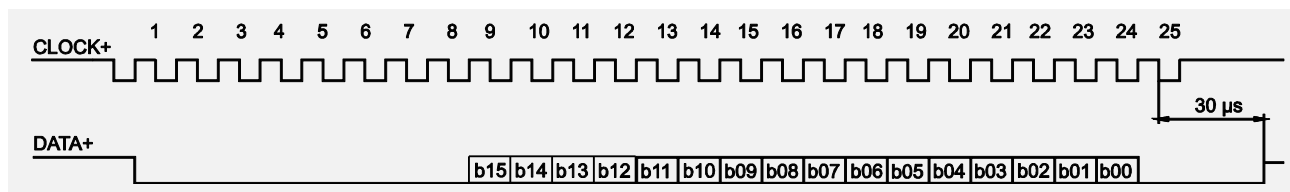
Teach-In of start and end value for the outputs PMUV, PMUV and PMUI2 is provided by two binary signals ZERO and END. At the start position connect signal ZERO for a short period to GND via push button. At the end position connect signal END for a short period to GND. The scaling range will be stored 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

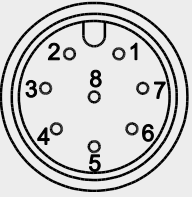
<b>ADSI</b> A/D converted synchronous serial 	Excitation voltage	11 ... 27 V DC
	Excitation current	200 mA max.
	Interface	EIA RS422, RS485, short-circuit proof
	Clock frequency	70 ... 500 kHz
	Code	Gray-Code, continuous progression
	Delay between pulse trains	30 µs min.
	Resolution	ADSI16: 16 bit (65536 counts) f.s. ADSI14: 14 bit (16384 counts) f.s. ADSI: 12 bit (4096 counts) f.s.
	Stability (temperature)	±50 x 10 <sup>-6</sup> / °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	

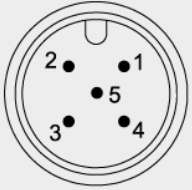
Signal wiring	Output signals	Connector pin no.	Cable color
<b>Connector M12, 8 pin</b>  View to soldering side of mating connector	Excitation +	1	white
	Excitation GND (0 V)	2	brown
	CLOCK	3	green
	$\overline{\text{CLOCK}}$	4	yellow
	DATA	5	grey
	$\overline{\text{DATA}}$	6	pink
	Not connected	7	blue
	Not connected	8	red

## Magnetic encoder, analog output


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


<b>U8</b> 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)	$\pm 50 \times 10^{-6}$ / °C f.s. (typical)
	Protection	Reverse polarity, short circuit
	Operating temperature	See specification of the respective sensor
	EMC	DIN EN 61326-1:2013


<b>I1</b> 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 <sub>L</sub>	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

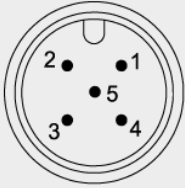
Signal wiring	Output signals	Connector pin no.	Cable color
<b>Connector M12, 5 pin</b>  View to the sensor connector	Excitation +	1	brown
	Signal	2	white
	GND	3	blue
	Do not connect!	4	black
	Do not connect!	5	(grey)

### Magnetic encoder, analog output, programmable

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

<b>U8/PMU</b> 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)	$\pm 50 \times 10^{-6}$ / °C f.s. (typical)
	Protection	Reverse polarity, short circuit
	Operating temperature	See specification of the respective sensor
	EMC	DIN EN 61326-1:2013

<b>I1/PMU</b> 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 <sub>L</sub>	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	Output signals	Connector pin no.	Cable color
<b>Connector M12, 5 pin</b>  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.

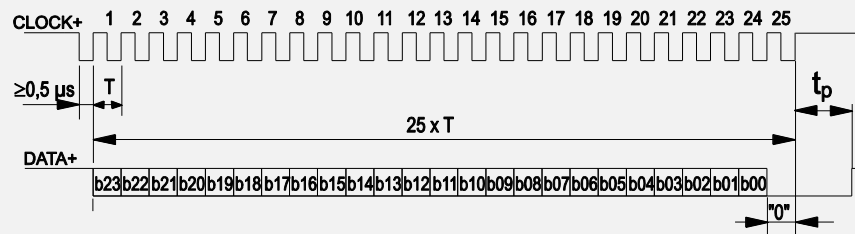


## Magnetic encoder, digital output

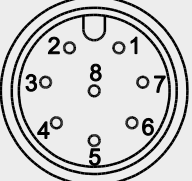
<b>MSSI</b> Synchronous serial SSI 	Interface	EIA RS-422
	Excitation voltage	8 ... 36 V DC
	Excitation current	19 mA typical at 24 V DC 35 mA typical at 12 V DC max. 80 mA
	Clock frequency	100 kHz ... 500 kHz
	Code	Gray-Code, continuous progression
	Delay between pulse trains ( $t_p$ )	30 $\mu$ s min.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


### Data format

(Train of 26 pulses)

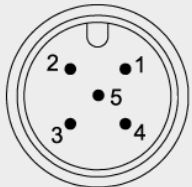


Transmission rate	Cable length	Baud rate	Note:
	50 m	100-400 kHz	Extension of the cable length will reduce the maximum transmission rate.
	100 m	100-300 kHz	


Signal wiring	Output signals	Connector pin no.	Cable color
<b>Connector M12, 8 pin</b>  View to the 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

<b>MCANOP</b> 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

<b>Specifications</b>	Excitation voltage	8 ... 36 V DC
	Excitation current	20 mA typical at 24 V DC 40 mA typical at 12 V DC 80 mA max.
	Measuring rate	1 kHz (asynchronous)
	Stability (temperature)	$\pm 50 \times 10^{-6}/^{\circ}\text{C}$ f.s. (typical)
	Repeatability	1 LSB
	Operating temperature	See specification of the respective sensor
	Protection	Reverse polarity, short circuit
	Dielectric strength	1 kV (V AC, 50 Hz, 1 min.)
	EMC	EN 61326-1:2013

Signal wiring	Output signals	Connector pin no.	Cable color
<b>Connector M12, 5 pin</b> 	Shield	1	brown
	Excitation +	2	white
	GND	3	blue
	CAN-H	4	black
	CAN-L	5	grey

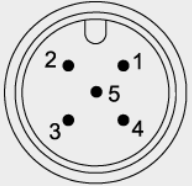
View to the sensor connector

<b>MCANJ1939</b> 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

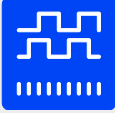
<b>NAME Fields</b>	Arbitrary address capable	1	Yes
	Industry group	0	Global
	Vehicle system	7Fh (127d)	Non specific
	Vehicle system instance	0	
	Function	FFh (255d)	Non specific
	Function instance	0	
	ECU instance	0	
	Manufacturer	145h (325d)	Manufacturer ID
	Identity number	0nnn	Serial number 21 bit

<b>Parameter Group Numbers (PGN)</b>	Configuration data	PGN EF00h	Proprietary-A (PDU1 peer-to-peer)
	Process data	PGN FFnnh	Proprietary-B (PDU2 broadcast); nn Group Extension (PS) configurable

<b>Specifications</b>	Excitation voltage	8 ... 36 V DC
	Excitation current	20 mA typical at 24 V DC 40 mA typical at 12 V DC max. 80 mA
	Measuring rate	1 kHz (asynchronous)
	Stability (temperature)	±50 x 10 <sup>-6</sup> /°C f.s. (typical)
	Repeatability	1 LSB
	Operating temperature	See specification of the respective sensor
	Protection	Reverse polarity, short circuit
	Dielectric strength	1 kV (V AC, 50 Hz, 1 min.)
	EMV	EN 61326-1:2013

Signal wiring	Output signals	Connector pin no.	Cable color
<b>Connector M12, 5 pin</b>  View to the sensor connector	Shield	1	brown
	Excitation +	2	white
	GND	3	blue
	CAN-H	4	black
	CAN-L	5	grey

## Incremental output

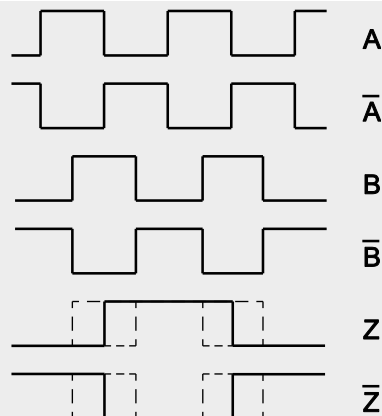
<b>PP530</b> Incremental interface 	Excitation voltage	5 ... 30 V DC
	Excitation current	25 mA typ. (w/o load), 200 mA max.
	Output frequency	200 kHz max.
	Output	Linedriver, Push-Pull, CMOS, TTL and HTL compatible
	Output current	30 mA max.
	Output voltage	Depends on the excitation voltage
	Saturation voltage high/low	$I_a < 10 \text{ mA}, U_b 5 \text{ V}/24 \text{ V}: < 0,5 \text{ V}$ $I_a < 30 \text{ mA}, U_b 5 \text{ V}/24 \text{ V}: < 1 \text{ V}$
	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

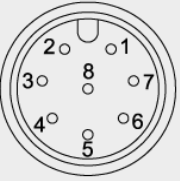
### NOTICE


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

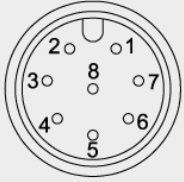
- Prevent unused output signals (e.g.  $\overline{A}/\overline{B}/\overline{Z}$ ) from unintentionally being shorted with each other or any other voltage like ground, excitation + or shield.
- Isolate and secure unused output wires.

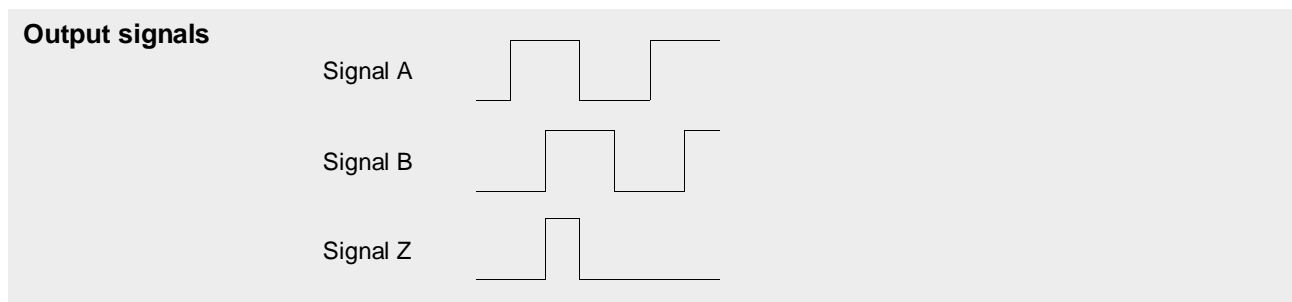
### Output signals



Signal wiring	Output signals	Connector pin no.	Cable color
<b>Connector M12, 8 pin</b>  View to soldering side of mating connector	Excitation +	1	white
	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

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 <sup>-6</sup> / °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	

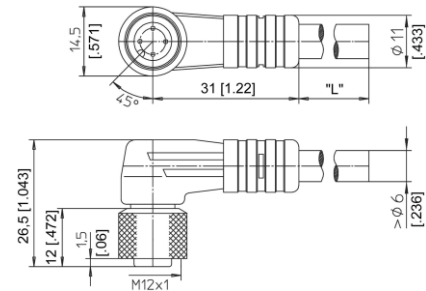
Signal wiring WS10 Connector M12, 8 pin	Output signals	Connector pin no.	Cable color
 <p>View to the sensor connector</p>	Excitation +	1	white
	Excitation GND	2	brown
	Signal A	4	yellow
	Signal $\bar{A}$	6	pink
	Signal B (A + 90°)	3	green
	Signal $\bar{B}$	5	grey
	Signal Z (reference pulse)	7	blue
	Signal $\bar{Z}$	8	red



**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 mm<sup>2</sup>  
Cable diameter: 5.6 ±0.2 mm



**Order code**

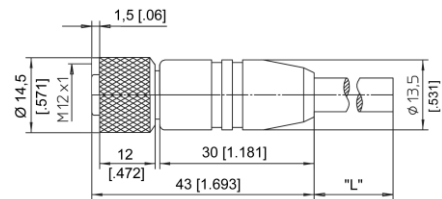
	<b>KAB - xM - M12/4F/W - LITZE</b>
IP69:	<b>KAB - xM - M12/4F/W/69K - LITZE</b>

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 mm<sup>2</sup>  
Cable diameter: 5.6 ±0.2 mm



**Order code**

	<b>KAB - xM - M12/4F/G - LITZE</b>
IP69:	<b>KAB - xM - M12/4F/G/69K - LITZE</b>

xM = length in m

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

**Applicable for cable carriers**

Maximum movement speed	3 m/s
Maximum acceleration	5 m/s <sup>2</sup>
Minimum bending radius	10 x cable diameter



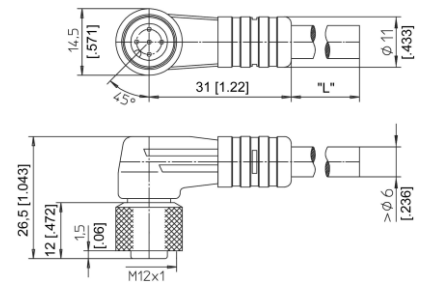
## Connector cable M12, 5 pin (angular coupling)

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 mm<sup>2</sup>

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

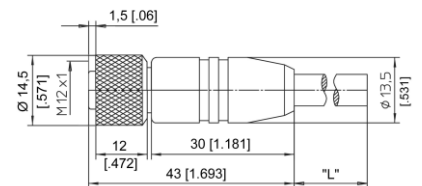
## Connector cable M12, 5 pin (straight coupling)

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 mm<sup>2</sup>

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

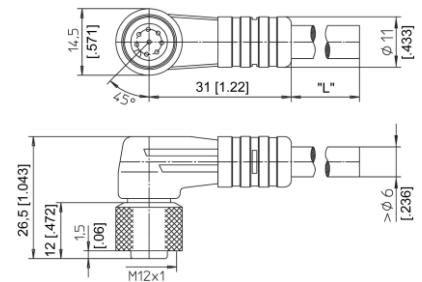
### Applicable for cable carriers

Maximum movement speed	3 m/s
Maximum acceleration	5 m/s <sup>2</sup>
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 mm<sup>2</sup>  
Cable diameter: 6.3 ±0.2 mm



#### Order code

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

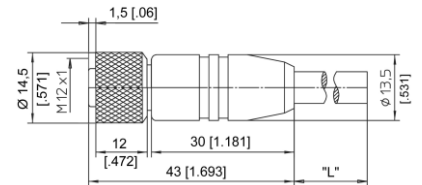
IP69: **KAB - xM - M12/8F/W/69K - LITZE**

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 mm<sup>2</sup>  
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 M12, 8 pin	Plug connection / cable color							
	1	2	3	4	5	6	7	8
	white	brown	green	yellow	grey	pink	blue	red

#### Applicable for cable carriers

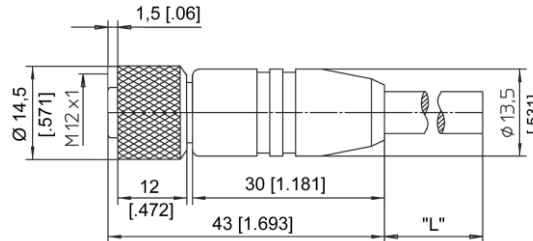
Maximum movement speed	3 m/s
Maximum acceleration	5 m/s <sup>2</sup>
Minimum bending radius	10 x cable diameter

### 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 <sup>2</sup>
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

