ASM®

perfect in sensors.

POSIWIRE®

Cable Extension Position Sensors

Product catalog

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Company Profile

ASM – Your partner worldwide

With more than 35 years of company tradition ASM is your expert partner for mechatronic displacement, angle and inclination sensors. ASM global headquarters in Moosinning, Germany, represent the heart of the company and are the center for sensor research, development and manufacturing. With a global sales network of more than 30 distributors and company subsidiaries ASM ensures worldwide accessibility to its customers.

The ASM product program includes various sensor technologies and comprises seven product lines offering a broad range of innovative solutions to measure linear displacement, angle and inclination.

Product range

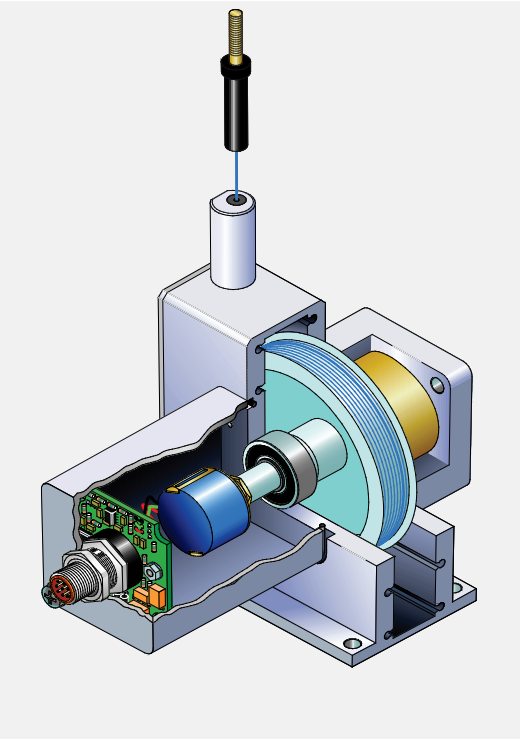
POSIWIRE® Cable Extension Position Sensors
POSITAPE® Tape Extension Position Sensors
POSICHRON® Magnetostrictive Position Sensors
POSIMAG® Magnetic Scale Position Sensors
POSIROT® Magnetic Angle Sensors
POSIHALL® Magnetic Multiturn Angle Sensors
POSITILT® Inclinometers

Quality and reliability

ASM high-quality products are subjected to a stringent quality management certified according to DIN EN ISO 9001:2008. Your application specific requests are evaluated by ASM product specialists in a comprehensive technical consultation to find out which solution best meets your requirements – this can be a standard or a customer specific technology solution.

Advantages at a glance

Robust. Compact. Reliable.
POSIWIRE® cable extension position sensors capture linear position either absolutely or incrementally using a measuring cable made from stainless steel. Due to their robustness, easy and space-saving installation and the availability of measuring lengths up to 60,000 mm, POSIWIRE® position sensors are the standard solution for many applications.
New options include the incorporation of magnetic absolute encoders into the POSIWIRE® range of sensors which can extend life in extreme environmental conditions.



Technical advantages

- Fast and easy installation
- Compact design
- Resistant to vibration and shock
- High protection class up to IP68/IP69
- Linearity up to 0.01%
- Measuring lengths up to 60,000 mm
- Numerous output types
- **NEW: also available with magnetic absolute encoder**

The functional principle
The POSIWIRE® sensor operates by attaching the measurement cable from the sensor directly to the moving object. The measurement cable is coiled onto a cable drum that is under constant spring tension. The unwinding process from the drum converts the linear movement of the measuring cable into an angular movement which is then captured by angle sensor elements (encoders or potentiometers) and converted into an electrical output signal. Subsequent signal conditioners convert the signal of the sensing element into voltage (0...10 Volt), current, (4...20 mA), or digital pulses (SSI) suitable for standard interfaces.

Applications

POSIWIRE® Cable Extension Sensors are designed for precise length measurement and positioning tasks as used in a broad range of applications, beginning with automation, process technology, medical engineering up to and including research and safety control systems.

Industrial Automation
For applications in the fields of elevator technology, conveying and storage systems, transport systems, automatic handling as well as for surveillance functions, POSIWIRE® Cable Extension Sensors offer a wide selection of interfaces, housing designs, measurement lengths and protection classes.

Medical Equipment
The POSIWIRE® sensor line offers solutions for cost-effective position monitoring in compact designs as utilized in applications such as surgical tables, patient beds and dentist chairs (e.g. models WS31, WS42, WS15KC and WS58C). Another typical application includes precision length measurement optimized for MRI, CT and “robot assisted” systems.

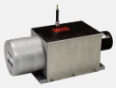
Mobile Working Machines
POSIWIRE® Cable Extension Sensors with magnetic, optional redundant encoder technology (WS61, WS85 and WS21) are fully optimized, easy to integrate and highly reliable solutions for the safety surveillance of telescopic systems for crane outriggers and crane booms.

Energy Generation and Environmental Control
Decentralized energy management and environmental protection facilities require monitoring systems over large distances. POSIWIRE® Cable Extension Sensors equipped with a high degree of environmental protection (e.g. WS10SG, WS61, WS85, WS21 and WS100M) represent the ‘eyes‘ of those systems and fulfill their task also in adverse environmental conditions, and sometimes even underwater.

Selection guide					
	Pages 11 - 37	Pages 38 - 95	Pages 96 - 118	Pages 119 - 129	Pages 130 - 140
Measurement range 0 … (mm)	**WS31 / WS42**	**WS10**	**WS12**	**WS61**	**WS85**
100		●	●		
125		●	●		
250	●	●			
375		●			
500	●	●	●		
750	●	●			
1000	●	●	●		
1250		●	●		
1500		●	●	●	
2000		●	●	●	
2500			●	●	
3000			●	●	
3500					
4000					●
5000					●
6000					●
6250					
7500					
8000					
10000					
12500					
15000					
17500					
20000					
25000					
30000					
40000					
60000					
Sensing device					
Precision potentiometer	●	●	●	-	-
Encoder (optical)	●	●	●	-	-
NEW: Magnetic Multiturn Encoder	-	●	●[1)]	●[1)]	●[1)]
Analog outputs, absolute					
Potentiometer 1 kΩ/10 kΩ	●	●	●	-	-
Voltage 0 … 10 V (0.5 … 10 V)	●	●	●	●	●
Current 4 … 20 mA	●	●	●	●	●
programmable (PMU)	-	●	●	●	●
Incremental outputs					
TTL / HTL / RS422	●	●	●	-	-
Digital outputs, absolute					
SSI	-	●	●	●	●
CAN / CANopen	-	●	●	●	●
Profibus, Interbus, DeviceNet etc.	-	-	-	-	-
Linearity					
up to	±0.20 %	±0,05 %	±0.05 %	±0.05 %	±0.05 %
Protection class					
Standard	IP50	IP65	IP67	IP67/IP69*	IP67/IP69*
Explosion protection (Dust-Ex)	-	●[2)]	●	-	-

* = connector version with a suitable connector

1) = optional redundant version 0.5 ... 10 V, 0.5 ... 4.5 V, 4 ... 20 mA, CANopen
2) = max. measurement range 1250 mm

							**Selection guide**
Pages 141 - 147	Pages 148 - 156	Pages 157 - 171	Pages 172 - 190	Pages 191 - 195	Pages 196 - 199	Pages 200 - 214	
WS17KT	**WS19KT**	**WS21**	**WS7.5**	**WS60**	**WS58C**	**WS100M**	**Measurement range 0 ... (mm)**
							100
							125
							250
							375
							500
							750
							1000
							1250
●							1500
●	●					●	2000
●					●		2500
●	●						3000
						●	3500
●							4000
●	●						5000
							6000
●							6250
						●	7500
	●	●					8000
●		●	●			●	10000
●		●					12500
●	●	●	●				15000
		●					17500
		●	●				20000
			●				25000
			●				30000
			●				40000
				●			60000
							Sensing device
●	-	-	●	-	-	●	Precision potentiometer
-	●	-	●	●	●	-	Encoder (optical)
-	-	●[1)]	●[1)]	-	-	●[1)]	**NEW: Magnetic Multiturn Encoder**
							Analog outputs, absolute
●	-	-	●	-	-	●	Potentiometer 1kΩ/10 kΩ
●	-	●	●	-	-	●	Voltage 0 ... 10 V (0.5 ... 10 V)
●	-	●	●	-	-	●	Current 4 ... 20 mA
●	-	●	●	-	-	●	programmable (PMU)
							Incremental outputs
-	●	-	●	●	-	-	TTL / HTL / RS422
							Digital outputs, absolute
●	●	●	●	●	●	●	SSI
●	●	●	●	●	●	●	CAN / CANopen
-	●	-	●	●	●	-	Profibus, Interbus, DeviceNet etc.
							Linearity
±0.05 %	±0.01 %	±0.05 %	±0.01 %	±0.025 %	±0.01 %	±0.05 %	up to
							Protection class
IP64	IP64	IP67/IP69[*]	IP52	IP52	IP50	IP68/IP69	Standard
-	-	-	-	-	-	-	Explosion protection (Dust-Ex)

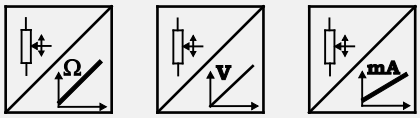
* = connector version with a suitable connector 1) = optional redundant version 0.5 ... 10 V, 0.5 ... 4.5 V, 4 ... 20 mA, CANopen

WS31C

Analog output

Sensor features

- **Measurement range up to 750 mm**
- **Protection class IP50**
- **Mounting selectable between mounting brackets or spacer nuts**
- **Analog output**



Specifications

Output	**R1K** = Potentiometer 1 kΩ **10V5** = Voltage 0.5 ... 10 V **420A** = Current 4 ... 20 mA, 2 wire
Resolution	Analog: quasi infinite
Linearity	±0.35% f.s., other values on request
Sensing device	Precision potentiometer
Housing material	Plastic measuring cable: stainless steel
Protection class	IP50
Connection	Cable output, standard length 2 m, Connector M8, 4-pin (only for output R1K)
Temperature range	-15 ... +60 °C, max. 85 % RH, non condensing
Weight	Approx. 130 g
Pull-out force	250 mm:1.5 N 500 mm:1.7 N 750 mm:1.2 N
EMC	DIN EN 61326-1:2013

Order code

WS31C – [1] – [2] – [3] – [4] – [5]

1 Measurement range (in mm)

250 / 500 / 750

2 Output

R1K	= Potentiometer 1 kΩ
10V5	= Voltage 0.5 ... 10 V
420A	= Current 4 ... 20 mA, 2 wire

3 Linearity

L35	= ±0.35%

4 Sensor mounting

1	= Mounting brackets
2	= Spacer nuts

5 Connection

KAB2M	= Cable output, standard length 2 m
M8	= Connector M8, 4 pin (only for output R1K)

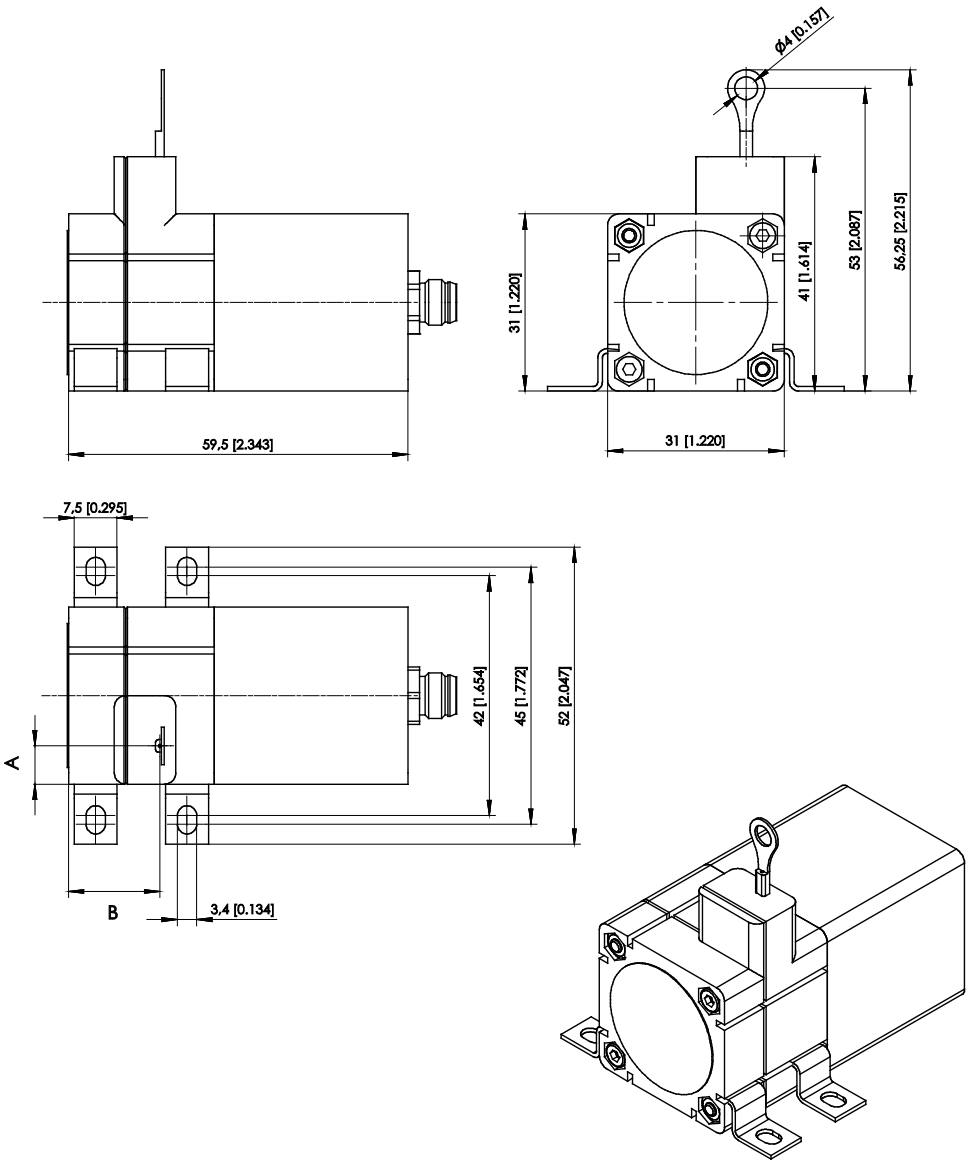
Order example

WS31C – 250 – 420A – L35 – 1 – KAB2M

Accessories:
Mounting bracket (see page 24)

Dimensions

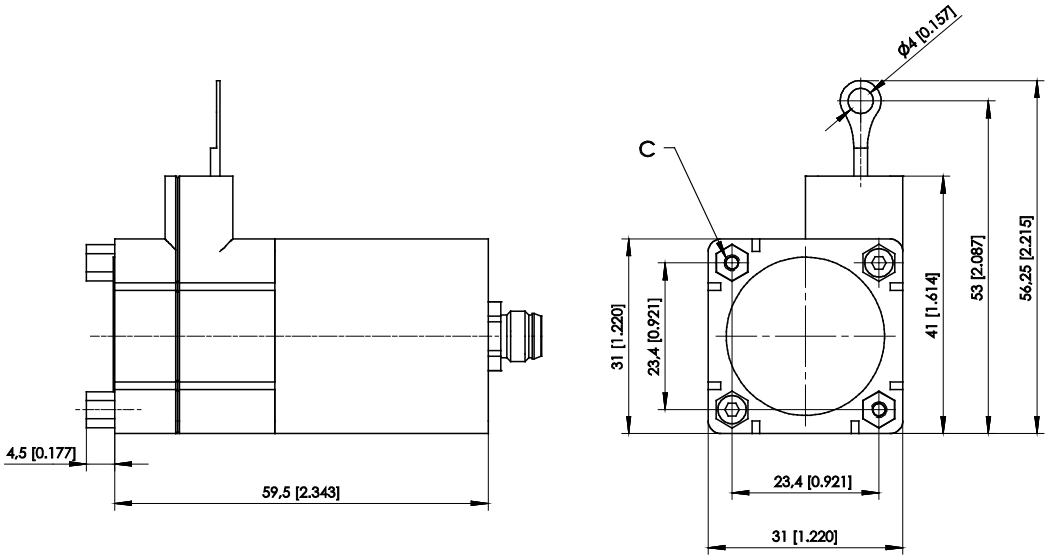
Measurement range 250 … 500 … 750 mm, R1K, 10V5, 420A, mounting brackets

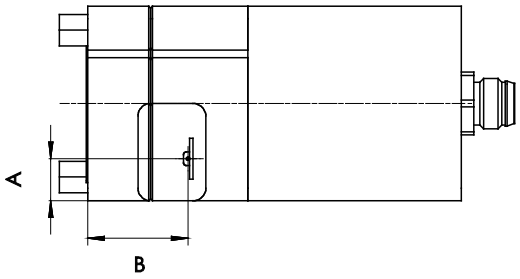


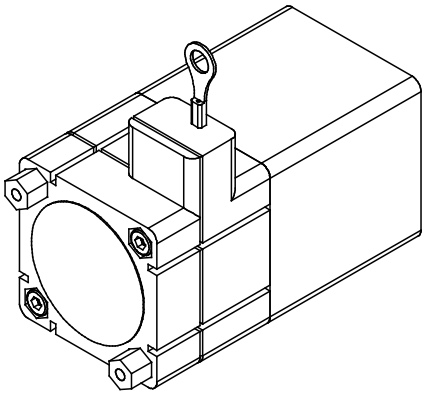
Dimensions in mm	Measurement range	A	B
	250; 500	6.7	16
	750	3.2	15.5

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

Measurement range 250 … 500 … 750 mm, R1K, 10V5, 420A, spacer nuts







Dimensions in mm	Measurement range	A	B
	250; 500	6.7	16
	750	3.2	15.5

C – M2,5 – 4 [.157] deep

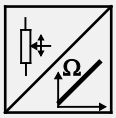
Dimensions in mm [inch]
Dimensions informative only.
For guaranteed dimensions consult factory.

WS31

Analog output

Sensor features

- **Measurement range up to 750 mm**
- **Protection class IP50**
- **Mounting selectable between mounting brackets or spacer nuts**
- **Analog output**



Specifications

Output	**R1K** = Potentiometer 1 KΩ
Resolution	Analog: quasi infinite
Linearity	±0.35% f.s., other values on request
Sensing device	Precision potentiometer
Housing material	Plastic measuring cable: stainless steel
Protection class	IP50
Connection	Potentiometer (soldering eye)
Temperature range	-15 ... +60 °C, max. 85 % RH, non condensing
Weight	Approx. 90 g
Pull-out force	250 mm:1.5 N 500 mm:1.7 N 750 mm:1.2 N
EMC	DIN EN 61326-1:2013

Order code

WS31 – 1 – 2 – 3 – 4

1 Measurement range (in mm)

250 / 500 / 750

2 Output

R1K = Potentiometer 1 KΩ

3 Linearity

L35 = ±0.35%

4 Sensor mounting

1 = Mounting brackets
2 = Spacer nuts

Order example

WS31 – 250 – R1K – L35 – 1

Accessories:
Mounting bracket (see page 24)

Incremental encoder output

Sensor features

- **Measurement range up to 500 mm**
- **Protection class IP50**
- **Mounting selectable between mounting brackets or spacer nuts**
- **Incremental encoder output**

Specifications

Output	**IE24LI** = Incremental encoder TTL compatible **IE24HI** = Incremental encoder HTL compatible
Resolution	10 pulses / mm (40 edges / mm)
Linearity	±0.20% f.s.
Sensing device	Incremental encoder
Housing material	Plastic measuring cable: stainless steel
Protection class	IP50
Connection	Cable output radial, length approx. 3 m
Temperature range	0 ... +60 °C, max. 85 % RH, non condensing
Weight	Approx. 95 g
Pull-out force	1.7 N
EMC	DIN EN 61326-1:2013

Order code

WS31 – **1** – **2** – **3** – **4**

1 Measurement range (in mm)

500

2 Resolution

10	= 10 pulses / mm

3 Output

IE24LI	= Incremental encoder TTL compatible
IE24HI	= Incremental encoder HTL compatible

4 Mounting

1	= Mounting brackets
2	= Spacer nuts

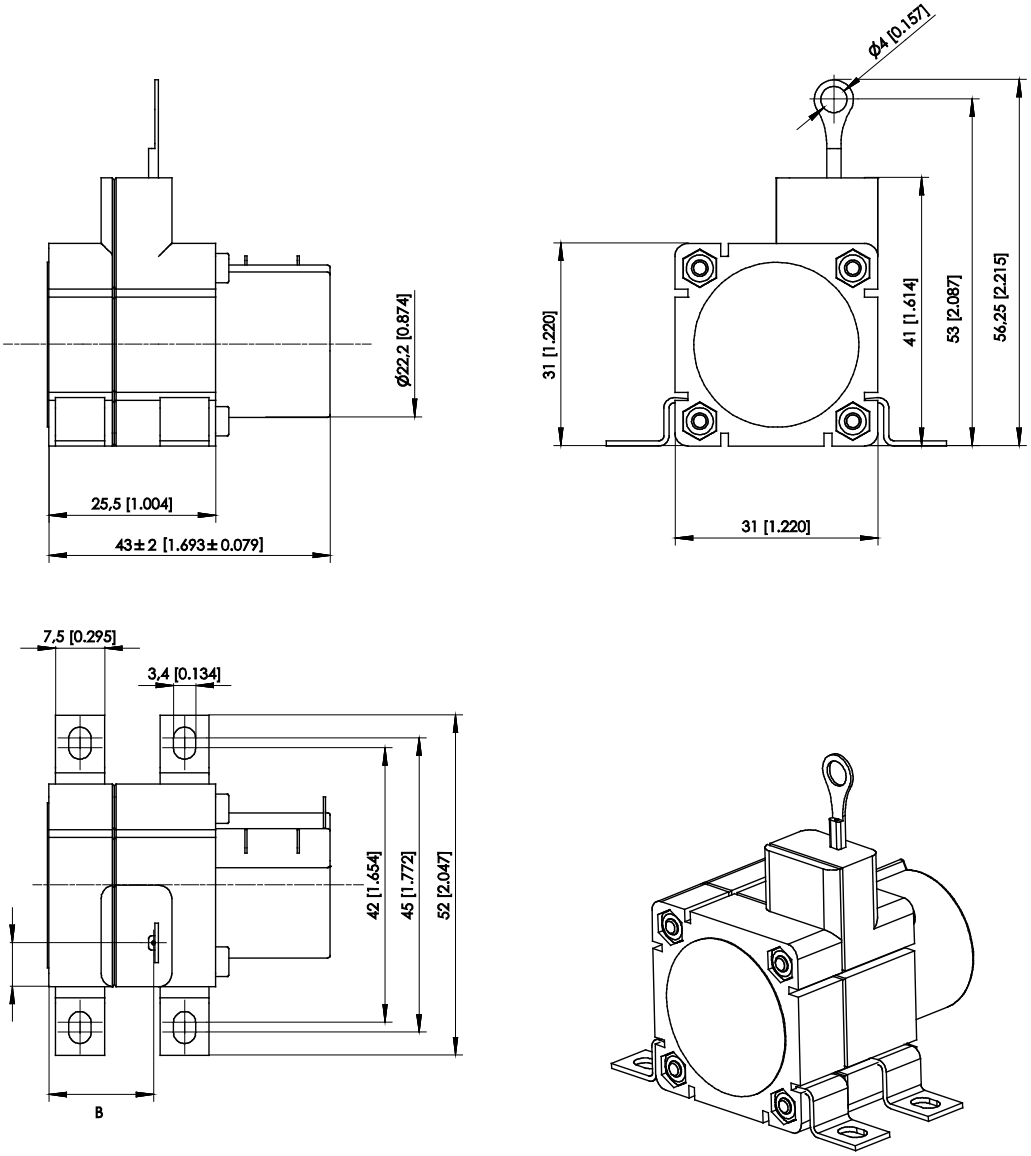
Order example

WS31 – 500 – 10 – IE24HI – 1

Accessories:
Mounting bracket (see page 24)

Dimensions

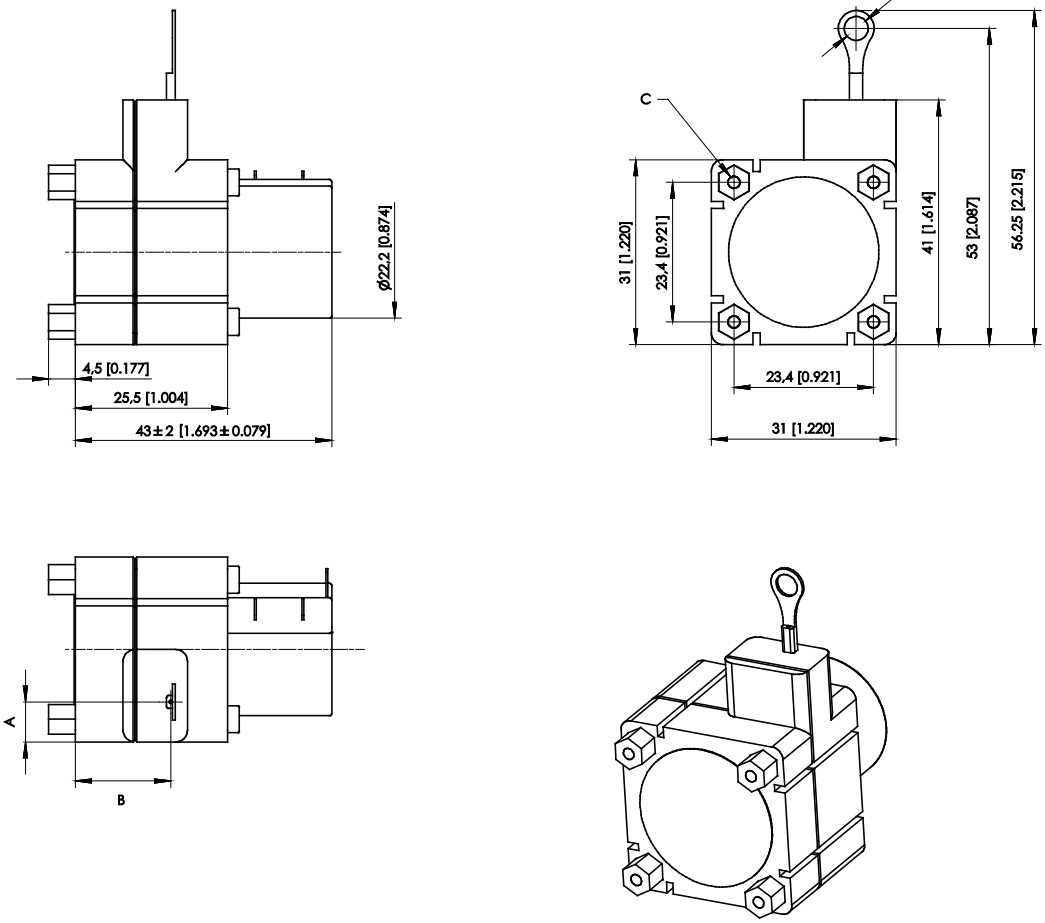
Measurement range 250 … 500 … 750 mm, R1K, mounting brackets



Dimensions in mm	Measurement range	A	B
	250; 500	6.7	16
	750	3.2	15.5

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

Measurement range 250 …500 … 750 mm, R1K, spacer nuts

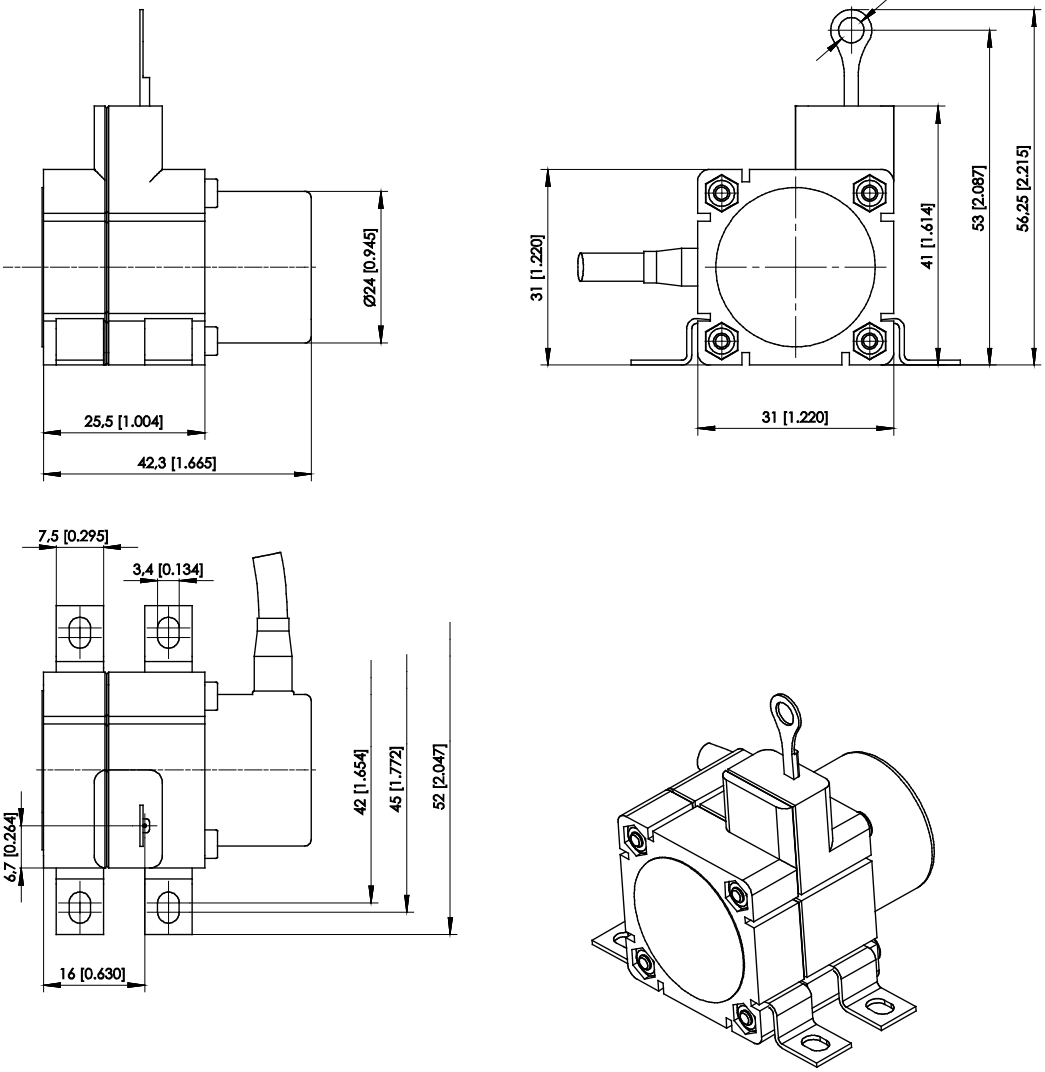


Dimensions in mm	Measurement range	A	B
	250; 500	6.7	16
	750	3.2	15.5

C – M2,5 – 4 [.157] deep

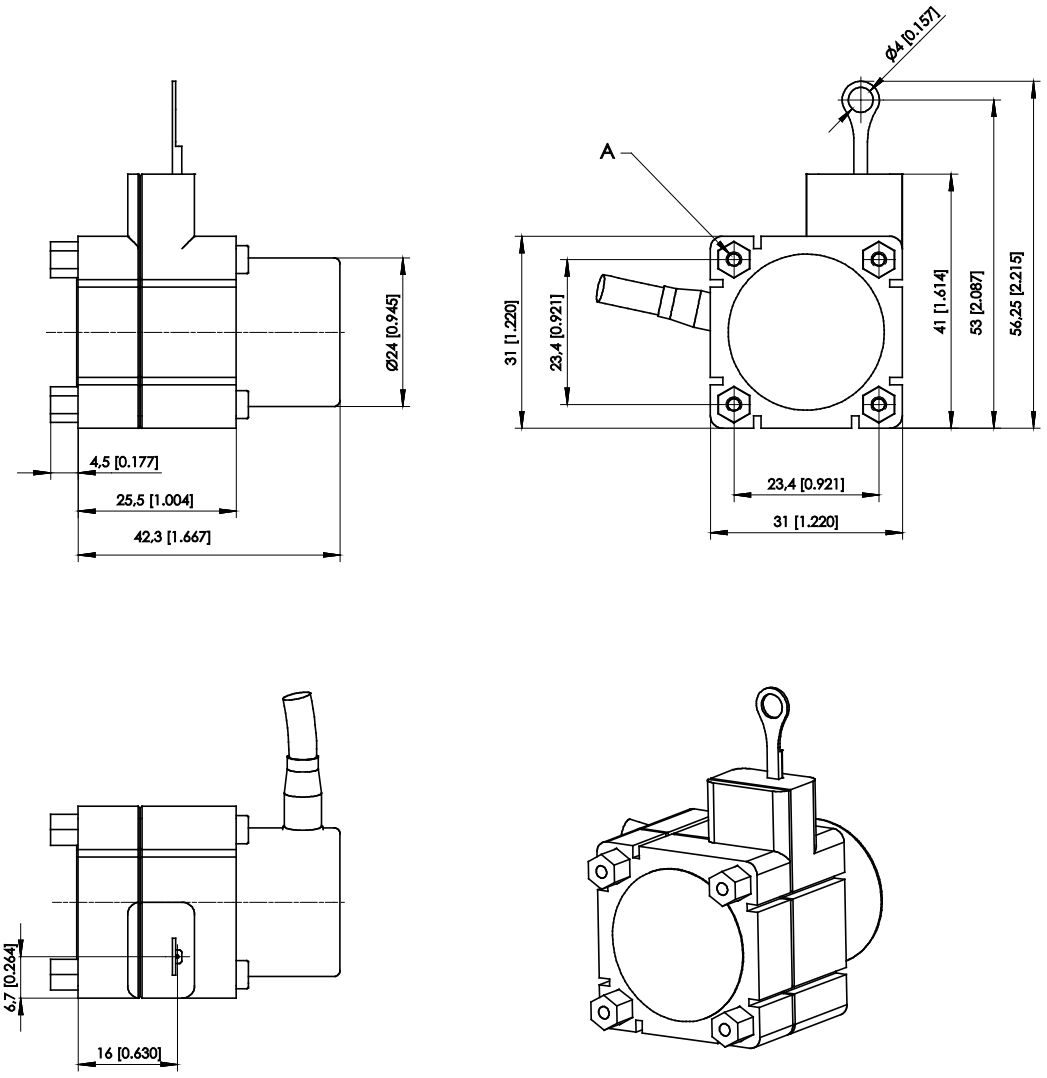
Dimensions in mm [inch].
Dimensions informative only.
For guaranteed dimensions consult factory.

Measurement range 500 mm, IE24, mounting brackets



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

Measurement range 500 mm, IE24, spacer nuts



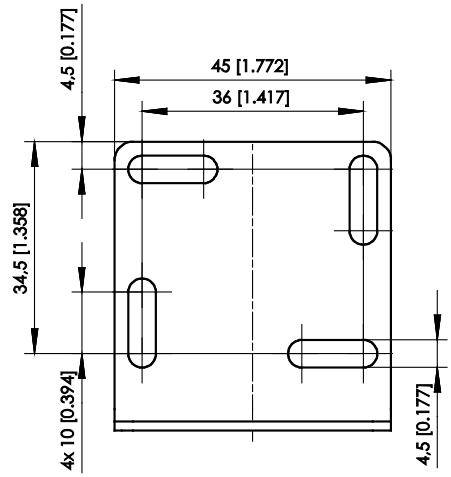
A - M2,5 – 4 [.157] deep

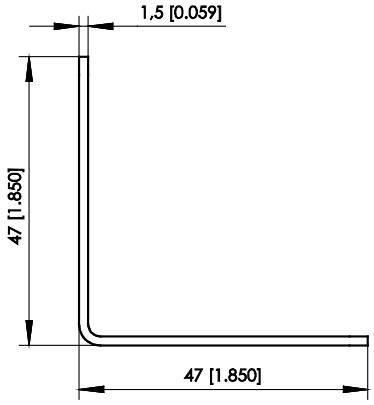
Dimensions in mm [inch]
Dimensions informative only.
For guaranteed dimensions consult factory.

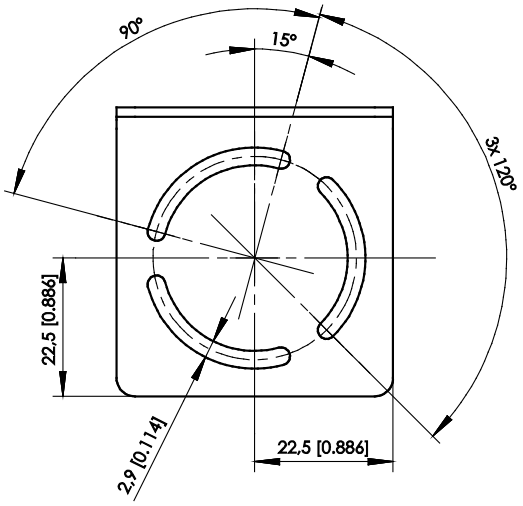
Mounting bracket WS31 / WS31C

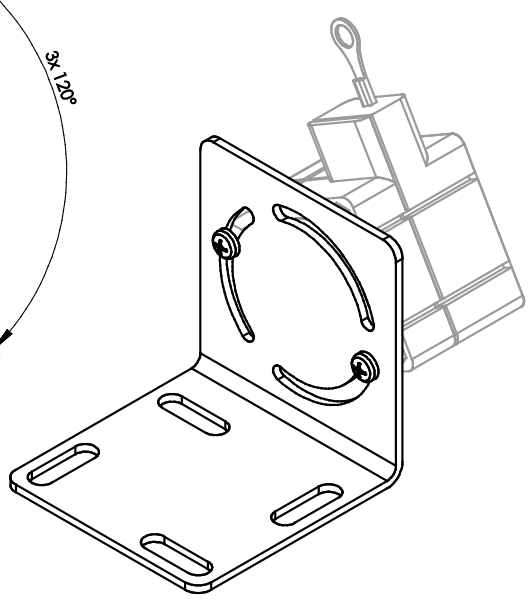
(only for sensors with spacer nuts)

Order code WS31-BFW1







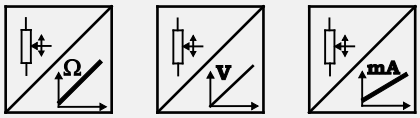


WS42C

Analog output

Sensor features

- **Measurement range up to 1000 mm**
- **Protection class IP50**
- **Mounting selectable between mounting brackets or spacer nuts**
- **Analog output**



Specifications

Output	**R1K** = Potentiometer 1 kΩ **10V5** = Voltage 0.5 ... 10 V **420A** = Current 4 ... 20 mA, 2 wire
Resolution	Analog: quasi infinite
Linearity	±0.35% f.s., other values on request
Sensing device	Precision potentiometer
Housing material	Plastic measuring cable: stainless steel
Protection class	IP50
Connection	Cable output, standard length 2 m, Connector M8, 4-pin (only for output R1K)
Temperature range	-15 ... +60 °C, max. 85 % RH, non condensing
Weight	Approx. 175 g
Pull-out force	750 mm:2.5 N 1000 mm: 1.7 N
EMC	DIN EN 61326-1:2013

Order code

WS42C – [1] – [2] – [3] – [4] – [5]

1 Measurement range (in mm)

750 / 1000

2 Output

R1K	= Potentiometer 1 kΩ
10V5	= Voltage 0.5 ... 10 V
420A	= Current 4 ... 20 mA, 2 wire

3 Linearity

L35	= ±0.35%

4 Sensor mounting

1	= Mounting brackets
2	= Spacer nuts

5 Connection

KAB2M	= Cable output, standard length 2 m
M8	= Connector M8, 4 pin (only for output R1K)

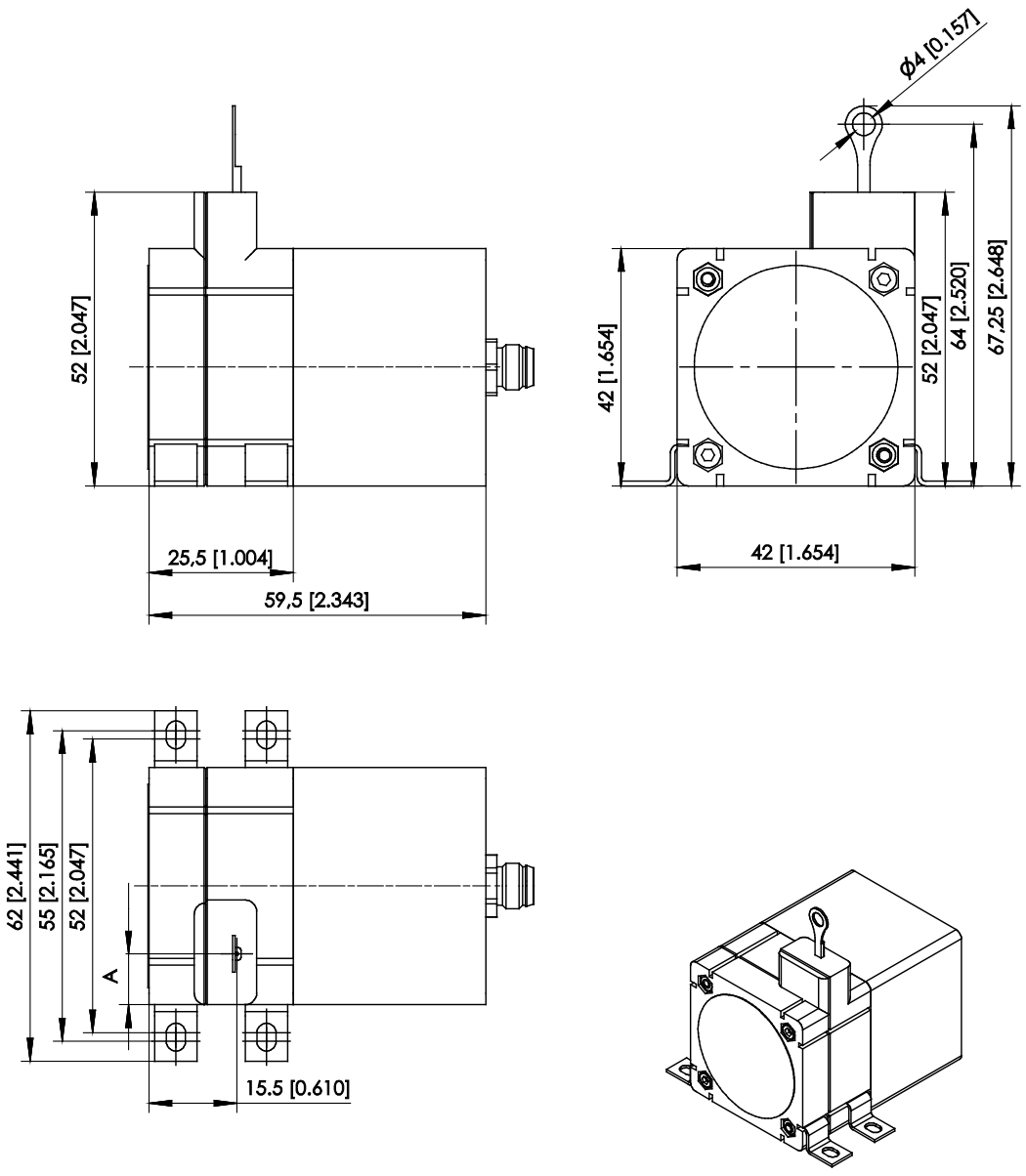
Order example

WS42C – 750 – 420A – L35 – 1 – KAB2M

Accessories:
Mounting bracket (see page 37)

Dimensions

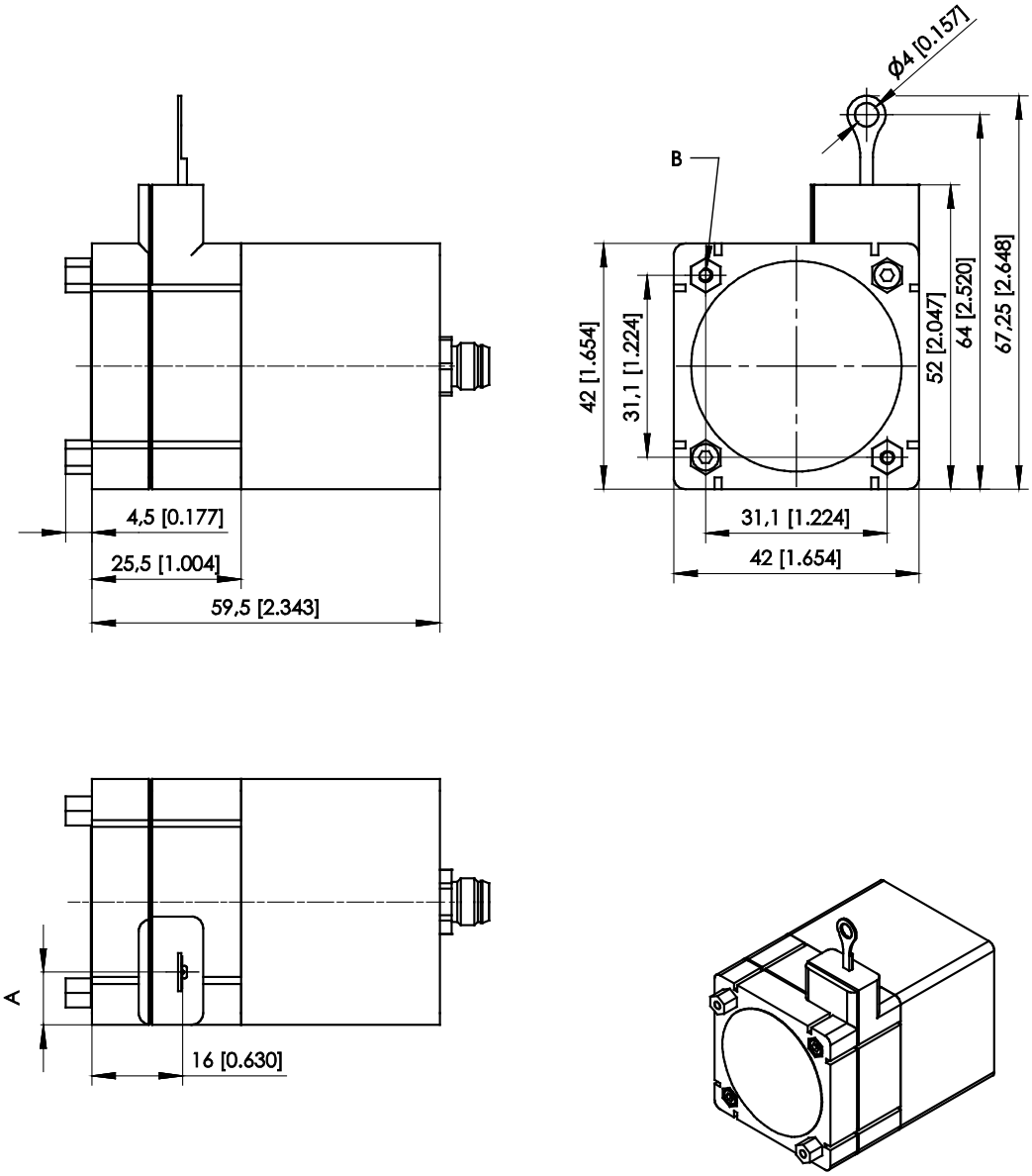
Measurement range 750 … 1000 mm, R1K, 10V5, 420A, mounting brackets



Dimensions in mm	Measurement range	A
	750	9
	1000	3.3

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

Measurement range 750 … 1000 mm, R1K, 10V5, 420A, spacer nuts



Dimensions in mm	Measurement range	A
	750	9
	1000	3.3

B – 2 x M2,5 – 4,5 [.177] deep

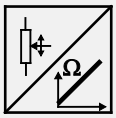
Dimensions in mm [inch]
Dimensions informative only.
For guaranteed dimensions consult factory.

WS42

Analog output

Sensor features

- **Measurement range up to 1000 mm**
- **Protection class IP50**
- **Mounting selectable between mounting brackets or spacer nuts**
- **Analog output**



Specifications

Output	**R1K** = Potentiometer 1 KΩ
Resolution	Analog: quasi infinite
Linearity	±0.35% f.s., other values on request
Sensing device	Precision potentiometer
Housing material	Plastic measuring cable: stainless steel
Protection class	IP50
Connection	Potentiometer (soldering eye)
Temperature range	-15 ... +60 °C, max. 85 % RH, non condensing
Weight	Approx. 125 g
Pull-out force	750 mm:2.5 N 1000 mm: 1.7 N
EMC	DIN EN 61326-1:2013

Order code

WS42 – 1 – 2 – 3 – 4

1 Measurement range (in mm)

750 / 1000

2 Output

R1K = Potentiometer 1 KΩ

3 Linearity

L35 = ±0.35%

4 Sensor mounting

1 = Mounting brackets
2 = Spacer nuts

Order example

WS42 – 1000 – R1K – L35 – 1

Accessories:
Mounting bracket (see page 37)

Incremental encoder output

Sensor features

- **Measurement range up to 1000 mm**
- **Protection class IP50**
- **Mounting selectable between mounting brackets or spacer nuts**
- **Incremental encoder output**

Specifications

Output	**IE24LI** = Incremental encoder TTL compatible **IE24HI** = Incremental encoder HTL compatible
Resolution	6 pulses / mm (24 edges / mm)
Linearity	±0.20% f.s.
Sensing device	Incremental encoder
Housing material	Plastic measuring cable: stainless steel
Protection class	IP50
Connection	Cable output radial, length approx. 3 m
Temperature range	0 ... +60 °C, max. 85 % RH, non condensing
Weight	Approx. 130 g
Pull-out force	1.7 N
EMC	DIN EN 61326-1:2013

Order code

WS42 – **1** – **2** – **3** – **4**

1 Measurement range (in mm)

1000

2 Resolution

6	= 6 pulses / mm

3 Output

IE24LI	= Incremental encoder TTL compatible
IE24HI	= Incremental encoder HTL compatible

4 Mounting

1	= Mounting brackets
2	= Spacer nuts

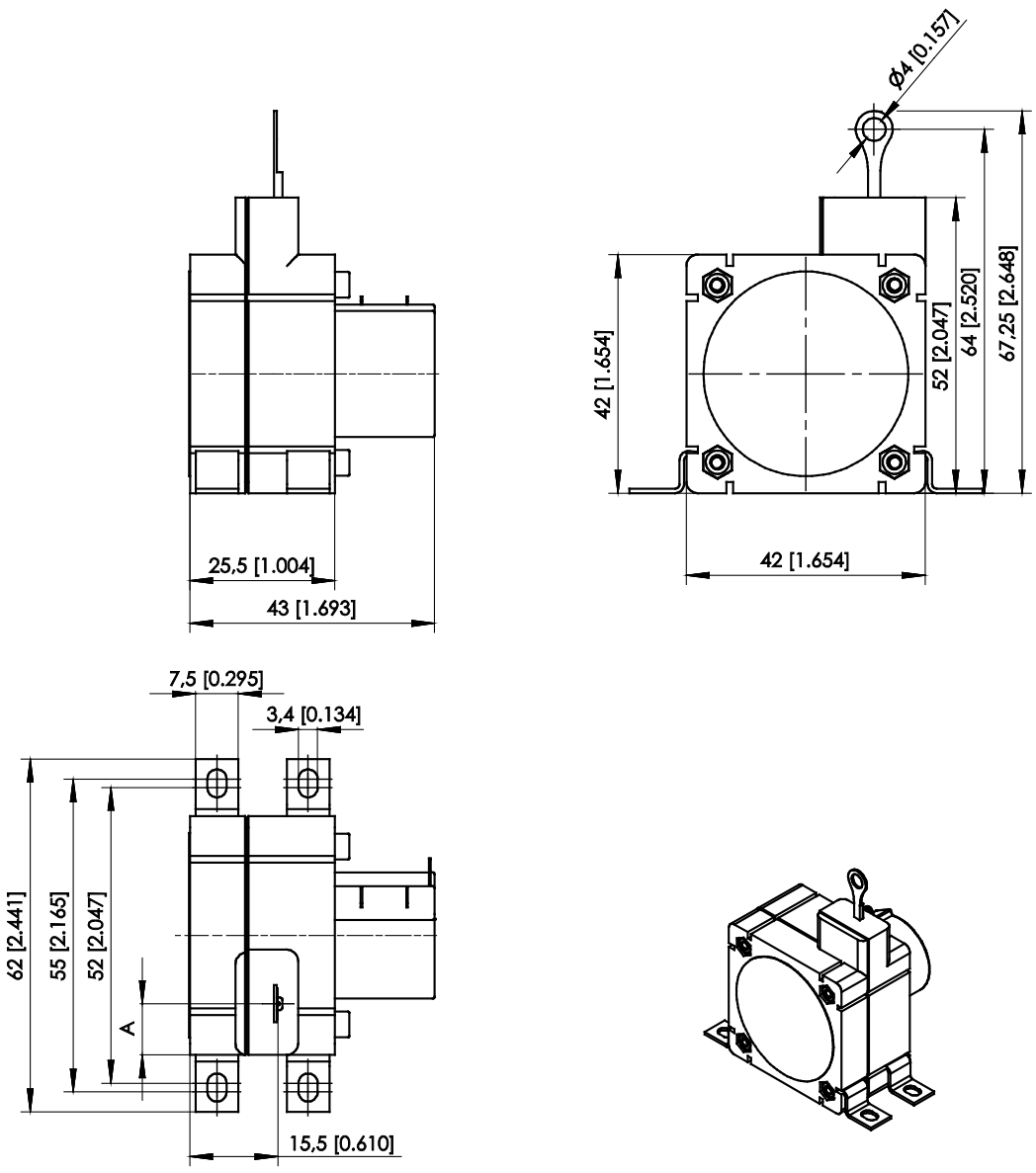
Order example

WS42 – 1000 – 6 – IE24HI – 1

Accessories:
Mounting bracket (see page 37)

Dimensions

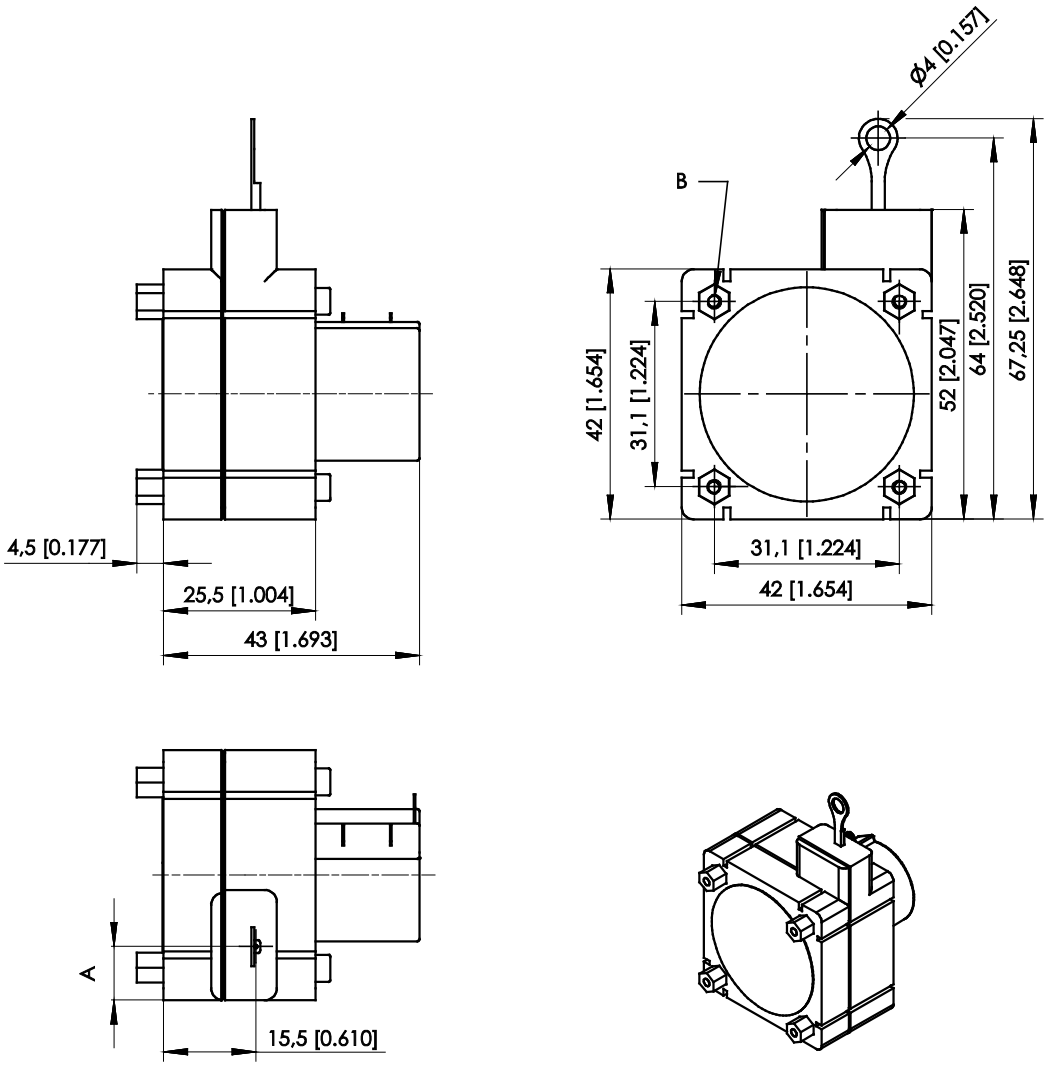
Measurement range 750/1000 mm, R1K, mounting brackets



Dimensions in mm	Measurement range	A
	750	9
	1000	3.3

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

Measurement range 750/1000 mm, R1K, spacer nuts

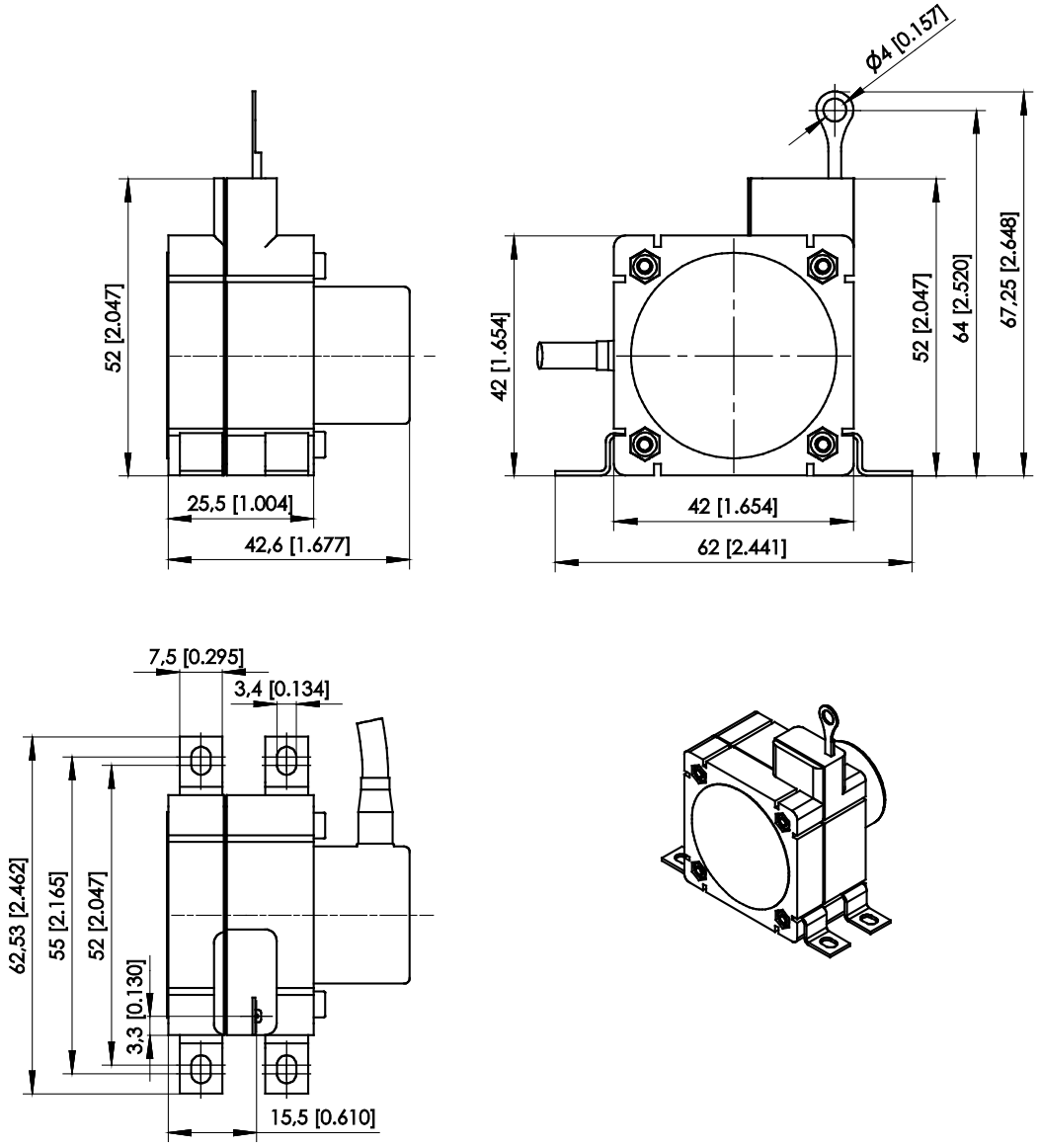


Dimensions in mm	Measurement range	A
	750	9
	1000	3.3

B – M2,5 – 4.5 [.177] deep

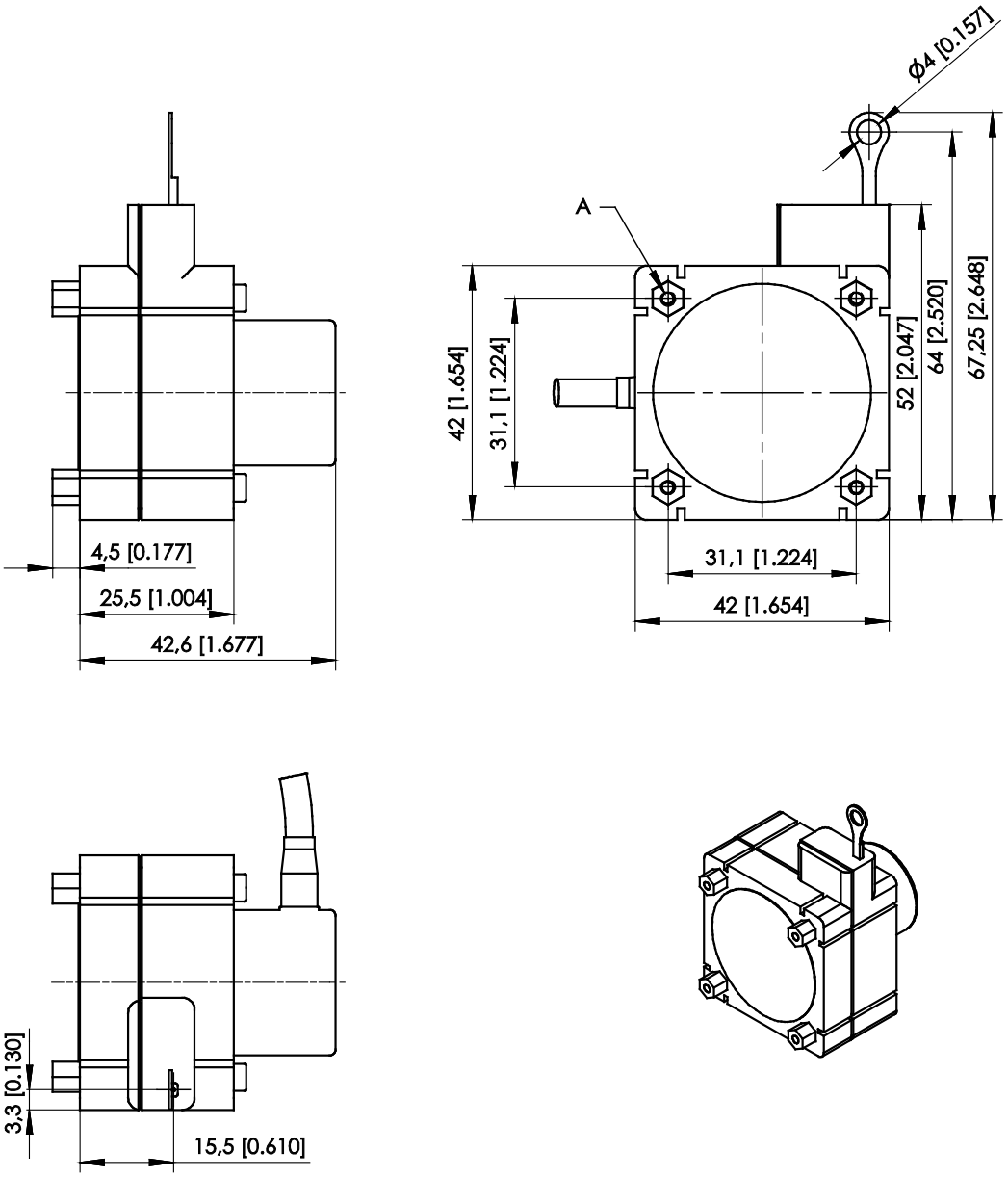
Dimensions in mm [inch]
Dimensions informative only.
For guaranteed dimensions consult factory.

Measurement range 1000 mm, IE24, mounting brackets



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

Measurement range 1000 mm, IE24, spacer nuts



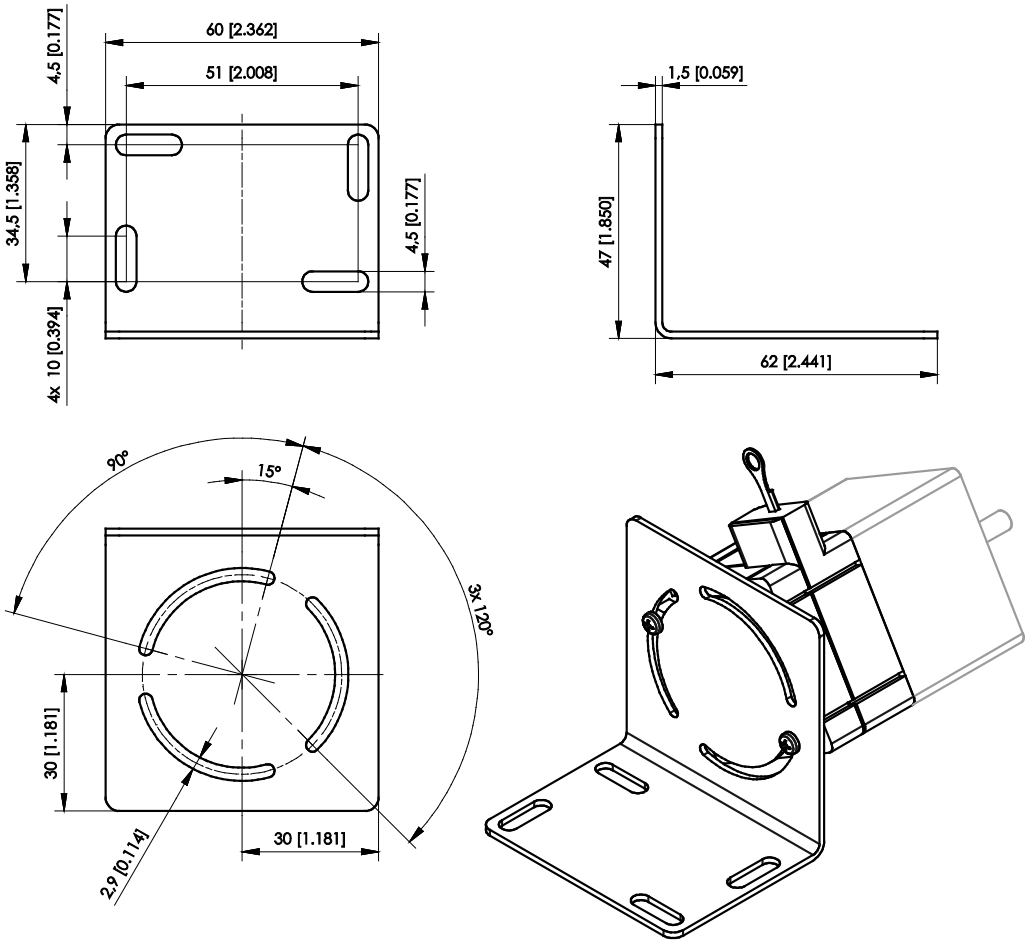
A – M2,5 – 4 [.157] deep

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

Mounting bracket WS42 / WS42C

(only for sensors with spacer nuts)

Order code WS42-BFW1

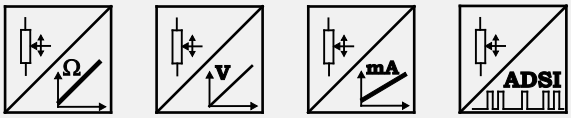


WS10SG

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 MSSI12
	ADSI14	= Signal conditioner SSI 14 bit,replaced by MSSI14
	ADSI16	= Signal conditioner SSI 16 bit,replaced by MSSI16
Resolution	Analog: quasi infinite	
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)	
Sensing device	Precision potentiometer	
Housing material	Plastic, aluminium and stainless steel measuring cable: stainless steel	
Protection class	IP65 (with mating connector only)	
Connection	Connector M12, 8 pin	
Temperature range	-20 ... +85 °C	
Weight	approx. 450 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

WS10SG – 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 MSSI12
ADSI14	= Signal conditioner SSI 14 bit,replaced by MSSI14
ADSI16	= Signal conditioner SSI 16 bit,replaced by MSSI16

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

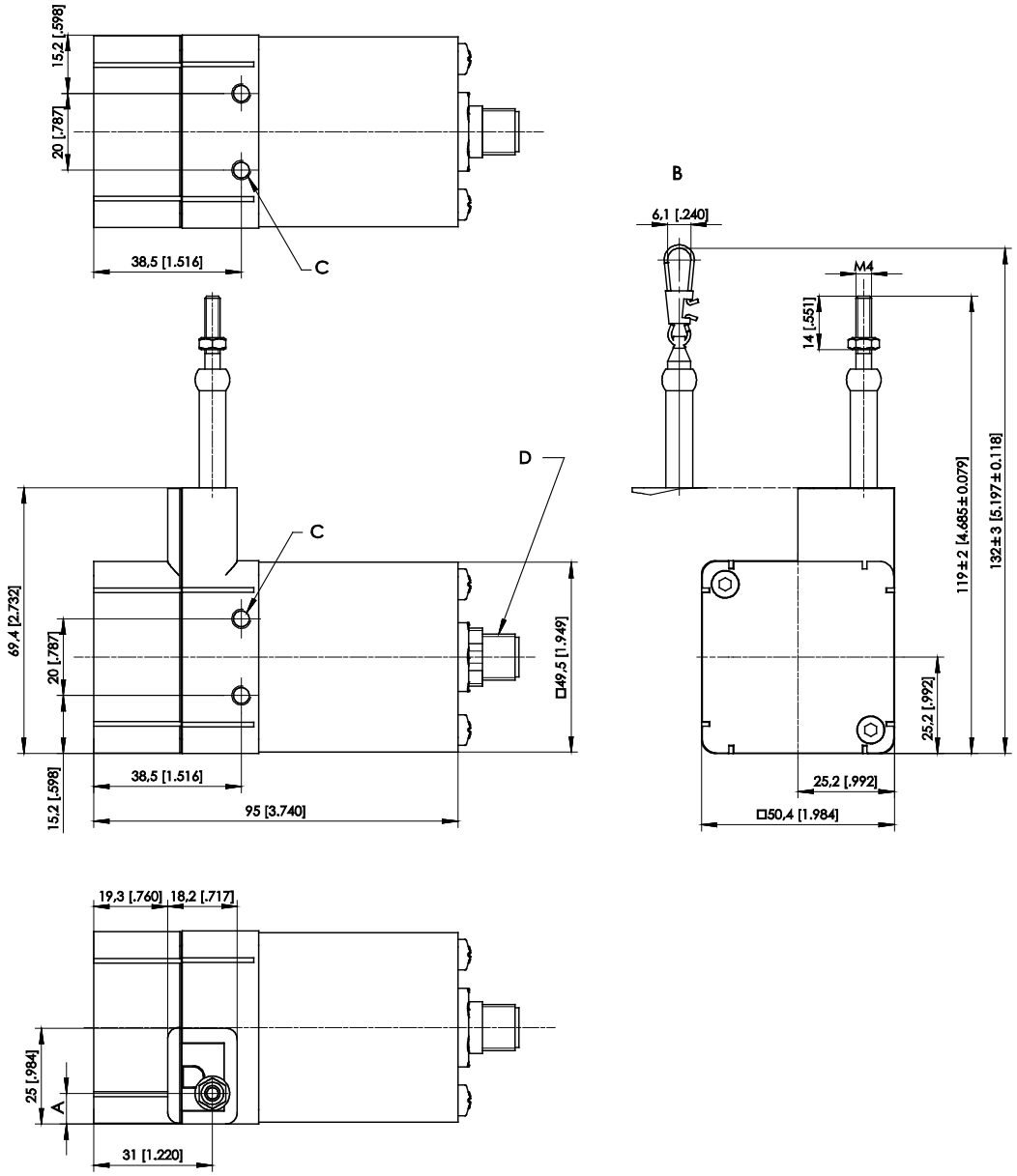
Order example

WS10SG – 1250 – 10V – L10 – M4 – M12

Accessories:
Connector cable (see page 264)

Dimensions

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



Dimensions in mm	Measurement range	A
	375; 750	12.4
	100; 125; 500; 1000; 1250	8

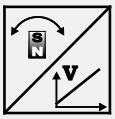
B – Option SB0
C – M5 - 8 [.315] deep
D – Connector M12

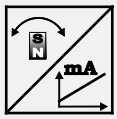
Dimensions in mm [inch]
Dimensions informative only.
For guaranteed dimensions consult factory.

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	Plastic, aluminium and stainless steel 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. 450 g
EMC	DIN EN 61326-1:2013

Order code

WS10SG – 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 characterisitics

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

WS10SG – 1250 – U2 – A – L10 – M4 – M12A5

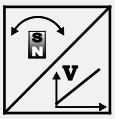
Accessories:

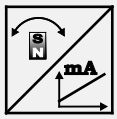
Connector cable (see page 262)
Optional connector cable 8 pin (see page 264)

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	Plastic, aluminium and stainless steel 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. 450 g
EMC	DIN EN 61326-1:2013

Order code

WS10SG – 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

WS10SG – 1250 – U2/PMU – A – L10 – M4 – M12A5

Accessories:

Connector cable (see page 263)

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	Plastic, aluminium and stainless steel 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. 450 g
EMC	DIN EN 61326-1:2013

Order code

WS10SG – 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

WS10SG – 1250 – 50 – MSSI – L10 – M4 – M12A8

Accessories:
Connector cable (see page 264)

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**

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	Plastic, aluminium and stainless steel measuring cable: stainless steel
Protection class	IP65 (with mating connector only)
Connection	Connector M12, 5 pin
Temperature range	-20 ... +85 °C
Weight	approx. 450 g
EMC	DIN EN 61326-1:2013

Cable forces for sensors with magnetic encoder

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

Order code

WS10SG – 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

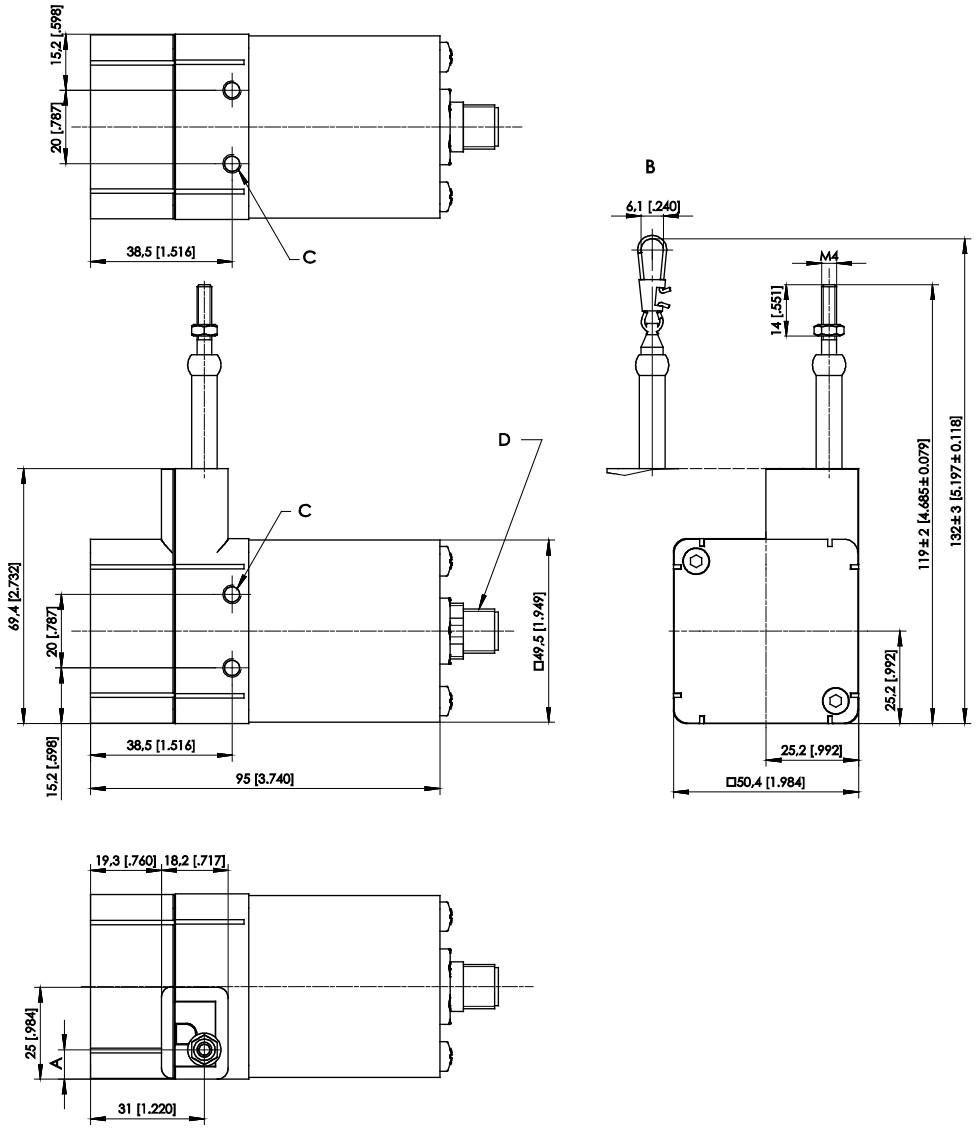
WS10SG – 1250 – MCANOP – L10 – M4 – M12/CAN

Accessories:

Connector cable (see page 265)

Dimensions

Measurement range 250 … 1250 mm, magnetic encoder output

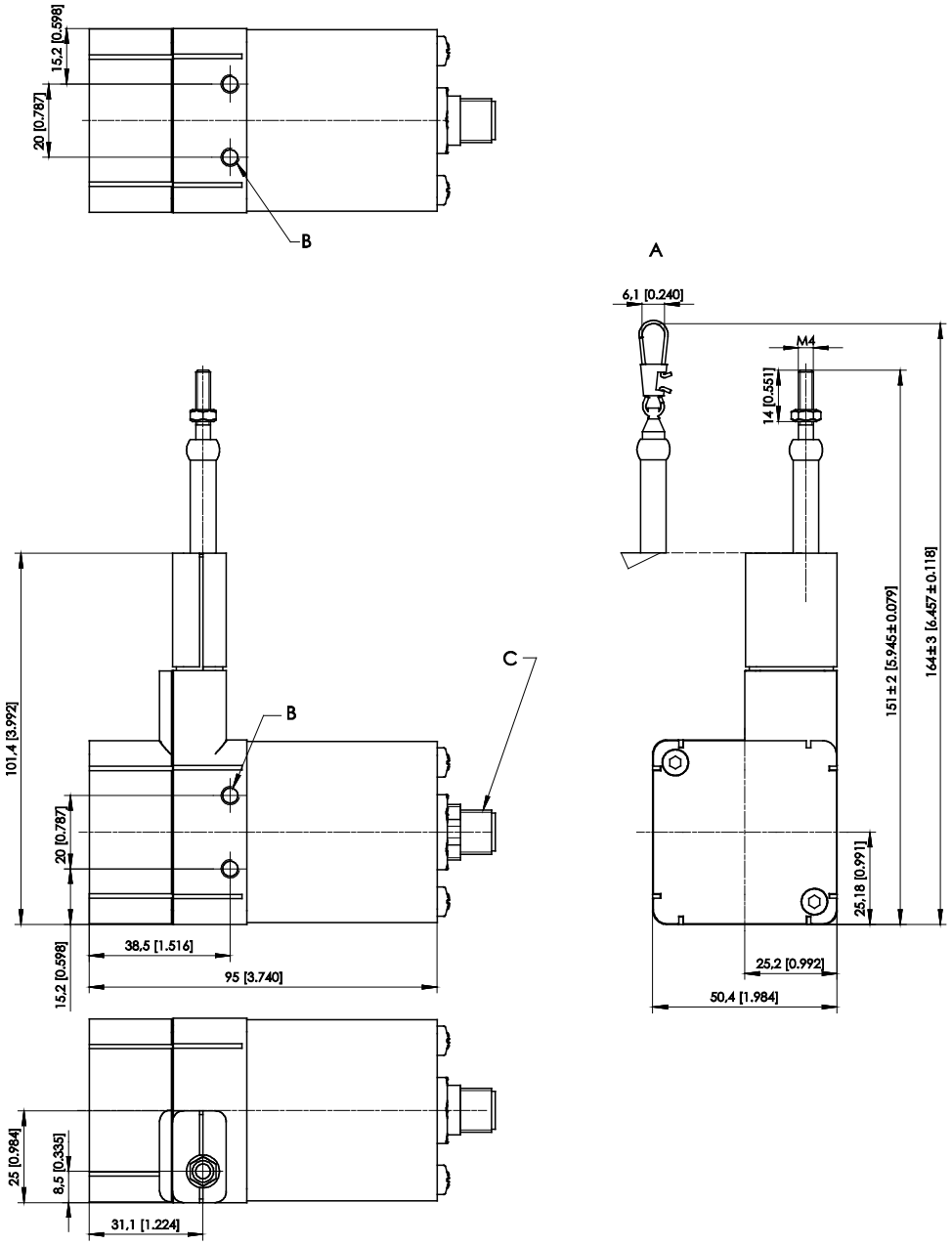


Dimensions in mm	Measurement range	A
	250	16.5
	375; 750	12.3
	500; 1000; 1250	8

B – Option SB0
C – 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
D – 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	Plastic, aluminium and stainless steel measuring cable: stainless steel
Protection class	IP65 (with mating connector only)
Connection	Connector M12, 8 pin
Temperature range	-20 ... +85 °C
Weight	approx. 450 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]
	1250	5,8	3,0

Order code

WS10SG – 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

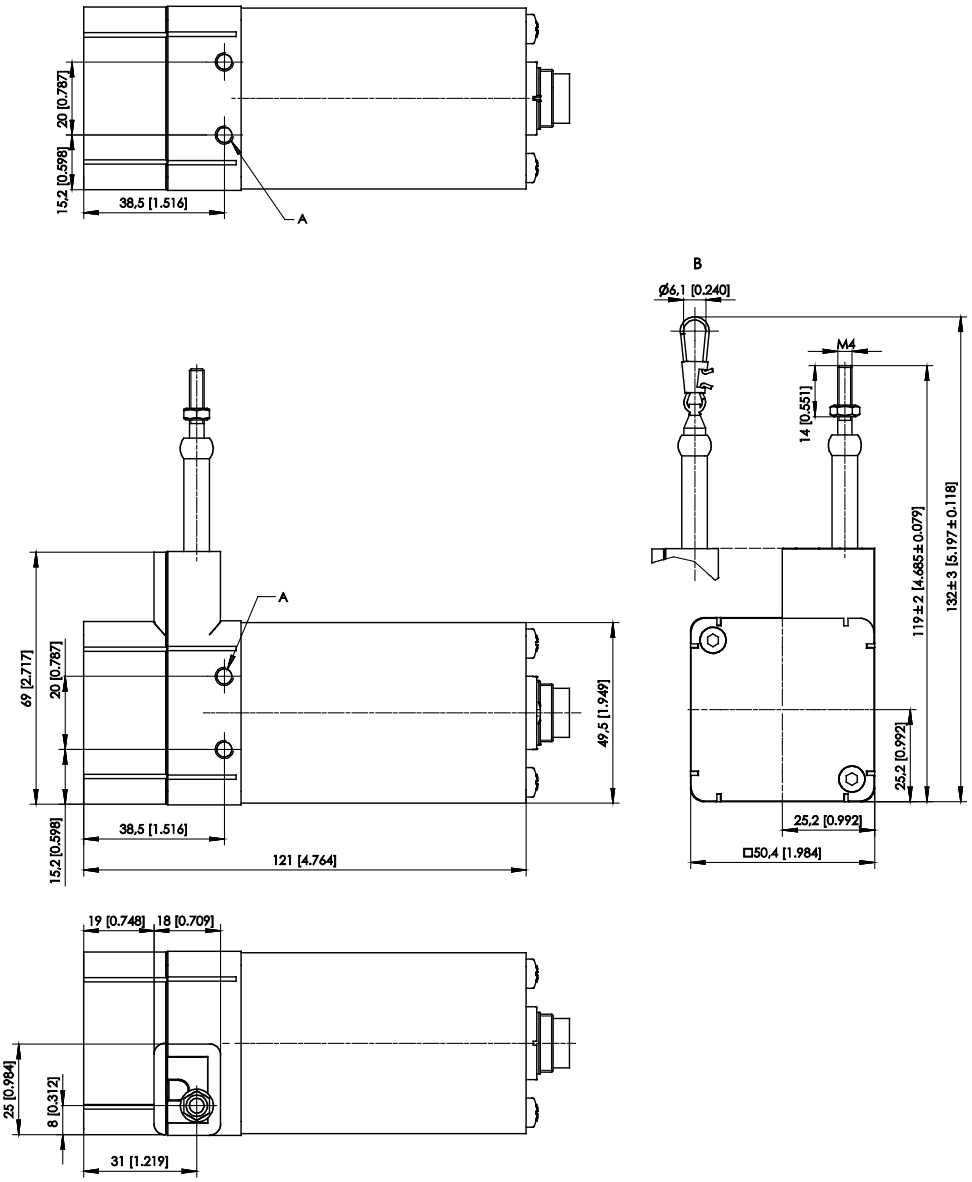
WS10SG – 1250 – 10 – PP530 – M4 – M12

Accessories:

Connector cable (see page 264)

Dimensions

Measurement range 1250 mm, incremental encoder output



A – M5 - 8 [.315] deep
B – Option SB0

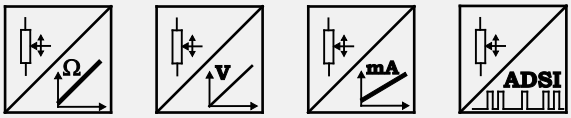
Dimensions in mm [inch]
Dimensions informative only.
For guaranteed dimensions consult factory.

WS10ZG

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 MSSI12
	ADSI14	= Signal conditioner SSI 14 bit,replaced by MSSI14
	ADSI16	= Signal conditioner SSI 16 bit,replaced by MSSI16
Resolution	Analog: quasi infinite	
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)	
Sensing device	Precision potentiometer	
Housing material	Zinc diecast, aluminium and stainless steel 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 MSSI12
ADSI14	= Signal conditioner SSI 14 bit,replaced by MSSI14
ADSI16	= Signal conditioner SSI 16 bit,replaced by MSSI16

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

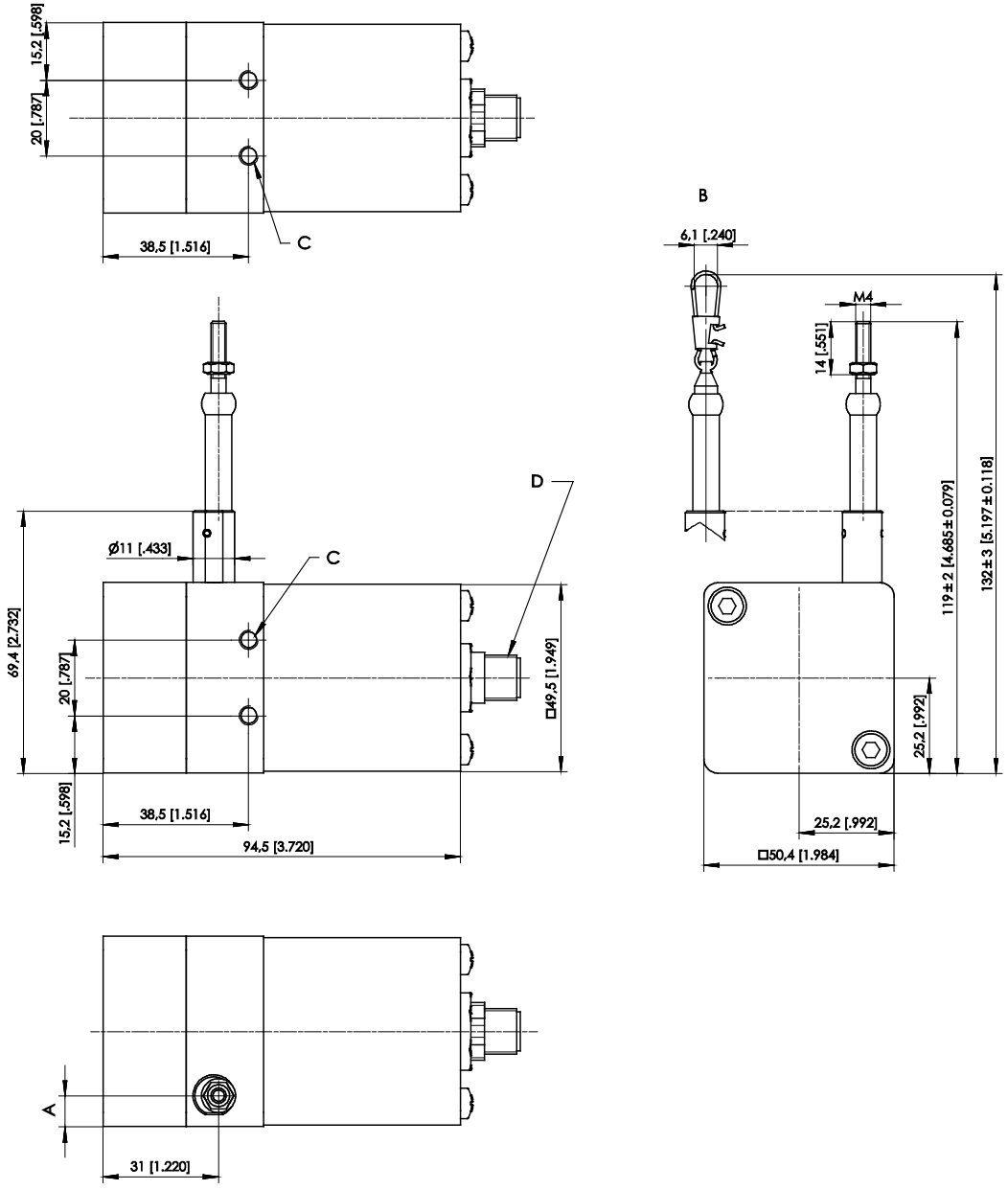
Order example

WS10ZG – 1250 – 10V – L10 – M4 – M12

Accessories:
Connector cable (see page 264)

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

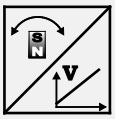
B – Option SB0
C – M5 - 8 [.315] deep
D – Connector M12

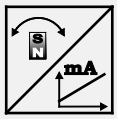
Dimensions in mm [inch]
Dimensions informative only.
For guaranteed dimensions consult factory.

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 and stainless steel 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 characterisitics

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

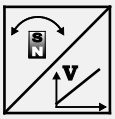
Accessories:

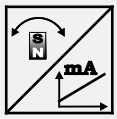
Connector cable (see page 262)
Optional connector cable 8 pin (see page 264)

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 and stainless steel 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 263)

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 and stainless steel 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 264)

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**

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 and stainless steel 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

Cable forces for sensors with magnetic encoder

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

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

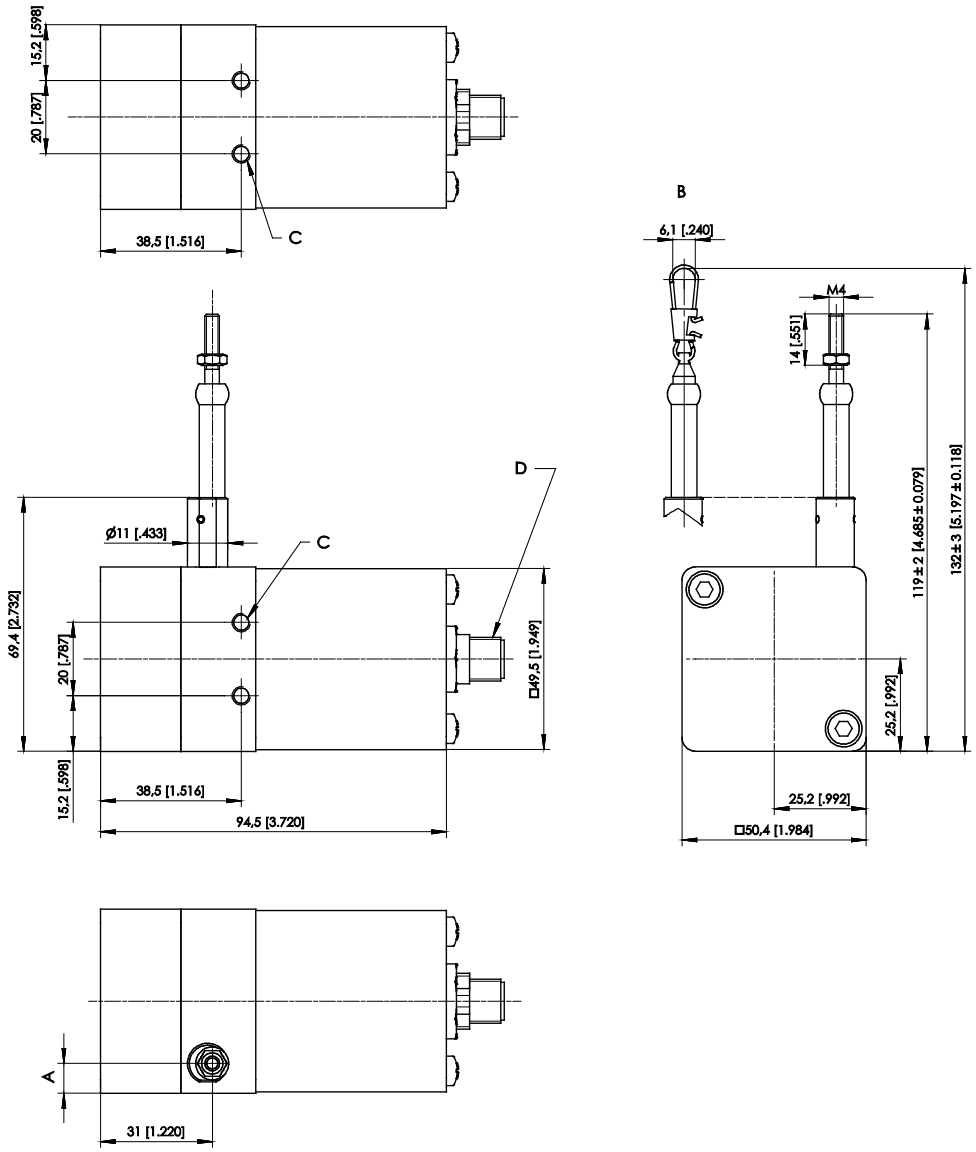
WS10ZG – 1250 – MCANOP – L10 – M4 – M12/CAN

Accessories:

Connector cable (see page 265)

Dimensions

Measurement range 250 … 1250, mm, magnetic encoder output

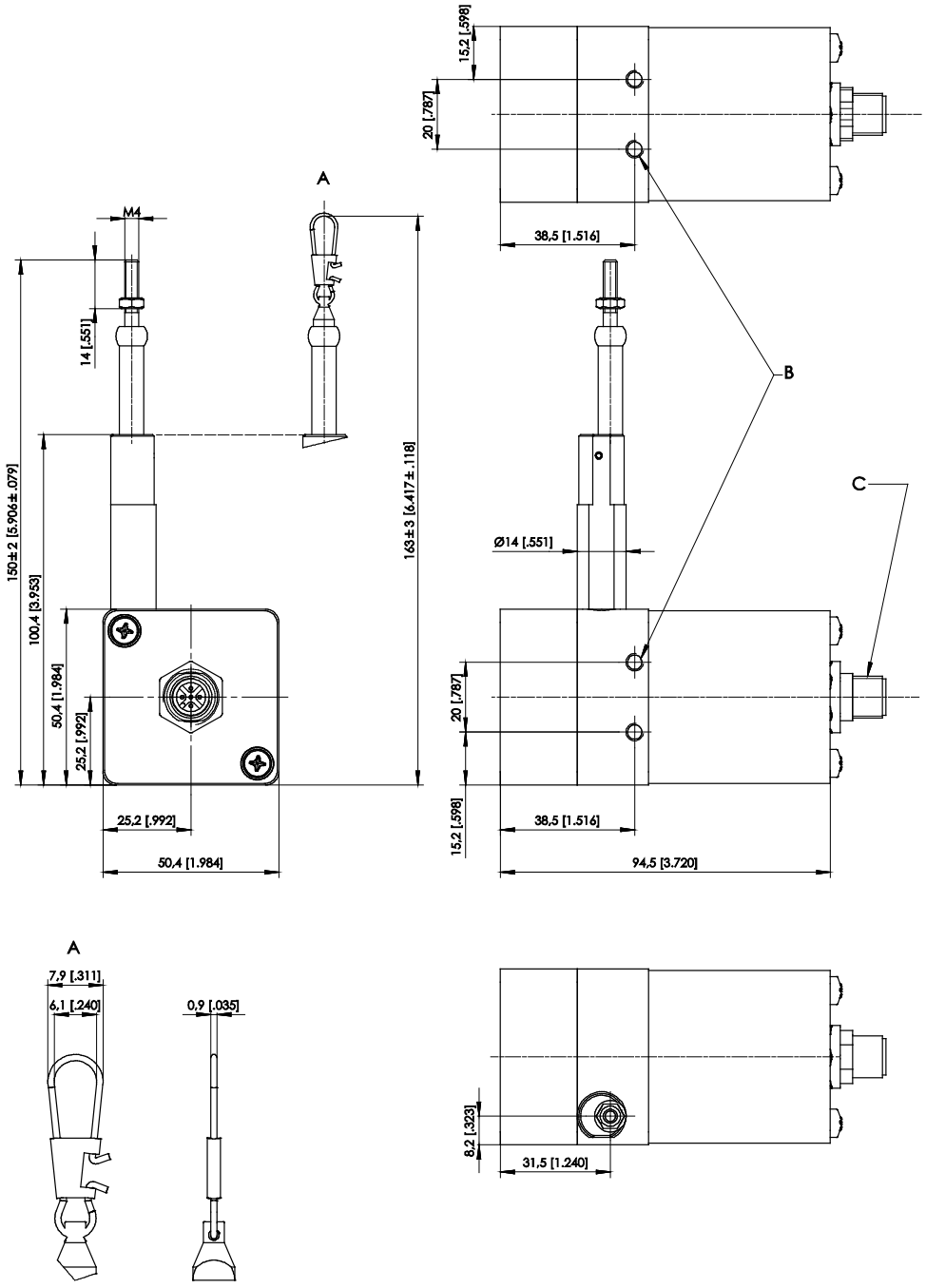


Dimensions in mm	Measurement range	A
	250	16.7
	375; 750	12.4
	500; 1000; 1250	8

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 and stainless steel 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]
	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

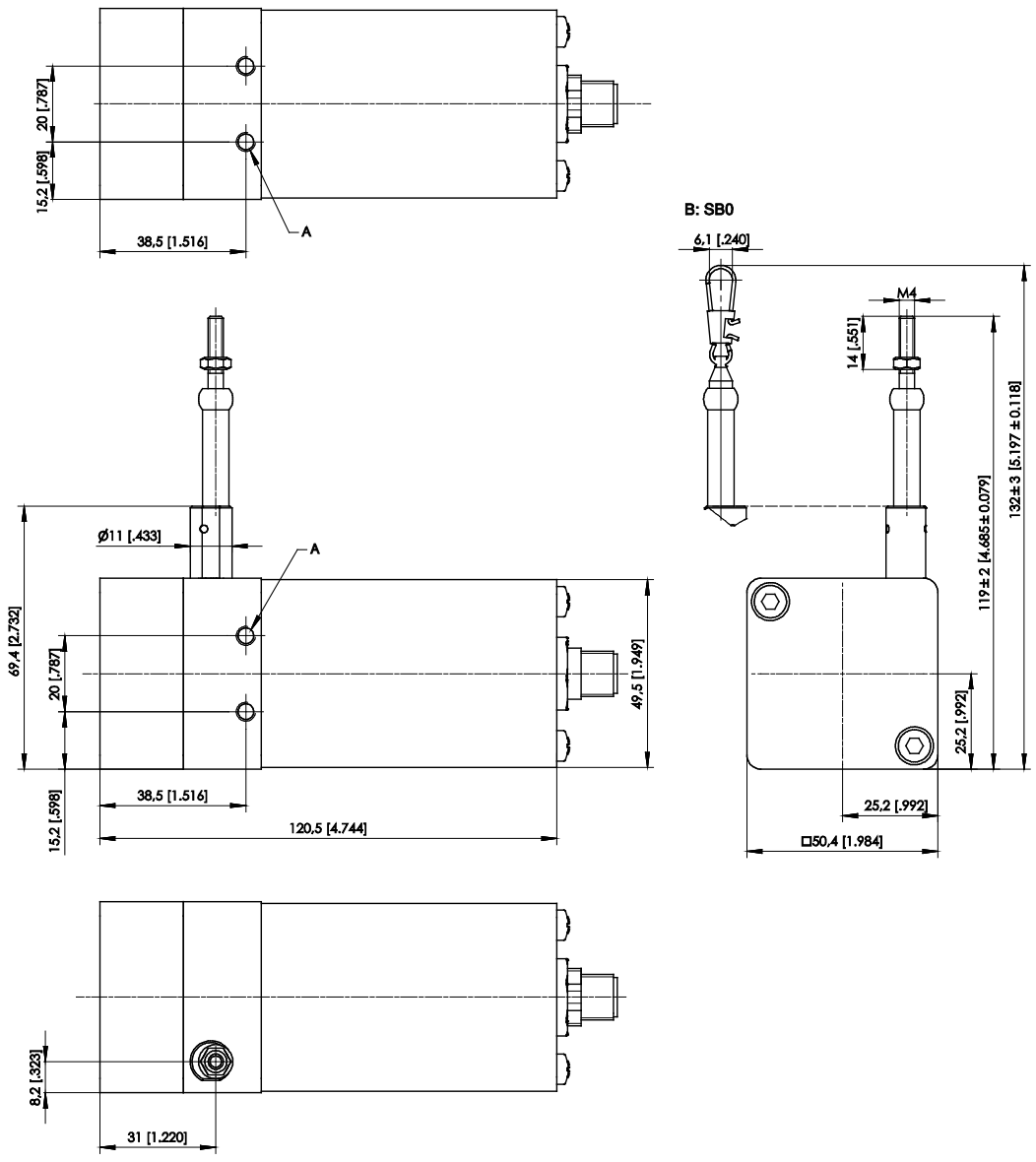
Order example

WS10ZG – 1250 – 10 – PP530 – M4 – M12

Accessories:
Connector cable (see page 264)

Dimensions

Measurement range 1250 mm, incremental encoder output



A – M5 - 8 [.315] deep
B – Option SB0

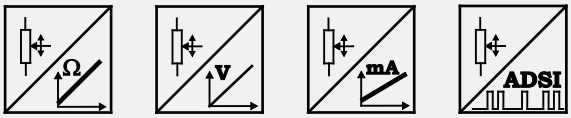
Dimensions in mm [inch]
Dimensions informative only.
For guaranteed dimensions consult factory.

WS10

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 MSSI12
	ADSI14	= Signal conditioner SSI 14 bit,replaced by MSSI14
	ADSI16	= Signal conditioner SSI 16 bit,replaced by MSSI16
Resolution	Analog: quasi infinite	
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)	
Sensing device	Precision potentiometer	
Housing material	Aluminium, stainless steel and plastic measuring cable: stainless steel	
Protection class	IP65 (with mating connector only)	
Connection	Connector M12, 8 pin	
Temperature range	-20 ... +85 °C	
Weight	approx. 550 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

WS10 – 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 MSSI12
ADSI14	= Signal conditioner SSI 14 bit,replaced by MSSI14
ADSI16	= Signal conditioner SSI 16 bit,replaced by MSSI16

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

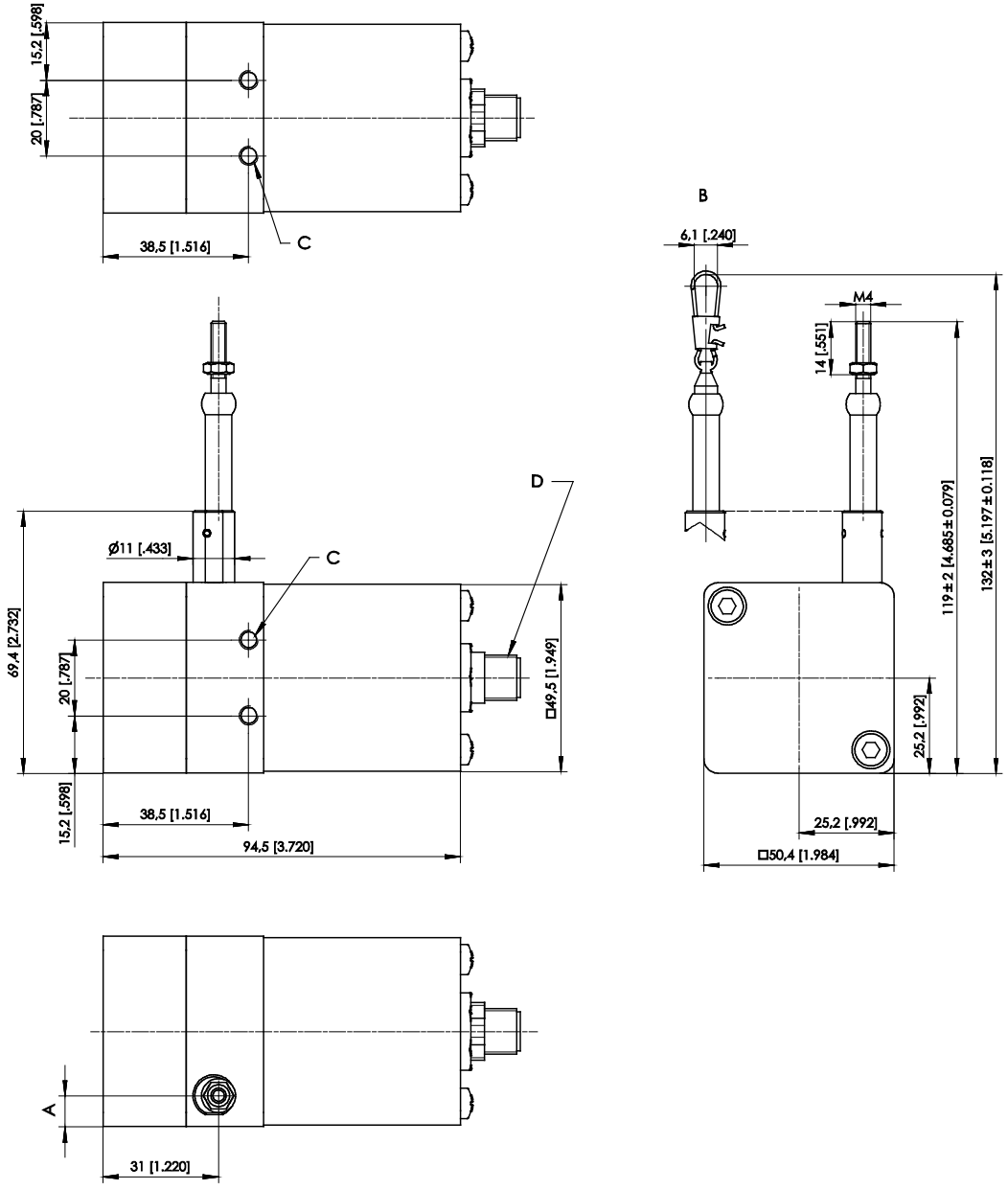
Order example

WS10 – 1250 – 10V – L10 – M4 – M12

Accessories:
Connector cable (see page 264)

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

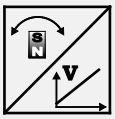
B – Option SB0
C – M5 - 8 [.315] deep
D – Connector M12

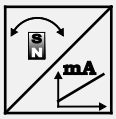
Dimensions in mm [inch]
Dimensions informative only.
For guaranteed dimensions consult factory.

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	Aluminium, stainless steel and plastic 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. 550 g
EMC	DIN EN 61326-1:2013

Order code

WS10 – 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 characterisitics

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

WS10 – 1250 – U2 – A – L10 – M4 – M12A5

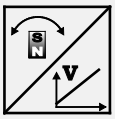
Accessories:

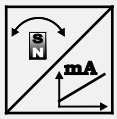
Connector cable (see page 262)
Optional connector cable 8 pin (see page 264)

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	Aluminium, stainless steel and plastic 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. 550 g
EMC	DIN EN 61326-1:2013

Order code

WS10 – 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

WS10 – 1250 – U2/PMU – A – L10 – M4 – M12A5

Accessories:

Connector cable (see page 263)

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	Aluminium, stainless steel and plastic 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. 550 g
EMC	DIN EN 61326-1:2013

Order code

WS10	–	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

WS10 – 1250 – 50 – MSSI – L10 – M4 – M12A8

Accessories:

Connector cable (see page 264)

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**

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	Aluminium, stainless steel and plastic measuring cable: stainless steel
Protection class	IP65 (with mating connector only)
Connection	Connector M12, 5 pin
Temperature range	-20 ... +85 °C
Weight	approx. 550 g
EMC	DIN EN 61326-1:2013

Cable forces for sensors with magnetic encoder

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

Order code

WS10 – 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

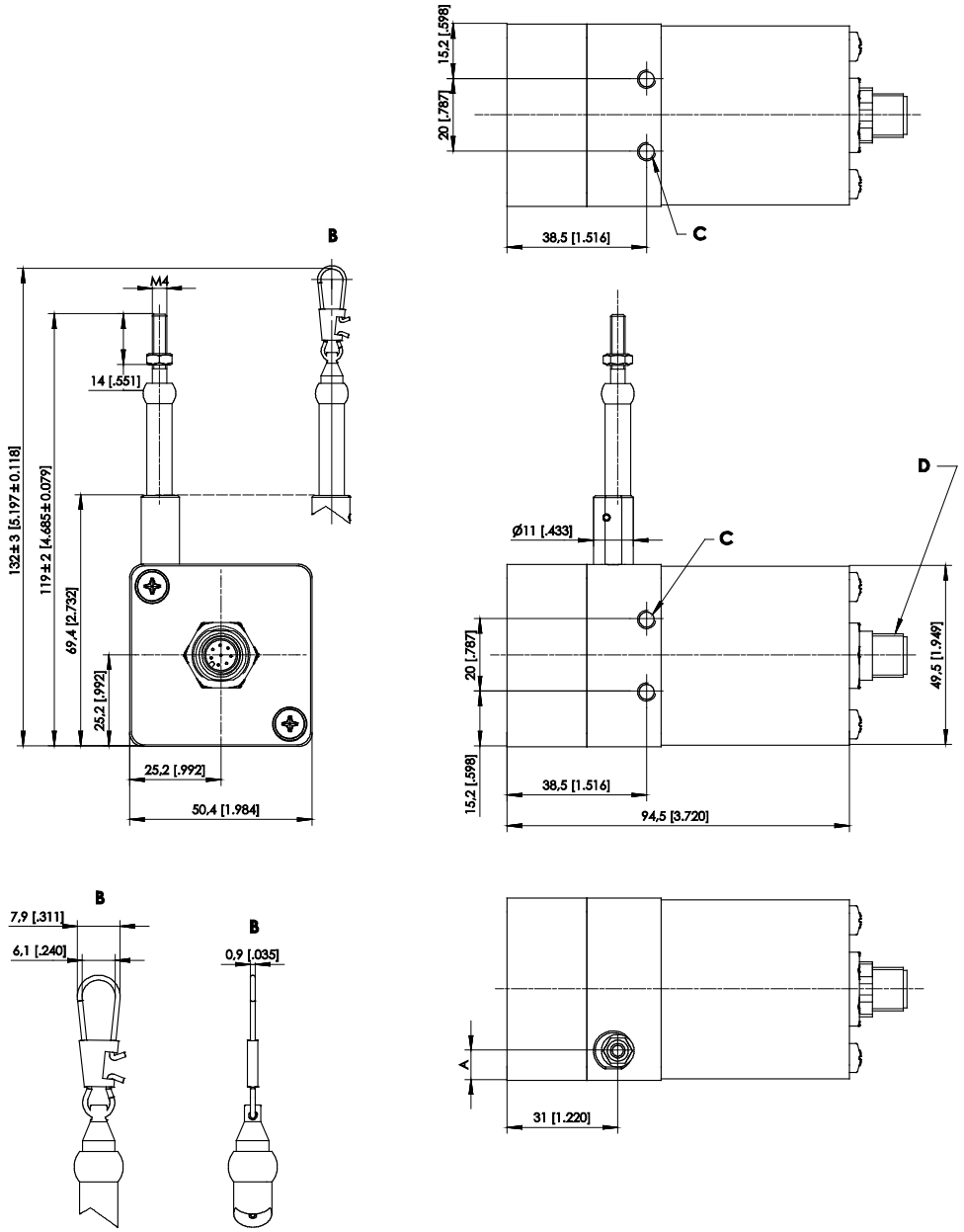
WS10 – 1250 – MCANOP – L10 – M4 – M12/CAN

Accessories:

Connector cable (see page 265)

Dimensions

Measurement range 250 … 1250 mm, magnetic encoder output

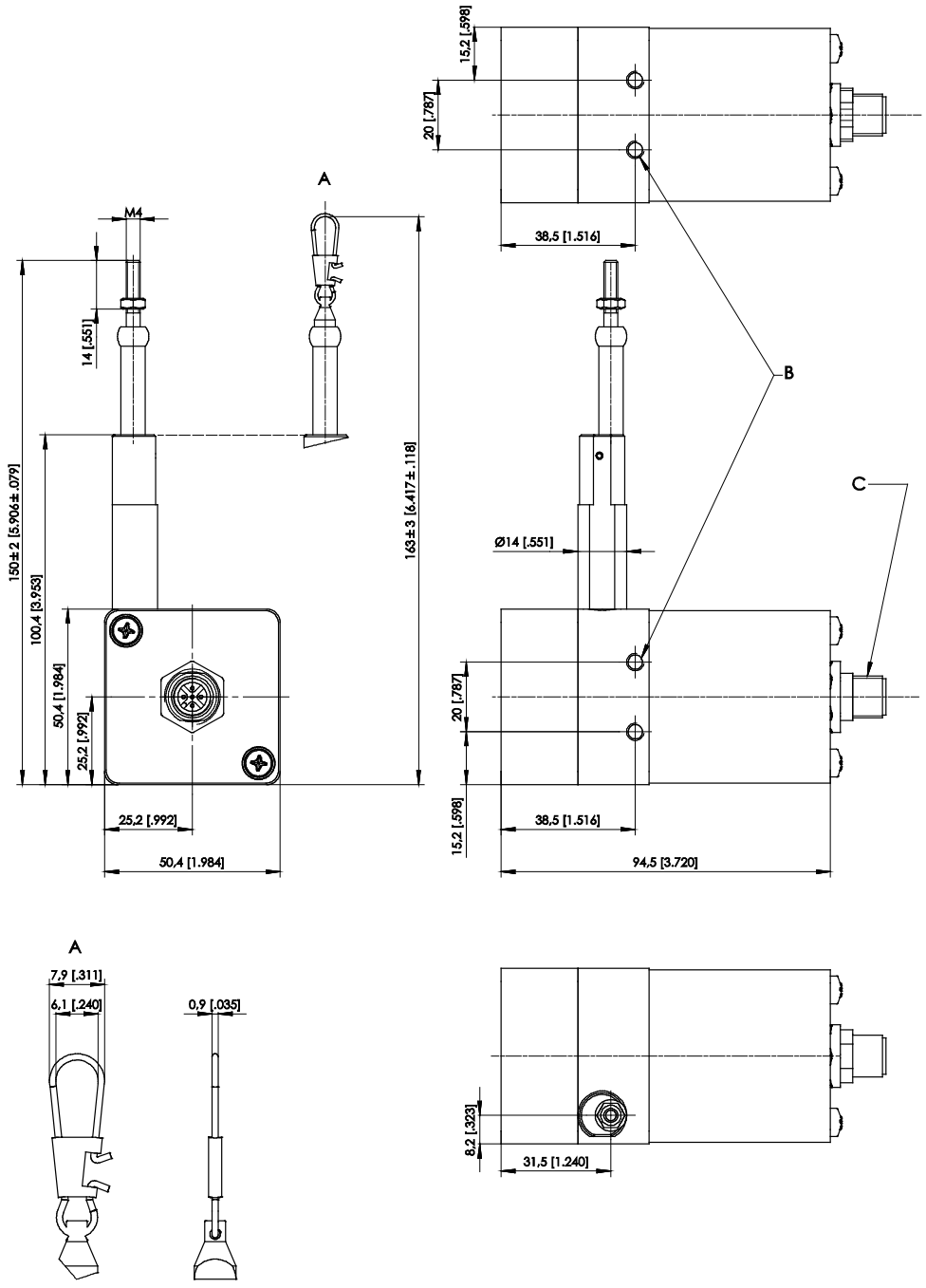


Dimensions in mm	Measurement range	A
	250	16.7
	375; 750	12.7
	500; 1000; 1250	8.2

A – Option SB0
B – Mounting drillings 4 x M5 - 8 [.315] deep
C – 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	Aluminium, stainless steel and plastic measuring cable: stainless steel
Protection class	IP65 (with mating connector only)
Connection	Connector M12, 8 pin
Temperature range	-20 ... +85 °C
Weight	approx. 550 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]
	1250	5,8	3,0

Order code

WS10 – [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

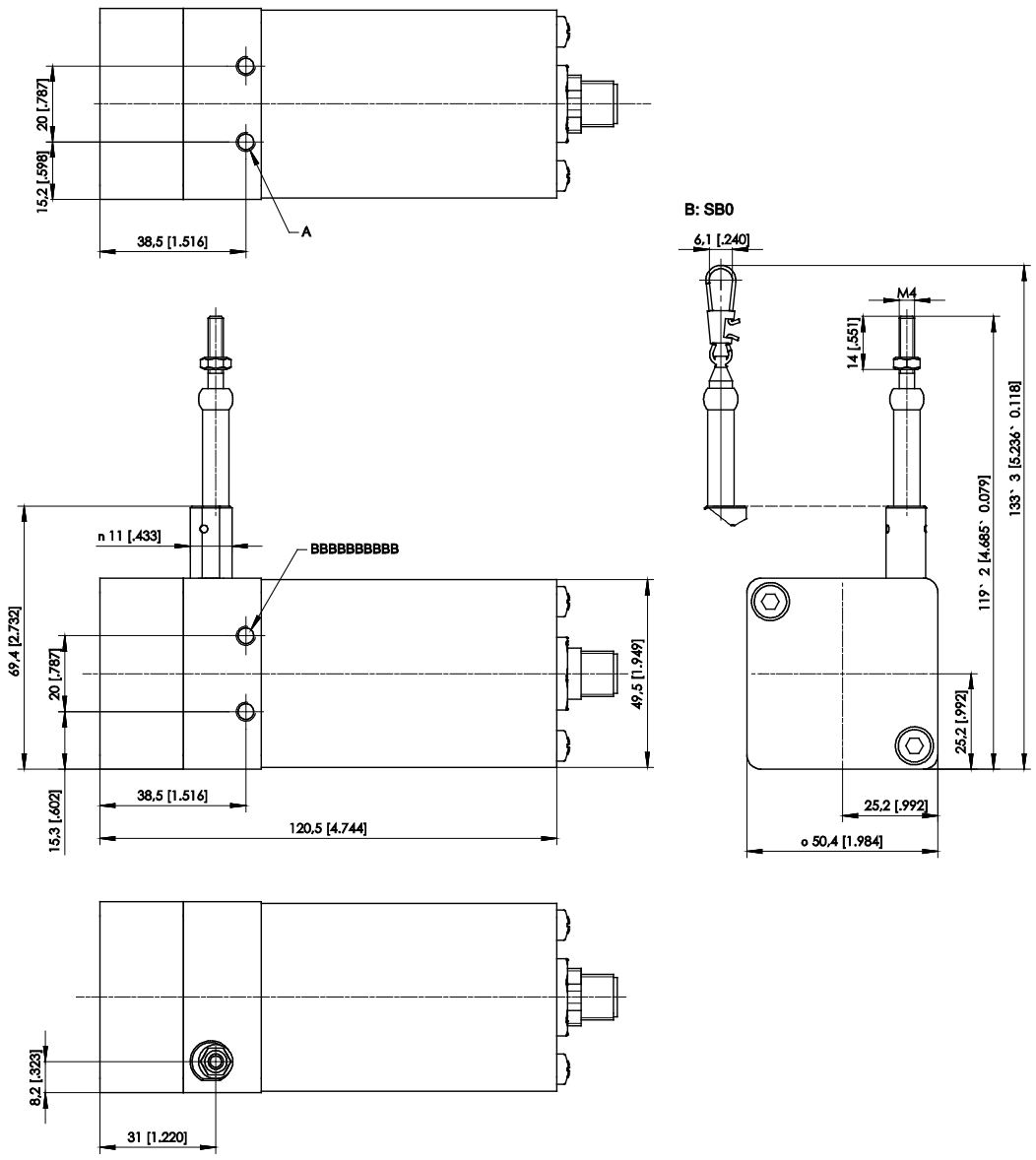
WS10 – 1250 – 10 – PP530 – M4 – M12

Accessories:

Connector cable (see page 264)

Dimensions

Measurement range 1250 mm, incremental encoder output

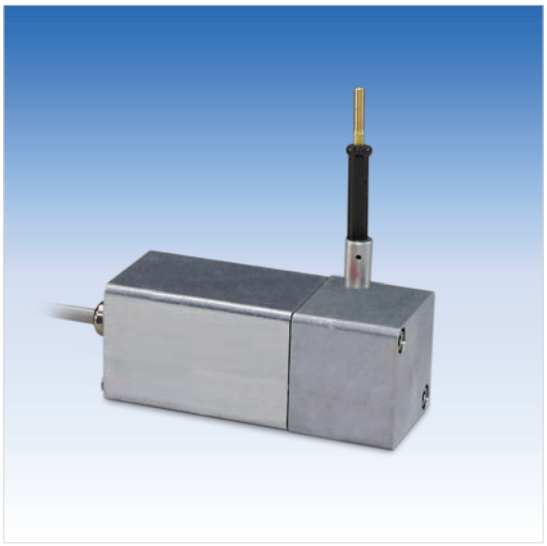


A – M5 - 8 [.315] deep
B – Option SB0

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

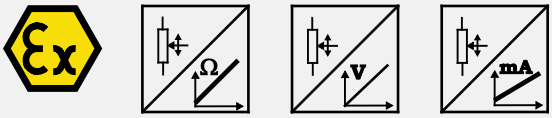
WS10EX

Analog output, Dust Explosion-Proof



Sensor features

- **Measurement range up to 1250 mm**
- **Analog output**
- **DIN EN 60079-0 (June 2014)**
  DIN EN 60079-31 (December 2014)
- **II 3D Ex tc IIIC T80°C Dc X**
  (X = examined with low impact energy of 4J)



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 Excitation voltage WS-EX sensors: 24 V DC typical
Resolution	Quasi infinite
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)
Sensing device	Precision potentiometer
Housing material	Aluminium, stainless steel and plastic measuring cable: stainless steel
Protection class of the housing	IP65
Connection	Cable output, standard lenght 2 m
Weight	approx. 600 g
Temperature range	-20°C ... +40°C
Standards	
Dust-Ex Proof	DIN EN 60079-0 (June 2014) DIN EN 60079-31 (December 2014)
EMC	DIN EN 61326-1:2013
Shock	DIN EN 60068-2-27:2010, 50 g 11 ms, 100 shocks
Vibration	DIN EN 60068-2-6:2008, 20 g 10 Hz-2 kHz, 10 cycles

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

WS10EX – 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

Excitation voltage WS-EX sensors: 24 V DC typical

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

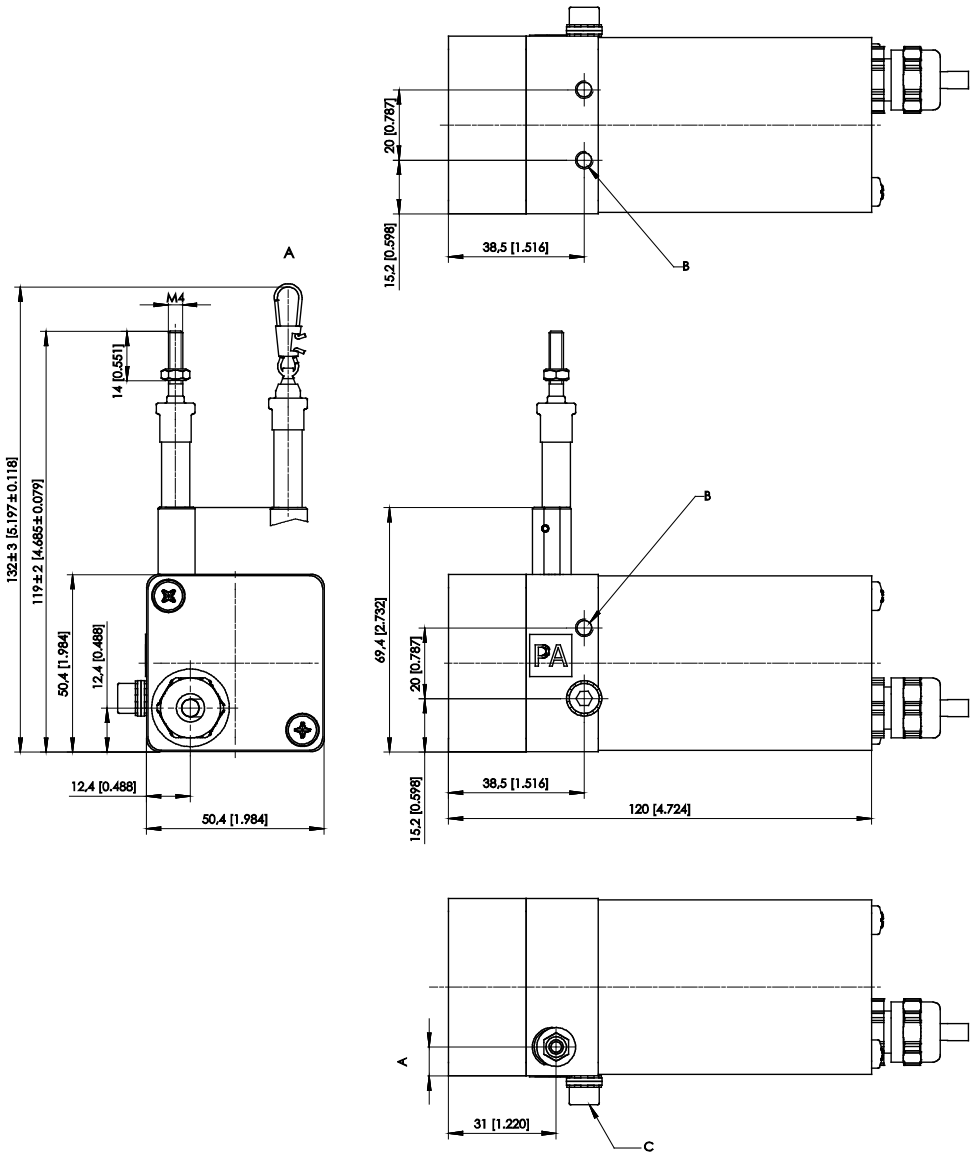
KAB2M = Cable output, standard lenght 2 m

Order example

WS10EX – 1250 – 10V – L10 – M4 – KAB2M

Dimensions

Measurement range 100 … 1250 mm, analog output, Dust-Explosion-Proof



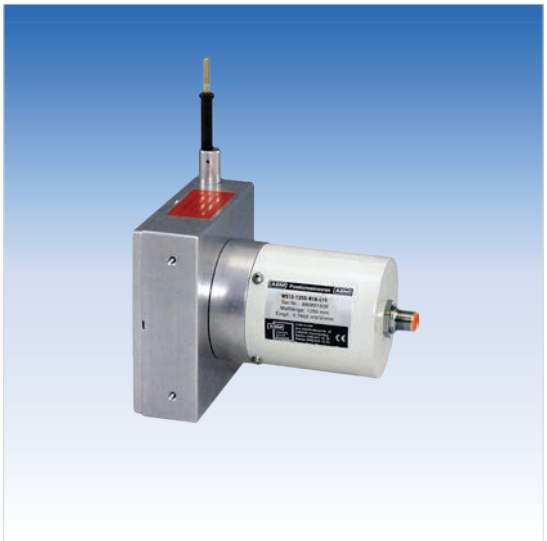
Dimensions in mm	Measurement range	A
	375; 750	12.7
	100; 125; 500; 1000; 1250	8.2

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

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

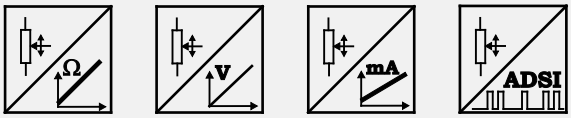
WS12

Analog output, SSI output



Sensor features

- **Measurement range up to 3000 mm**
- **Protection class IP67 (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 MSSI12 **ADSI14** = Signal conditioner SSI 14 bit,replaced by MSSI14 **ADSI16** = Signal conditioner SSI 16 bit,replaced by MSSI16
Resolution	Analog: quasi infinite
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)
Sensing device	Precision potentiometer
Housing material	Aluminium, stainless steel and plastic measuring cable: stainless steel
Protection class	IP67 (with mating connector only)
Connection	Connector M12, 8 pin
Temperature range	-20 ... +85 °C
Weight	Up to 1500 mm approx. 1 kg, from 2000 mm approx. 1,5 kg
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	5.2	2.8
	125	4.6	2.5
	500	5.9	2.6
	1000	5.5	2.4
	1250	4.8	2.1
	1500	10.4	6.4
	2000	8.1	5.0
	2500	6.7	4.0
	3000	6.2	3.0

Order code

WS12 – 1 – 2 – 3 – 4 – 5

1 Measurement range (in mm)

100 / 125 / 500 / 1000 / 1250 / 1500 / 2000 / 2500 / 3000

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 MSSI12
ADSI14	= Signal conditioner SSI 14 bit,replaced by MSSI14
ADSI16	= Signal conditioner SSI 16 bit,replaced by MSSI16

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

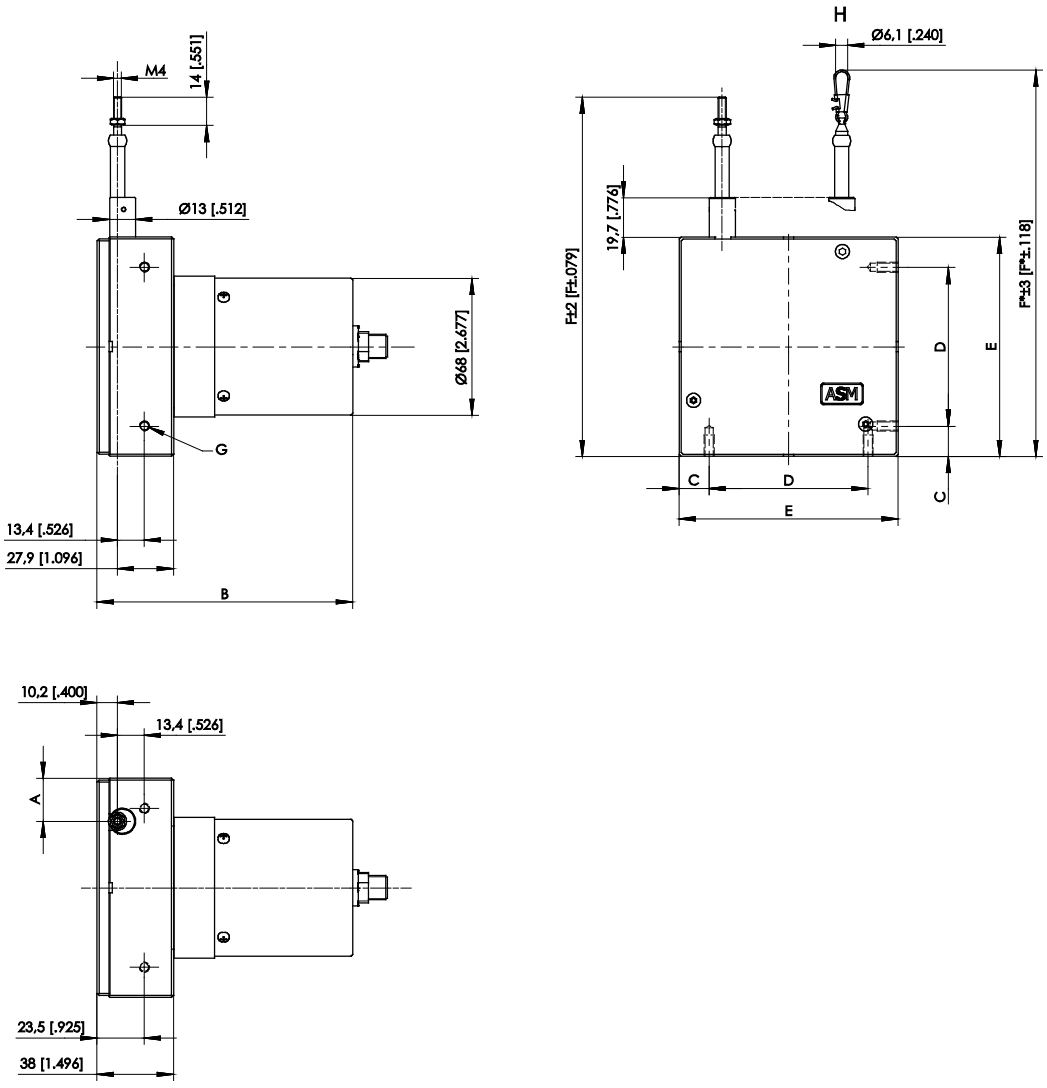
Order example

WS12 – 3000 – 10V – L10 – M4 – M12

Accessories:
Connector cable (see page 264)

Dimensions

Measurement range 100 … 3000 mm, analog output, SSI output



Dimensions in mm	Measurement range	A	B	C	D	E	F	F*
	100; 500; 1000	18.3	112	14	43	71	141	154
	125; 1250	14.5	112	14	43	71	141	154
	1500	10.7	127	14	43	71	141	154
	2000	21.5	127	15	79	109	179	192
	2500	13.3	127	15	79	109	179	192
	3000	9.2	127	15	79	109	179	192

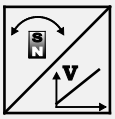
G – 4 x M5 - 10 [.394] deep
H – Option SB0

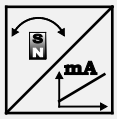
Dimensions in mm [inch]
Dimensions informative only.
For guaranteed dimensions consult factory.

Magnetic encoder, analog output

Sensor features

- **With magnetic absolute encoder**
- **Measurement range up to 3000 mm**
- **Protection class IP67 (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	Aluminium, stainless steel and plastic measuring cable: stainless steel
Protection class	IP67 (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	Up to 1500 mm approx. 1 kg, from 2000 mm approx. 1,5 kg
EMC	DIN EN 61326-1:2013

Order code

WS12 – 1 – 2 – 3 – 4 – 5 – 6

1 Measurement range (in mm)

500 / 1000 / 1250 / 1500 / 2000 / 2500 / 3000

2 Output

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

3 Signal characterisitics

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

WS12 – 3000 – U2 – A – L10 – M4 – M12A5

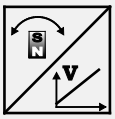
Accessories:

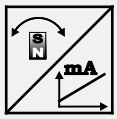
Connector cable (see page 262)
Optional connector cable 8 pin (see page 264)

Magnetic encoder, analog output, programmable

Sensor features

- **With magnetic absolute encoder**
- **Measurement range up to 3000 mm**
- **Protection class IP67 (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	Aluminium, stainless steel and plastic measuring cable: stainless steel
Protection class	IP67 (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	Up to 1500 mm approx. 1 kg, from 2000 mm approx. 1,5 kg
EMC	DIN EN 61326-1:2013

Order code

WS12 – 1 – 2 – 3 – 4 – 5 – 6

1 Measurement range (in mm)

500 / 1000 / 1250 / 1500 / 2000 / 2500 / 3000

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

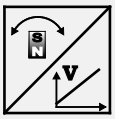
WS12 – 3000 – U2/PMU – A – L10 – M4 – M12A5

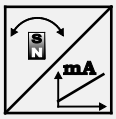
Accessories:
Connector cable (see page 263)

Magnetic encoder, analog output, redundant

Sensor features

- **With magnetic absolute encoder**
- **Measurement range up to 3000 mm**
- **Protection class IP67 (with mating connector only)**
- **Analog output, redundant**
- **Absolute measurement**





Specifications

Output	**U2R** = Voltage 0.5 ... 10 V, redundant **U8R** = Voltage 0.5 ... 4.5 V, redundant **I1R** = Current 4 ... 20 mA, 3 wire, redundant
Resolution	<0.002% f.s.
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)
Sensing device	Magnetic absolute encoder
Housing material	Aluminium, stainless steel and plastic measuring cable: stainless steel
Protection class	IP67 (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	Up to 1500 mm approx. 1 kg, from 2000 mm approx. 1,5 kg
EMC	DIN EN 61326-1:2013

Order code

WS12 – 1 – 2 – 3 – 4 – 5 – 6

1 Measurement range (in mm)

500 / 1000 / 1250 / 1500 / 2000 / 2500 / 3000

2 Output

U2R	= Voltage 0.5 ... 10 V, redundant
U8R	= Voltage 0.5 ... 4.5 V, redundant
I1R	= Current 4 ... 20 mA, 3 wire, redundant

3 Signal characteristics

A/A	= Output 1 increasing, output 2 increasing
A/D	= Output 1 increasing, output 2 decreasing
D/D	= Output 1 decreasing, output 2 decreasing

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

WS12 – 3000 – I1R – A/D – L10 – M4 – M12A8

Accessories:

Connector cable (see page 264)

Magnetic encoder, digital output SSI

Sensor features

- **With magnetic absolute encoder**
- **Measurement range up to 3000 mm**
- **Protection class IP67 (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	Aluminium, stainless steel and plastic measuring cable: stainless steel
Protection class	IP67 (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	Up to 1500 mm approx. 1 kg, from 2000 mm approx. 1,5 kg
EMC	DIN EN 61326-1:2013

Order code

WS12	–	1	–	2	–	3	–	4	–	5	–	6

1 Measurement range (in mm)

500 / 1000 / 1250 / 1500 / 2000 / 2500 / 3000

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

WS12 – 3000 – 50 – MSSI – L10 – M4 – M12A8

Accessories:
Connector cable (see page 264)

Magnetic encoder, digital output CAN Bus

Sensor features

- **With magnetic absolute encoder**
- **Measurement range up to 3000 mm**
- **Protection class IP67 (with mating connector only)**
- **Digital output CAN Bus**
- **Absolute measurement**
- **Optional redundant CAN Bus**

Specifications

Output	**MCANOP** = CANopen **MCANJ1939** = CAN SAE J1939 **MCANOPR** = CANopen redundant **MCANJ1939R** = CAN SAE J1939 redundant
Resolution	setting via CAN Bus
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)
Sensing device	Magnetic absolute encoder
Housing material	Aluminium, stainless steel and plastic measuring cable: stainless steel
Protection class	IP67 (with mating connector only)
Connection	Connector M12, 5 pin
Temperature range	-20 ... +85 °C
Weight	Up to 1500 mm approx. 1 kg, from 2000 mm approx. 1,5 kg
EMC	DIN EN 61326-1:2013

Cable forces for sensors with magnetic encoder

Cable forces typical at = 20 °C	Measurement range	Maximum pull-out force	Minimum pull-in force
	[mm]	[N]	[N]
	500	5.9	2.6
	1000	5.5	2.4
	1250	4.8	2.1
	1500	10.4	6.4
	2000	8.1	5.0
	2500	6.7	4.0
	3000	6.2	3.0

Order code

WS12 – 1 – 2 – 3 – 4 – 5

1 Measurement range (in mm)

500 / 1000 / 1250 / 1500 / 2000 / 2500 / 3000

2 Output

MCANOP	= CANopen
MCANJ1939	= CAN SAE J1939
MCANOPR	= CANopen redundant
MCANJ1939R	= CAN SAE J1939 redundant

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

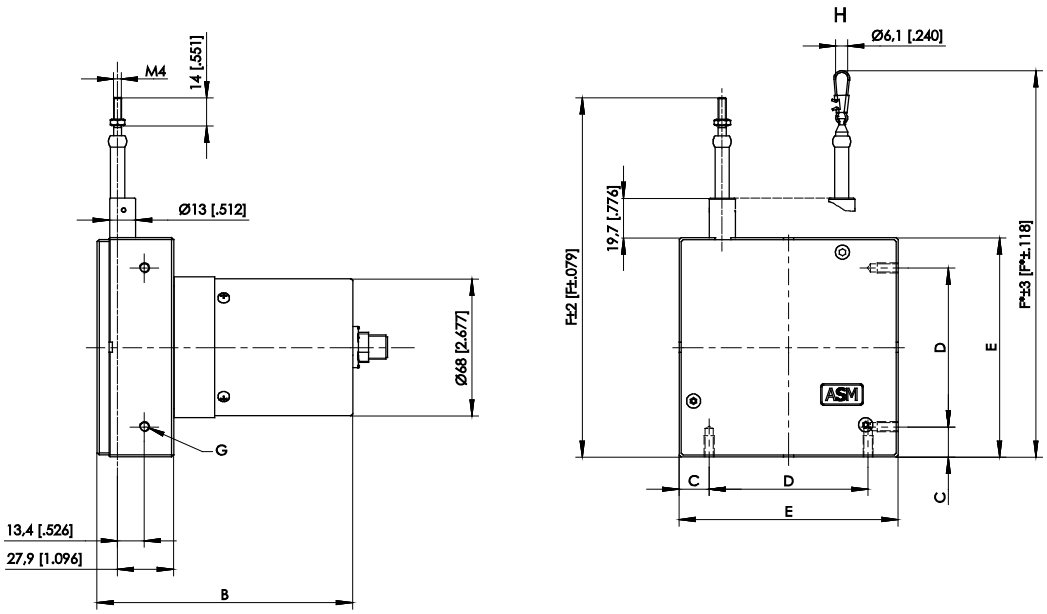
Order example

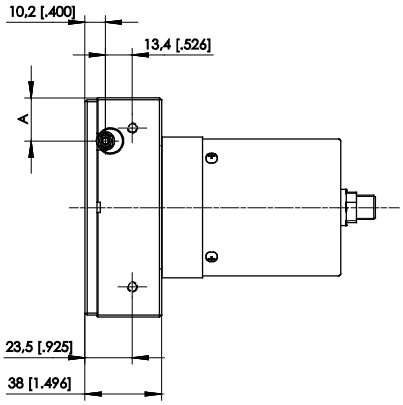
WS12 – 3000 – MCANOP – L10 – M4 – M12/CAN

Accessories:
Connector cable (see page 265)

Dimensions

Measurement range 500 … 3000 mm, magnetic encoder output





Dimensions in mm	Measurement range	A	B	C	D	E	F	F*
	500; 1000	18.3	112	14	43	71	141	154
	1250	14.5	112	14	43	71	141	154
	1500	10.7	127	14	43	71	141	154
	2000	21.5	127	15	79	109	179	192
	2500	13.3	127	15	79	109	179	192
	3000	9.2	127	15	79	109	179	192

G – 4 x M5 - 10 [.394] deep
H – Option SB0

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

Incremental encoder output

Sensor features

- **Measurement range up to 3000 mm**
- **Protection class IP67 (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 5 pulses / mm (40 or 20 edges / mm)
Linearity	±0.05% f.s.
Sensing device	Incremental encoder
Housing material	Aluminium, stainless steel and plastic measuring cable: stainless steel
Protection class	IP67 (with mating connector only)
Connection	Connector M12, 8 pin
Temperature range	-20 ... +85 °C
Weight	Up to 1500 mm approx. 1 kg, from 2000 mm approx. 1,5 kg
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]
	1250	6.6	2.7
	1500	10.6	6.5
	2000	5.7	4.1
	2500	5.7	4.1
	3000	5.8	4.0

Order code

WS12 – 1 – 2 – 3 – 4 – 5

1 Measurement range (in mm)

1250 / 1500 / 2000 / 2500 / 3000

2 Resolution

10	= 10 pulses / mm (1250, 1500 mm)
05	= 5 pulses / mm (2000, 2500, 3000 mm)

other numbers 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

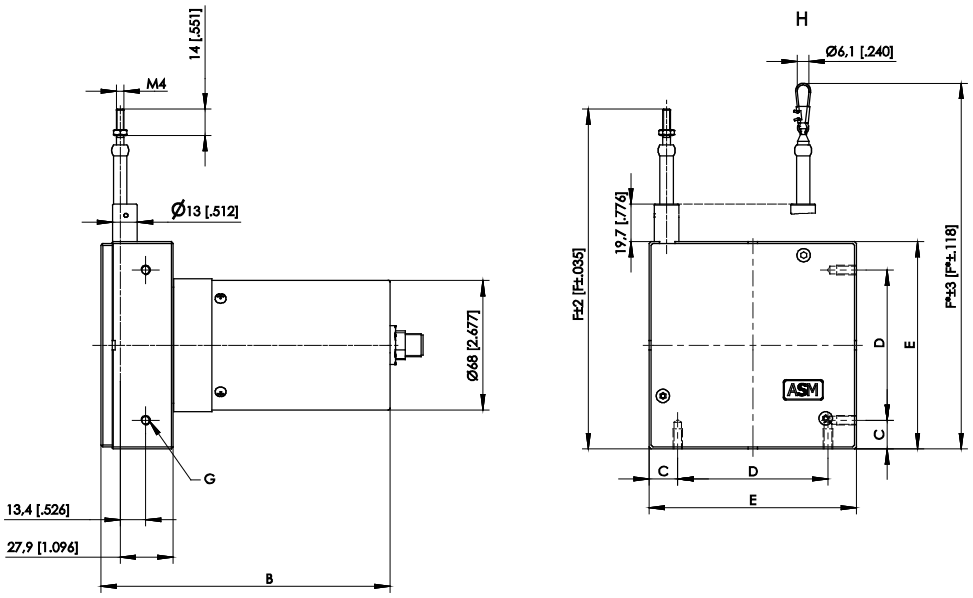
WS12 – 3000 – 5 – PP530 – M4 – M12

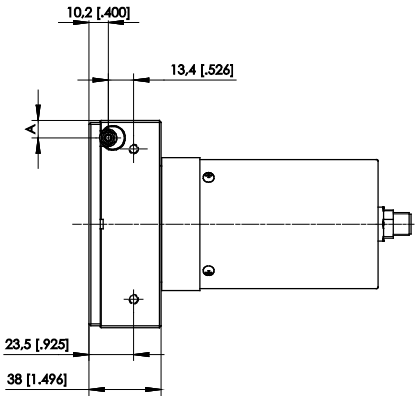
Accessories:

Connector cable (see page 264)

Dimensions

Measurement range 1250 … 3000 mm, incremental encoder output





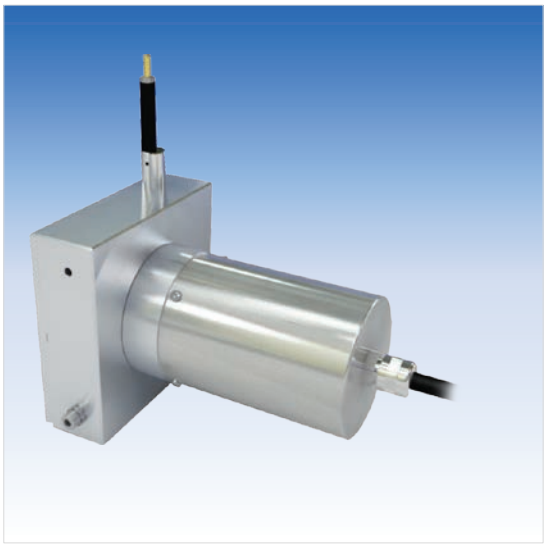
Dimensions in mm	Measurement range	A	B	C	D	E	F	F*
	1250	18.3	137	14	43	71	141	154
	1500	10.7	152	14	43	71	141	154
	2000	9.2	152	15	79	109	179	192
	2500	9.2	152	15	79	109	179	192
	3000	9.2	152	15	79	109	179	192

G – 4 x M5 - 10 [.394] deep
H – Option SB0

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

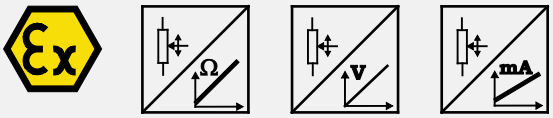
WS12EX

Analog output, Dust Explosion-Proof



Sensor features

- **Measurement range up to 3000 mm**
- **Analog output**
- **DIN EN 60079-0 (June 2014)**
  DIN EN 60079-31 (December 2014)
- **II 3D Ex tc IIIC T80°C Dc**



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 Excitation voltage WS-EX sensors: 24 V DC typical
Resolution	Quasi infinite
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)
Sensing device	Precision potentiometer
Housing material	Aluminium, stainless steel and plastic measuring cable: stainless steel
Protection class of the housing	IP65
Connection	Cable output, standard lenght 2 m
Weight	Up to 1500 mm approx. 1 kg, from 2000 mm approx. 1.5 kg
Temperature range	-20°C ... + 40°C
Standards	
Dust-Ex Proof	DIN EN 60079-0 (June 2014) DIN EN 60079-31 (December 2014)
EMC	DIN EN 61326-1:2013
Shock	DIN EN 60068-2-27:2010, 50 g 11 ms, 100 shocks
Vibration	DIN EN 60068-2-6:2008, 20 g 10 Hz-2 kHz, 10 cycles

Cable forces typical at = 20 °C	Measurement range	Maximum pull-out force	Minimum pull-in force
	[mm]	[N]	[N]
	100	5.2	2.8
	125	4.6	2.5
	500	5.9	2.6
	1000	5.5	2.4
	1250	4.8	2.1
	1500	10.4	6.4
	2000	8.1	5.0
	2500	6.7	4.0
	3000	6.2	3.0

Order code

WS12EX – 1 – 2 – 3 – 4 – 5

1 Measurement range (in mm)

100 / 125 / 500 / 1000 / 1250 / 1500 / 2000 / 2500 / 3000

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

Excitation voltage WS-EX sensors: 24 V DC typical

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

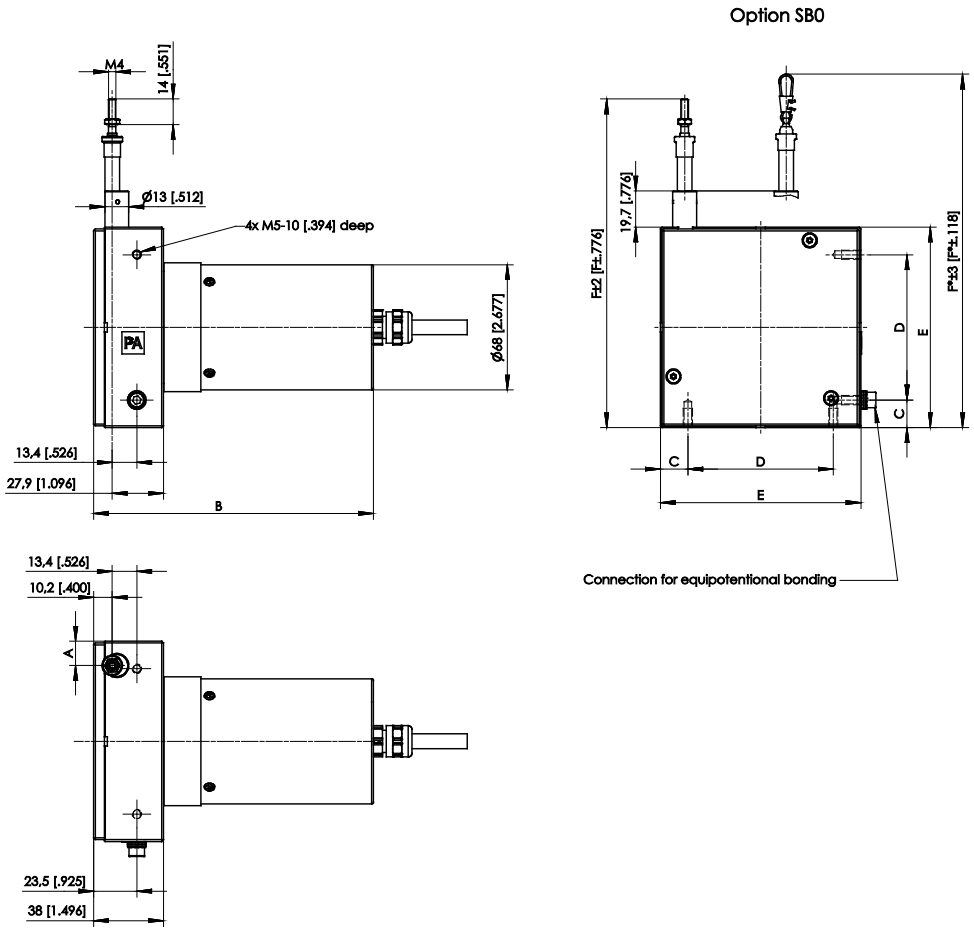
KAB2M	= Cable output, standard lenght 2 m

Order example

WS12EX – 3000 – 10V – L10 – M4 – KAB2M

Dimensions

Measurement range 100 … 3000 mm, analog output, Dust-Explosion-proof

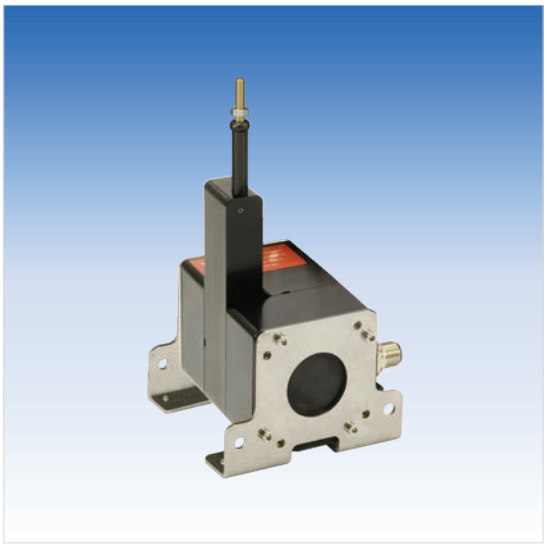


Dimensions in mm	Measurement range	A	B	C	D	E	F	F*
	100; 500;1000	18.3	137	14	43	71	141	154
	125; 1250	14.5	137	14	43	71	141	154
	1500	10.7	152	14	43	71	141	154
	2000	21.5	152	15	79	109	179	192
	2500	13.3	152	15	79	109	179	192
	3000	9.2	152	15	79	109	179	192

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

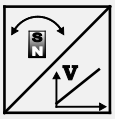
WS61

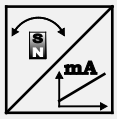
Magnetic encoder, analog output



Sensor features

- **With magnetic absolute encoder**
- **Measurement range up to 3000 mm**
- **Protection class IP67/IP69 (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	Plastic and stainless steel measuring cable: stainless steel
Protection class	IP67/IP69 (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	-40 ... +85 °C
Weight	Approx. 700 g
EMC	DIN EN 61326-1:2013

Order code

WS61 – 1 – 2 – 3 – 4 – 5 – 6

1 Measurement range (in mm)

1500 / 2000 / 2500 / 3000

2 Output

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

3 Signal characterisitics

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

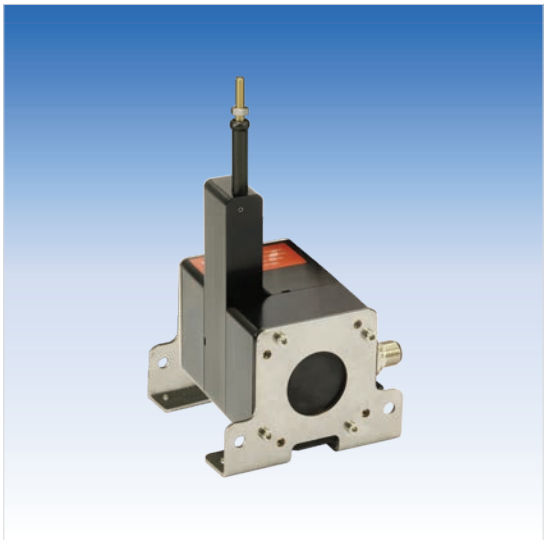
M12R5	= Connector M12, 5 pin

Order example

WS61 – 3000 – U2 – A – L10 – M4 – M12R5

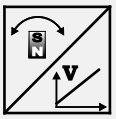
Accessories:
Connector cable (see page 262)

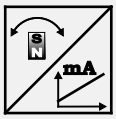
Magnetic encoder, analog output, programmable



Sensor features

- **With magnetic absolute encoder**
- **Measurement range up to 3000 mm**
- **Protection class IP67/IP69 (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	Plastic and stainless steel measuring cable: stainless steel
Protection class	IP67/IP69 (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	-40 ... +85 °C
Weight	Approx. 700 g
EMC	DIN EN 61326-1:2013

Order code

WS61 – 1 – 2 – 3 – 4 – 5 – 6

1 Measurement range (in mm)

1500 / 2000 / 2500 / 3000

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

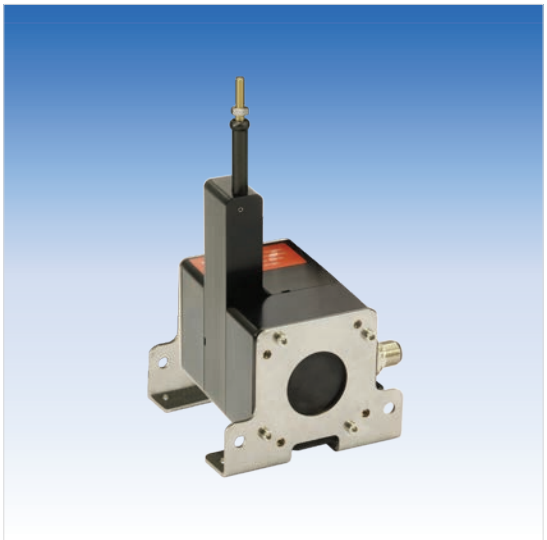
M12R5	= Connector M12, 5 pin

Order example

WS61 – 3000 – U2/PMU – A – L10 – M4 – M12R5

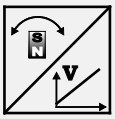
Accessories:
Connector cable (see page 263)

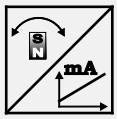
Magnetic encoder, analog output, redundant



Sensor features

- **With magnetic absolute encoder**
- **Measurement range up to 3000 mm**
- **Protection class IP67/IP69 (with mating connector only)**
- **Analog output, redundant**
- **Absolute measurement**





Specifications

Output	**U2R** = Voltage 0.5 ... 10 V, redundant **U8R** = Voltage 0.5 ... 4.5 V, redundant **I1R** = Current 4 ... 20 mA, 3 wire, redundant
Resolution	<0.002% f.s.
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)
Sensing device	Magnetic absolute encoder
Housing material	Plastic and stainless steel measuring cable: stainless steel
Protection class	IP67/IP69 (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	-40 ... +85 °C
Weight	Approx. 700 g
EMC	DIN EN 61326-1:2013

Order code

WS61 – 1 – 2 – 3 – 4 – 5 – 6

1 Measurement range (in mm)

1500 / 2000 / 2500 / 3000

2 Output

U2R	= Voltage 0.5 ... 10 V, redundant
U8R	= Voltage 0.5 ... 4.5 V, redundant
I1R	= Current 4 ... 20 mA, 3 wire, redundant

3 Signal characteristics

A/A	= Output 1 increasing, output 2 increasing
A/D	= Output 1 increasing, output 2 decreasing
D/D	= Output 1 decreasing, output 2 decreasing

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

M12R8	= Connector M12, 8 pin

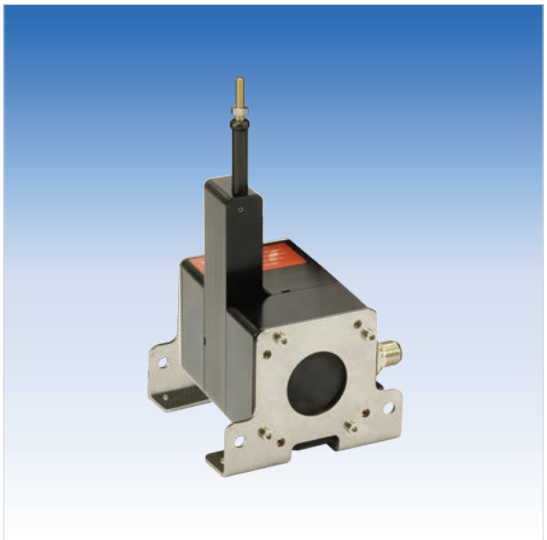
Order example

WS61 – 3000 – I1R – A/D – L10 – M4 – M12R8

Accessories:

Connector cable (see page 264)

Magnetic encoder, digital output SSI



Sensor features

- **With magnetic absolute encoder**
- **Measurement range up to 3000 mm**
- **Protection class IP67/IP69 (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	Plastic and stainless steel measuring cable: stainless steel
Protection class	IP67/IP69 (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	-40 ... +85 °C
Weight	Approx. 700 g
EMC	DIN EN 61326-1:2013

Order code

WS61 – 1 – 2 – 3 – 4 – 5 – 6

1 Measurement range (in mm)

1500 / 2000 / 2500 / 3000

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

M12R8	= Connector M12, 8 pin

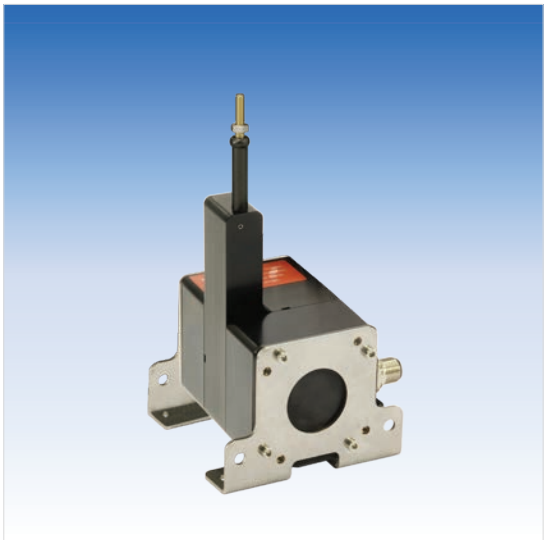
Order example

WS61 – 3000 – 50 – MSSI – L10 – M4 – M12R8

Accessories:

Connector cable (see page 264)

Magnetic encoder, digital output CAN Bus



Sensor features

- **With magnetic absolute encoder**
- **Measurement range up to 3000 mm**
- **Protection class IP67/IP69 (with mating connector only)**
- **Digital output CAN Bus**
- **Absolute measurement**
- **Optional redundant CAN Bus**

Specifications

Output	**MCANOP** = CANopen **MCANJ1939** = CAN SAE J1939 **MCANOPR** = CANopen redundant **MCANJ1939R** = CAN SAE J1939 redundant
Resolution	setting via CAN Bus
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)
Sensing device	Magnetic absolute encoder
Housing material	Plastic and stainless steel measuring cable: stainless steel
Protection class	IP67/IP69 (with mating connector only)
Connection	Connector M12, 5 pin
Temperature range	-40 ... +85 °C
Weight	Approx. 700 g
EMC	DIN EN 61326-1:2013

Cable forces for sensors with magnetic encoder

Cable forces typical at = 20 °C	**Measurement range**	**Maximum pull-out force**	**Minimum pull-in force**
	[mm]	[N]	[N]
	1500	3.6	2.8
	2000	3.7	2.8
	2500	3.8	2.8
	3000	3.8	2.8

Order code

WS61 – 1 – 2 – 3 – 4 – 5

1 Measurement range (in mm)

1500 / 2000 / 2500 / 3000

2 Output

MCANOP	= CANopen
MCANJ1939	= CAN SAE J1939
MCANOPR	= CANopen redundant
MCANJ1939R	= CAN SAE J1939 redundant

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

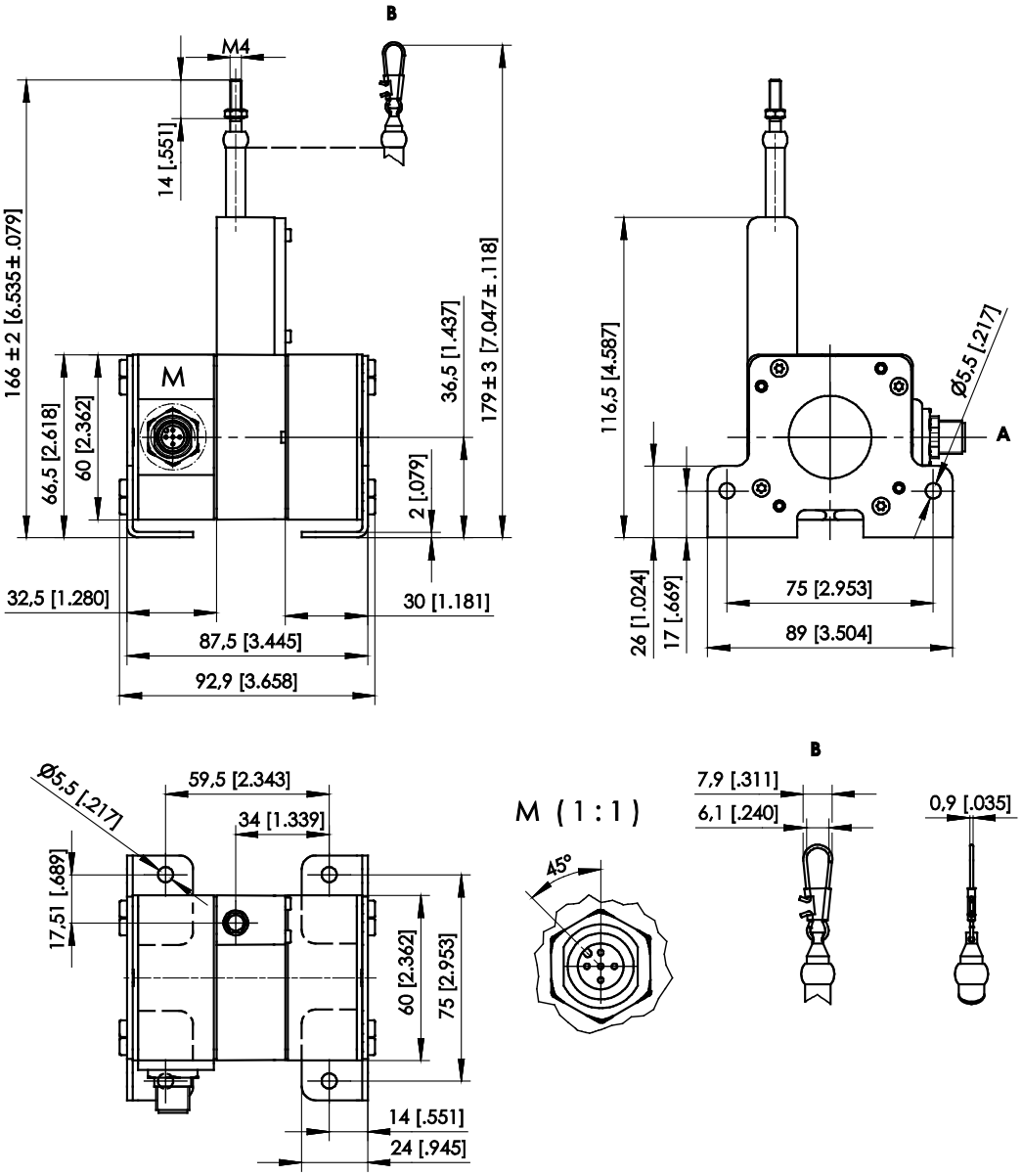
WS61 – 3000 – MCANOP – L10 – M4 – M12/CAN

Accessories:

Connector cable (see page 265)

Dimensions

Measurement range 1500 … 3000 mm, magnetic encoder output



A – Connector M12
B – Option SB0

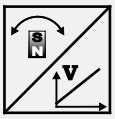
Dimensions in mm [inch]
Dimensions informative only.
For guaranteed dimensions consult factory.

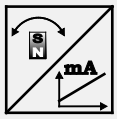
WS85

Magnetic encoder, analog output

Sensor features

- **With magnetic absolute encoder**
- **Measurement range up to 6000 mm**
- **Protection class IP67/IP69 (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	Plastic and stainless steel measuring cable: stainless steel
Protection class	IP67/IP69 (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	-40 ... +85 °C
Weight	Approx. 1250 g
EMC	DIN EN 61326-1:2013

Order code

WS85 – 1 – 2 – 3 – 4 – 5 – 6

1 Measurement range (in mm)

4000 / 5000 / 6000

2 Output

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

3 Signal characterisitics

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

M12R5	= Connector M12, 5 pin

Order example

WS85 – 6000 – U2 – A – L10 – M4 – M12R5

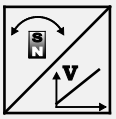
Accessories:

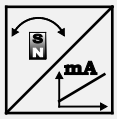
Connector cable (see page 262)

Magnetic encoder, analog output, programmable

Sensor features

- **With magnetic absolute encoder**
- **Measurement range up to 6000 mm**
- **Protection class IP67/IP69 (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	Plastic and stainless steel measuring cable: stainless steel
Protection class	IP67/IP69 (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	-40 ... +85 °C
Weight	Approx. 1250 g
EMC	DIN EN 61326-1:2013

Order code

WS85 – 1 – 2 – 3 – 4 – 5 – 6

1 Measurement range (in mm)

4000 / 5000 / 6000

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

M12R5	= Connector M12, 5 pin

Order example

WS85 – 6000 – U2/PMU – A – L10 – M4 – M12R5

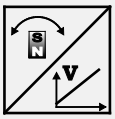
Accessories:

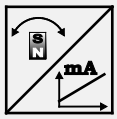
Connector cable (see page 263)

Magnetic encoder, analog output, redundant

Sensor features

- **With magnetic absolute encoder**
- **Measurement range up to 6000 mm**
- **Protection class IP67/IP69 (with mating connector only)**
- **Analog output, redundant**
- **Absolute measurement**





Specifications

Output	**U2R** = Voltage 0.5 ... 10 V, redundant **U8R** = Voltage 0.5 ... 4.5 V, redundant **I1R** = Current 4 ... 20 mA, 3 wire, redundant
Resolution	<0.002% f.s.
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)
Sensing device	Magnetic absolute encoder
Housing material	Plastic and stainless steel measuring cable: stainless steel
Protection class	IP67/IP69 (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	-40 ... +85 °C
Weight	Approx. 1250 g
EMC	DIN EN 61326-1:2013

Order code

WS85 – 1 – 2 – 3 – 4 – 5 – 6

1 Measurement range (in mm)

4000 / 5000 / 6000

2 Output

U2R	= Voltage 0.5 ... 10 V, redundant
U8R	= Voltage 0.5 ... 4.5 V, redundant
I1R	= Current 4 ... 20 mA, 3 wire, redundant

3 Signal characteristics

A/A	= Output 1 increasing, output 2 increasing
A/D	= Output 1 increasing, output 2 decreasing
D/D	= Output 1 decreasing, output 2 decreasing

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

M12R8	= Connector M12, 8 pin

Order example

WS85 – 6000 – I1R – A/D – L10 – M4 – M12R8

Accessories:

Connector cable (see page 264)

Magnetic encoder, digital output SSI

Sensor features

- **With magnetic absolute encoder**
- **Measurement range up to 6000 mm**
- **Protection class IP67/IP69 (with mating connector only)**
- **Digital output SSI**
- **Absolute measurement**

Specifications

Output	**MSSI** = SSI synchronous serial interface
Resolution	50 / 100
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)
Sensing device	Magnetic absolute encoder
Housing material	Plastic and stainless steel measuring cable: stainless steel
Protection class	IP67/IP69 (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	-40 ... +85 °C
Weight	Approx. 1250 g
EMC	DIN EN 61326-1:2013

Order code

WS85 – [1] – [2] – [3] – [4] – [5] – [6]

1 Measurement range (in mm)

4000 / 5000 / 6000

2 Resolution (in µm)

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

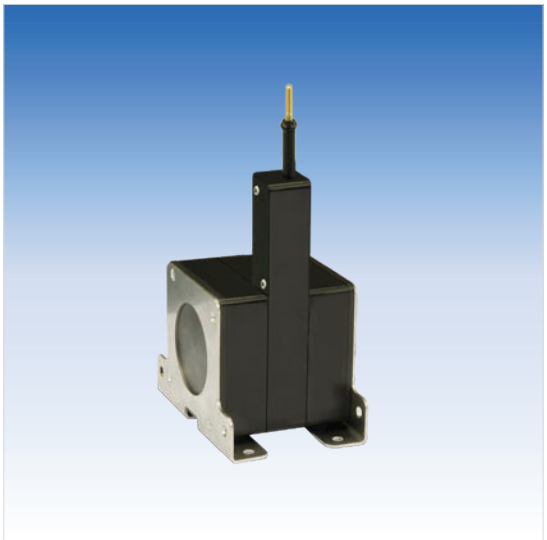
M12R8 = Connector M12, 8 pin

Order example

WS85 – 6000 – 50 – MSSI – L10 – M4 – M12R8

Accessories:
Connector cable (see page 264)

Magnetic encoder, digital output CAN Bus



Sensor features

- **With magnetic absolute encoder**
- **Measurement range up to 6000 mm**
- **Protection class IP67/IP69 (with mating connector only)**
- **Digital output CAN Bus**
- **Absolute measurement**
- **Optional redundant CAN Bus**

Specifications

Output	**MCANOP** = CANopen **MCANJ1939** = CAN SAE J1939 **MCANOPR** = CANopen redundant **MCANJ1939R** = CAN SAE J1939 redundant
Resolution	setting via CAN Bus
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)
Sensing device	Magnetic absolute encoder
Housing material	Plastic and stainless steel measuring cable: stainless steel
Protection class	IP67/IP69 (with mating connector only)
Connection	Connector M12, 5 pin
Temperature range	-40 ... +85 °C
Weight	Approx. 1250 g
EMC	DIN EN 61326-1:2013

Cable forces for sensors with magnetic encoder

Cable forces typical at = 20 °C	**Measurement range**	**Maximum pull-out force**	**Minimum pull-in force**
	[mm]	[N]	[N]
	4000	7.2	4.3
	5000	7.2	4.3
	6000	7.4	4.3

Order code

WS85 – 1 – 2 – 3 – 4 – 5

1 Measurement range (in mm)

4000 / 5000 / 6000

2 Output

MCANOP	= CANopen
MCANJ1939	= CAN SAE J1939
MCANOPR	= CANopen redundant
MCANJ1939R	= CAN SAE J1939 redundant

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

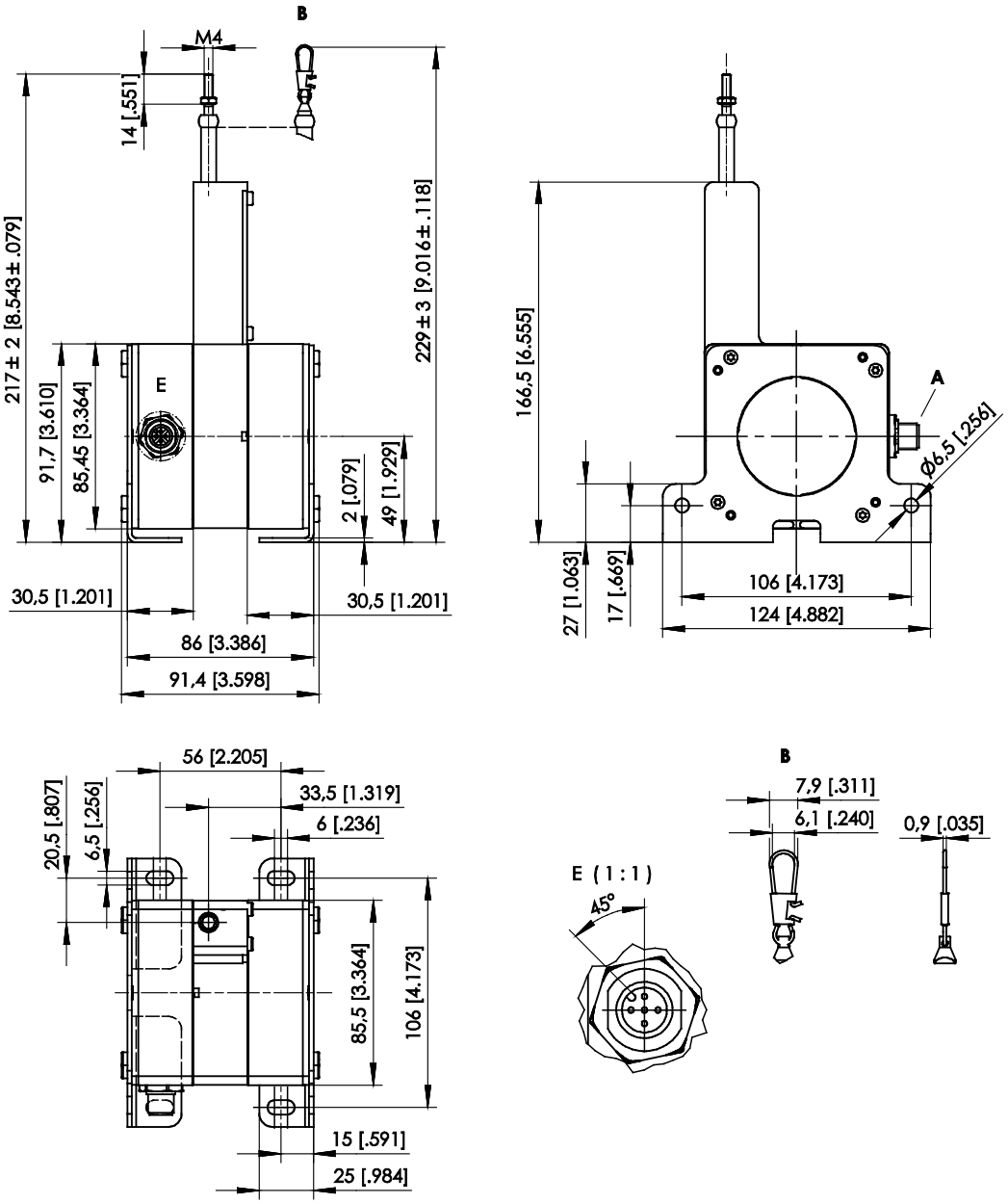
WS85 – 6000 – MCANOP – L10 – M4 – M12/CAN

Accessories:

Connector cable (see page 265)

Dimensions

Measurement range 4000 … 6000 mm, magnetic encoder output



A – Connector M12
B – Option SB0

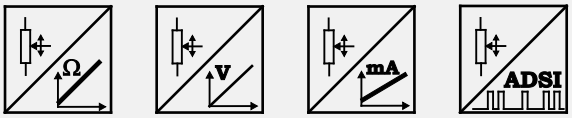
Dimensions in mm [inch]
Dimensions informative only.
For guaranteed dimensions consult factory.

WS17KT

Analog output, SSI output

Sensor features

- **Measurement range up to 15000 mm**
- **Protection class IP64 (optional IP66)**
- **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 MSSI12 **ADSI14** = Signal conditioner SSI 14 bit,replaced by MSSI14 **ADSI16** = Signal conditioner SSI 16 bit,replaced by MSSI16
Resolution	Analog: quasi infinite
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)
Sensing device	Precision potentiometer
Housing material	Aluminium, stainless steel and plastic measuring cable: stainless steel
Protection class	IP64 (optional IP66)
Connection	Connector M12, 8 pin
Temperature range	-20 ... +85 °C
Weight	see table "Cable forces"
EMC	DIN EN 61326-1:2013

Cable forces typical at = 20 °C	Measurement range [mm]	Weight approx. [kg]	Maximum pull-out force [N]	Minimum pull-in force [N]
	1500	1.4	11.0	6.2
	2000	1.4	8.5	4.8
	2500	1.5	5.5	3.5
	3000	2.9	14.5	10.3
	4000	2.9	12.7	9.1
	5000	5.3	13.0	9.3
	6250	5.5	10.2	7.3
	10000	6.0	16.5	9.1
	12500	6.0	16.5	9.1
	15000	6.0	16.5	9.1

Order code

WS17KT – [1] – [2] – [3] – [4] – [5]

1 Measurement range (in mm)

1500 / 2000 / 2500 / 3000 / 4000 / 5000 / 6250 / 10000 / 12500 / 15000

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 MSSI12
ADSI14	= Signal conditioner SSI 14 bit,replaced by MSSI14
ADSI16	= Signal conditioner SSI 16 bit,replaced by MSSI16

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

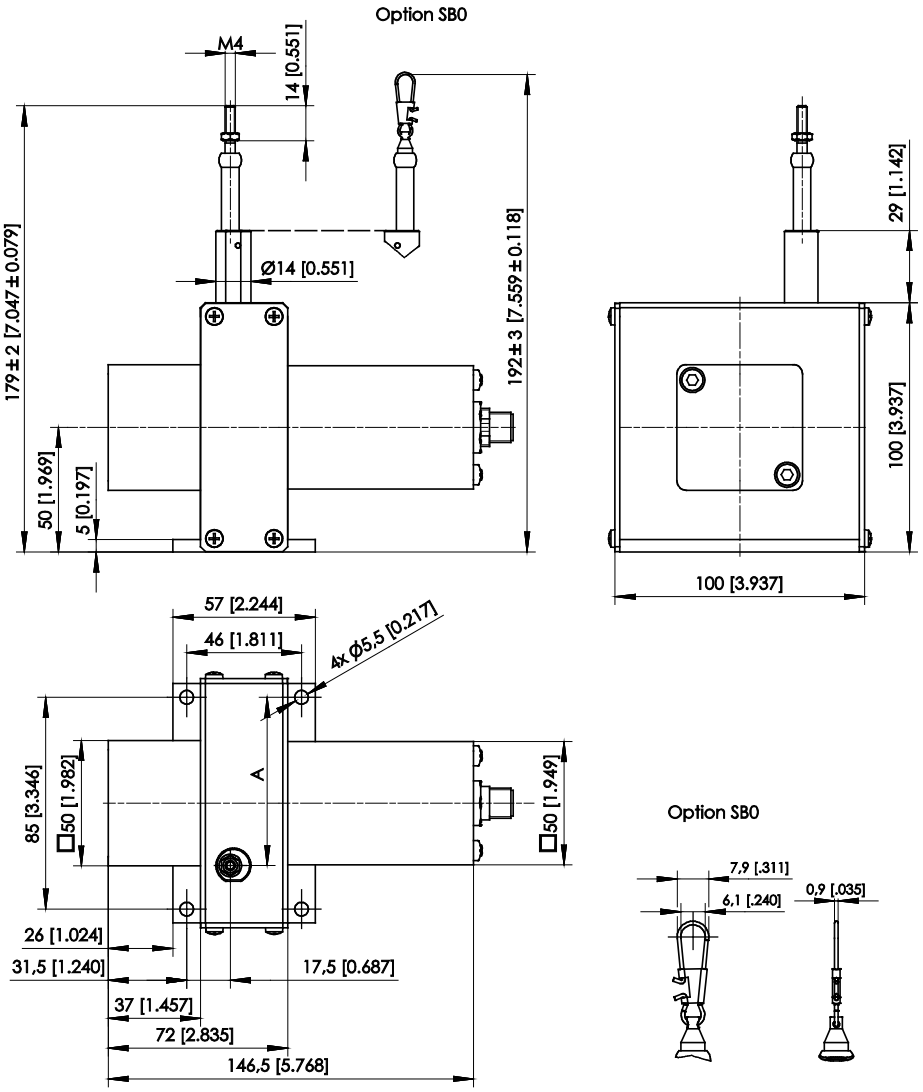
Order example

WS17KT – 2500 – 10V – L10 – M4 – M12

Accessories:
Connector cable (see page 264)

Dimensions

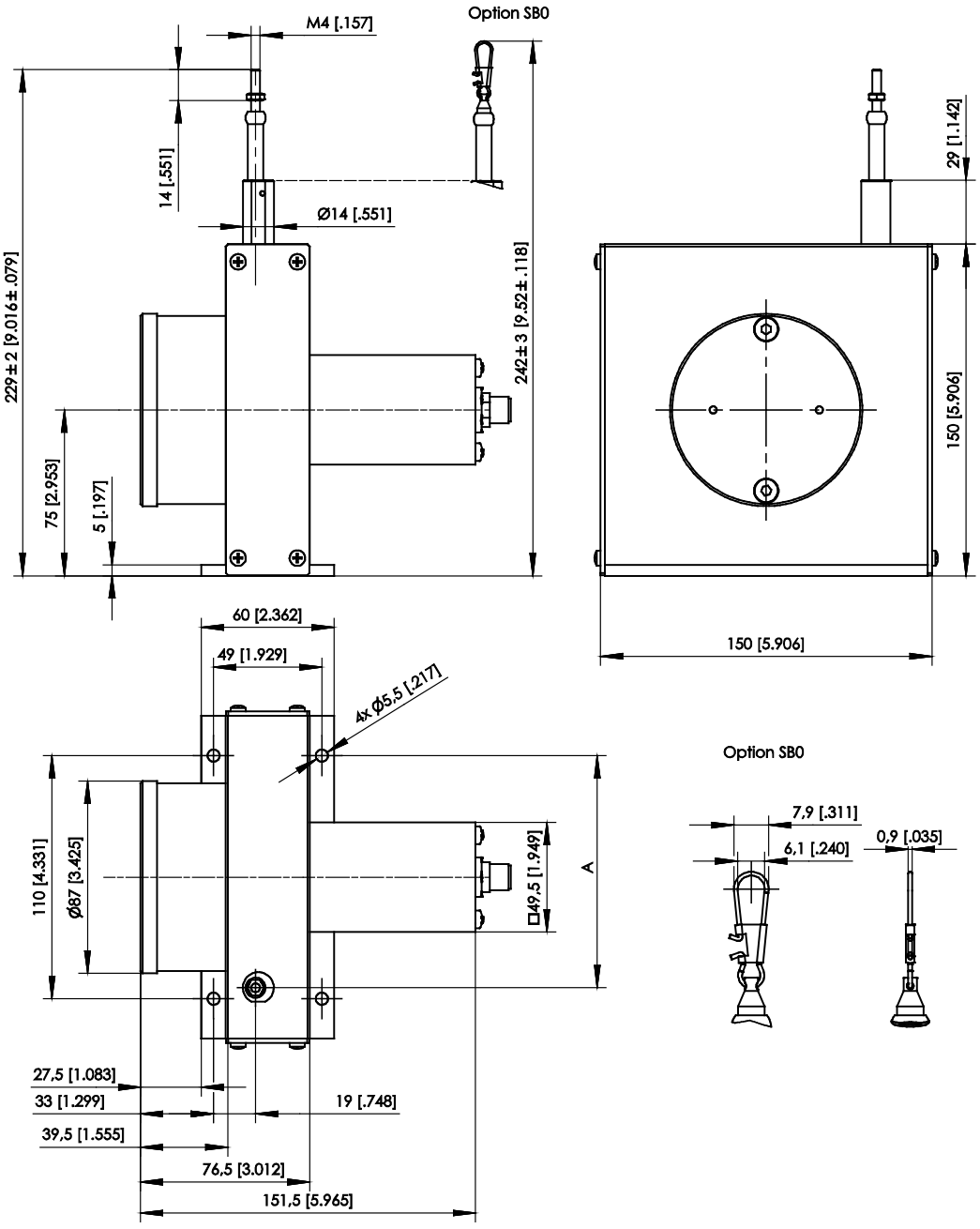
Measurement range 1500 … 2000 … 2500 mm, analog output, SSI output



Dimensions in mm	Measurement range	A
	1500	67.5
	2000	75.5
	2500	82.5

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

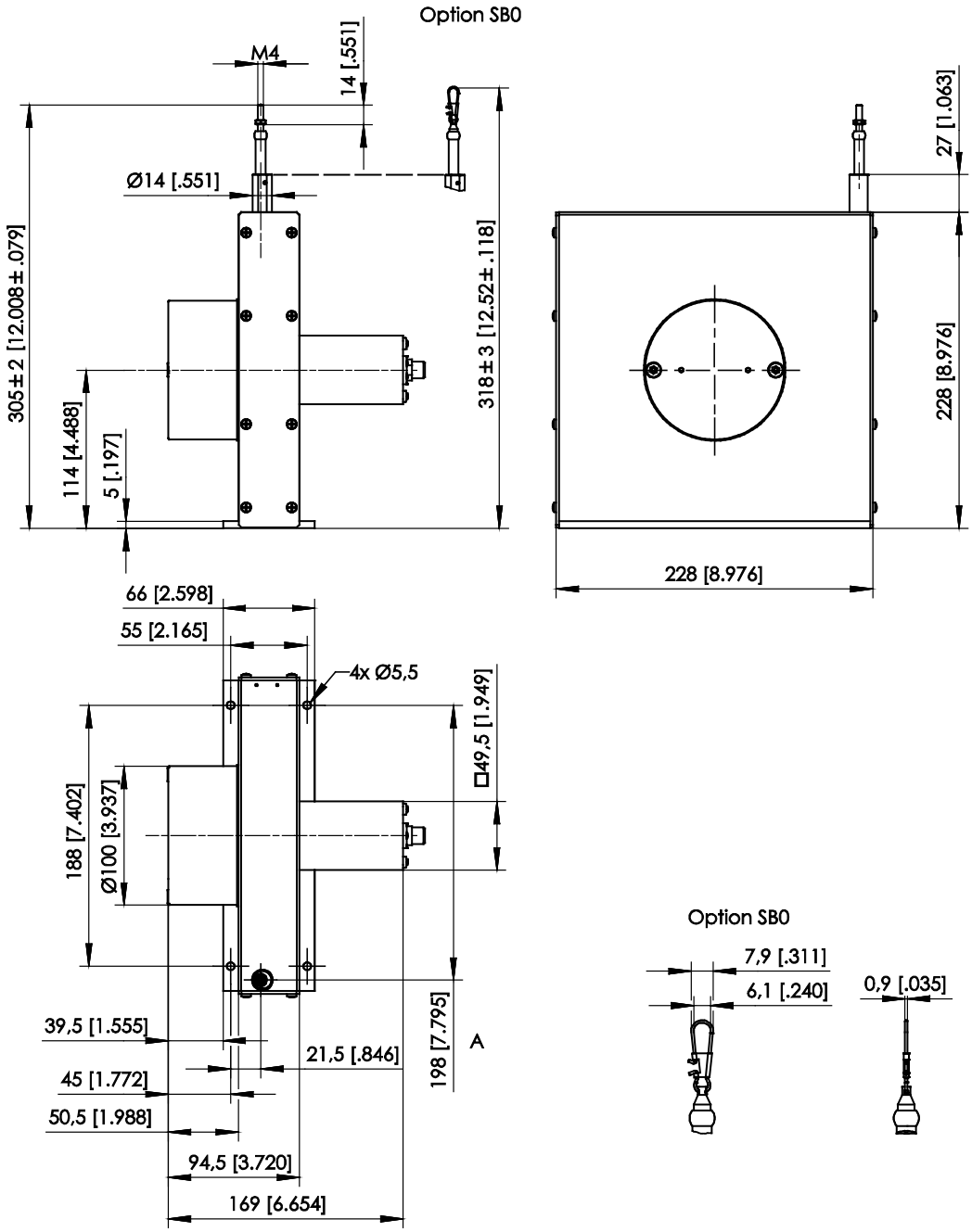
Measurement range 3000 ... 4000 mm, analog output, SSI output



Dimensions in mm	Measurement range	A
	3000	105
	4000	120

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

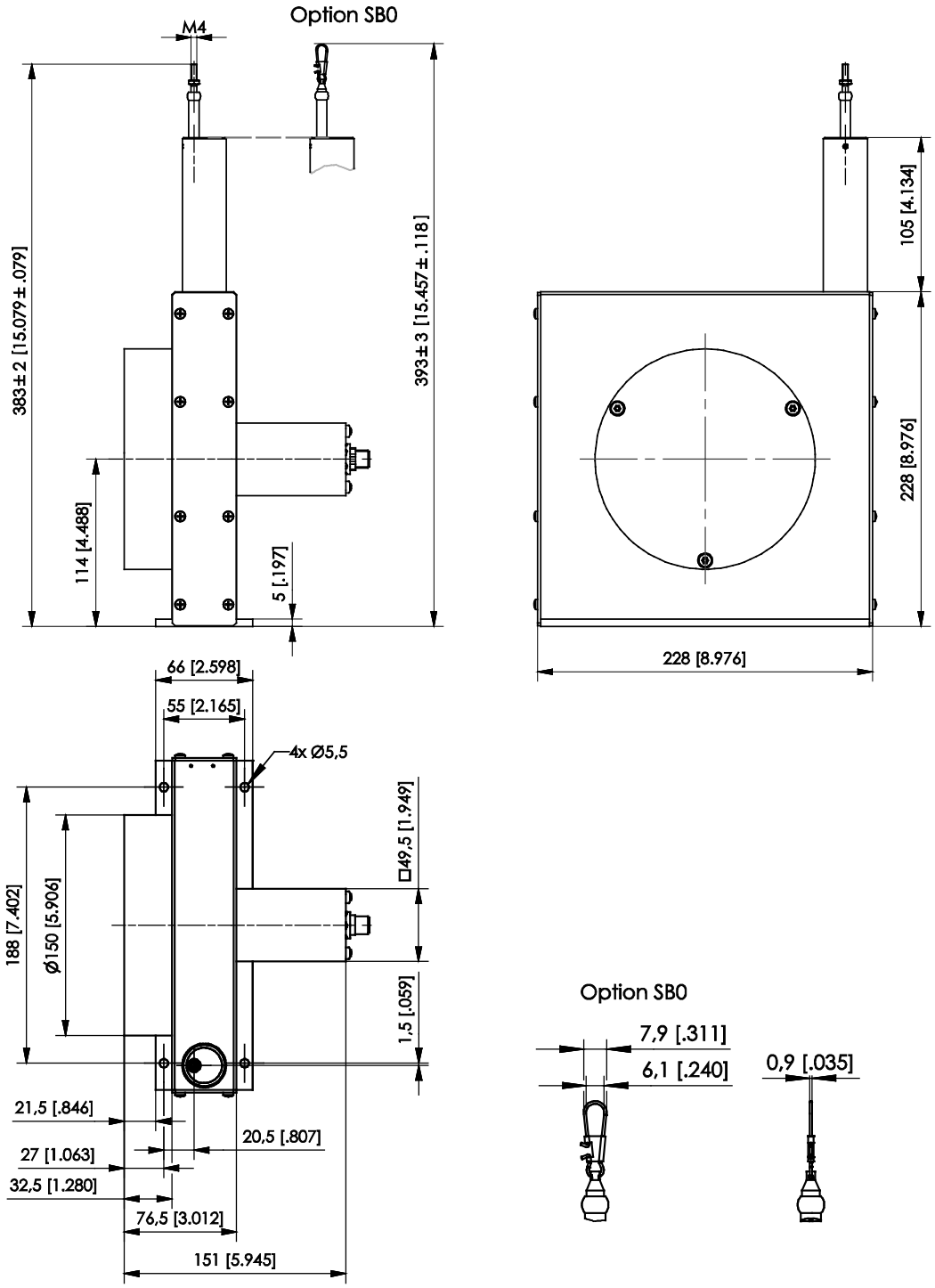
Measurement range 5000 … 6250 mm, analog output, SSI output



Dimensions in mm	Measurement range	A
	5000	178
	6250	198

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

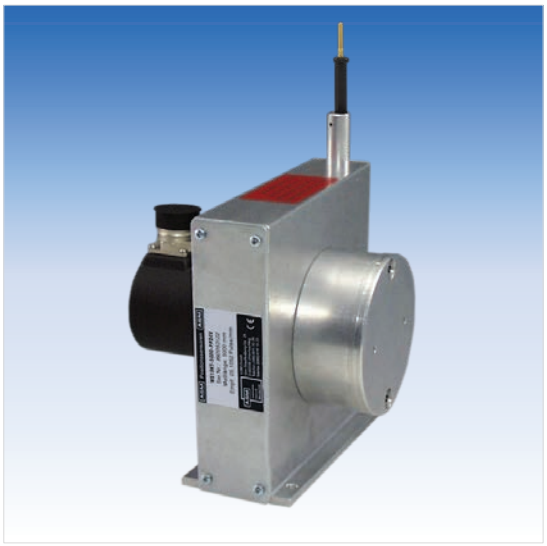
Measurement range 10000 … 12500 … 15000 mm, analog output, SSI output



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

WS19KT

Absolute encoder output



Sensor features

- **Measurement range up to 15000 mm**
- **Protection class IP64**
- **Absolute encoder output**

Specifications

Output	**HSSI** = Absolute encoder with synchronous serial output (SSI) **HPROF** = Absolute encoder with Profibus interface **HINT** = Absolute encoder with Interbus interface **HDEV** = Absolute encoder with DeviceNet interface **HCAN** = Absolute encoder with CAN-interface **HCANOP** = Absolute encoder with CANopen interface		
Resolution for 12 bit per revolution (4096 steps/ revolution)		Resolution	Dist/Rev.
	WS19KT-2000	0.04 mm	163.84 mm
	WS19KT-3000	0.063 mm	260.09 mm
	WS19KT-5000	0.10 mm	409.60 mm
	WS19KT-8000	0.162 mm	667.90 mm
	WS19KT-15000	0.146 mm	600.00 mm
Linearity	±0.05% f.s. (standard) ±0.01% f.s. (optional)		
Sensing device	Absolute encoder		
Housing material	Aluminium, stainless steel and plastic measuring cable: stainless steel		
Protection class	IP64		
Connection	Depending on the type of encoder: connector or Bus cover		
Temperature range	-20 ... +85 °C		
Weight	see table "Cable forces"		
EMC	DIN EN 61326-1:2013		

Cable forces typical at = 20 °C	Measurement range [mm]	Weight approx. [kg]	Maximum pull-out force [N]	Minimum pull-in force [N]
	2000	1.3	11.0	6.0
	3000	1.6	8.1	4.9
	5000	3.0	12.0	9.0
	8000	5.6	10.5	6.8
	15000	6.1	16.5	9.1

Order code

WS19KT – 1 – 2 – 3 – 4

1 Measurement range (in mm)

2000 / 3000 / 5000 / 8000 / 15000

2 Output

HSSI	= Absolute encoder with synchronous serial output (SSI)
HPROF	= Absolute encoder with Profibus interface
HINT	= Absolute encoder with Interbus interface
HDEV	= Absolute encoder with DeviceNet interface
HCAN	= Absolute encoder with CAN-interface
HCANOP	= Absolute encoder with CANopen interface

3 Linearity (optional)

L01	= ±0.01% f.s.

4 Cable fixing

M4	= M4 cable fixing
SB0	= cable clip

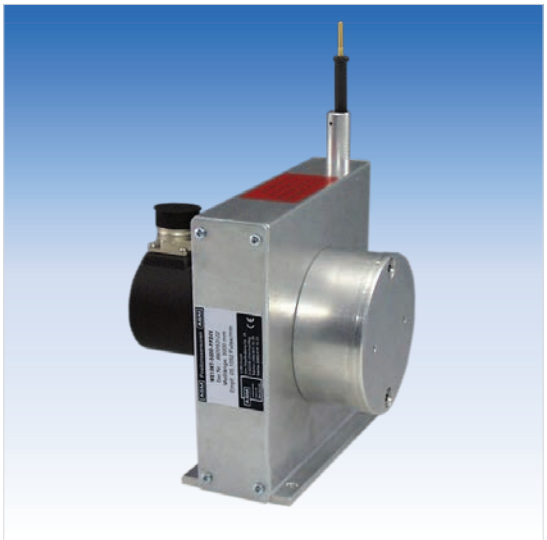
Order example

WS19KT – 3000 – HSSI – M4

Accessories:

Mating connector CONN-CONIN-12F-G (see page 266)

Incremental encoder output



Sensor features

- **Measurement range up to 15000 mm**
- **Protection class IP64**
- **Incremental encoder output**

Specifications

Output	**LD5VC** = Incremental encoder TTL compatible **PP24VC** = Incremental encoder HTL compatible
Resolution	WS19KT-2000 25 pulses / mm WS19KT-3000 15.75 pulses / mm WS19KT-5000 10 pulses / mm WS19KT-8000 6.13 pulses / mm WS19KT15000 6.83 pulses /mm
Linearity	±0.05% f.s.
Sensing device	Incremental encoder
Housing material	Aluminium, stainless steel and plastic measuring cable: stainless steel
Protection class	IP64
Connection	Connector 12 pin
Temperature range	-20 ... +85 °C
Weight	see table "Cable forces"
EMC	DIN EN 61326-1:2013

Cable forces typical at = 20 °C	**Measurement range [mm]**	**Weight approx. [kg]**	**Maximum pull-out force [N]**	**Minimum pull-in force [N]**
	2000	1.3	11.0	6.0
	3000	1.6	8.1	4.9
	5000	3.0	12.0	9.0
	8000	5.6	10.5	6.8
	15000	6.1	16.5	9.1

Order code

WS19KT – 1 – 2 – 3 – 4

1 Measurement range (in mm)

2000 / 3000 / 5000 / 8000 / 15000

2 Output

LD5VC	= Incremental encoder TTL compatible
PP24VC	= Incremental encoder HTL compatible

3 Linearity (optional)

L01	= ±0.01% f.s.

4 Cable fixing

M4	= M4 cable fixing
SB0	= cable clip

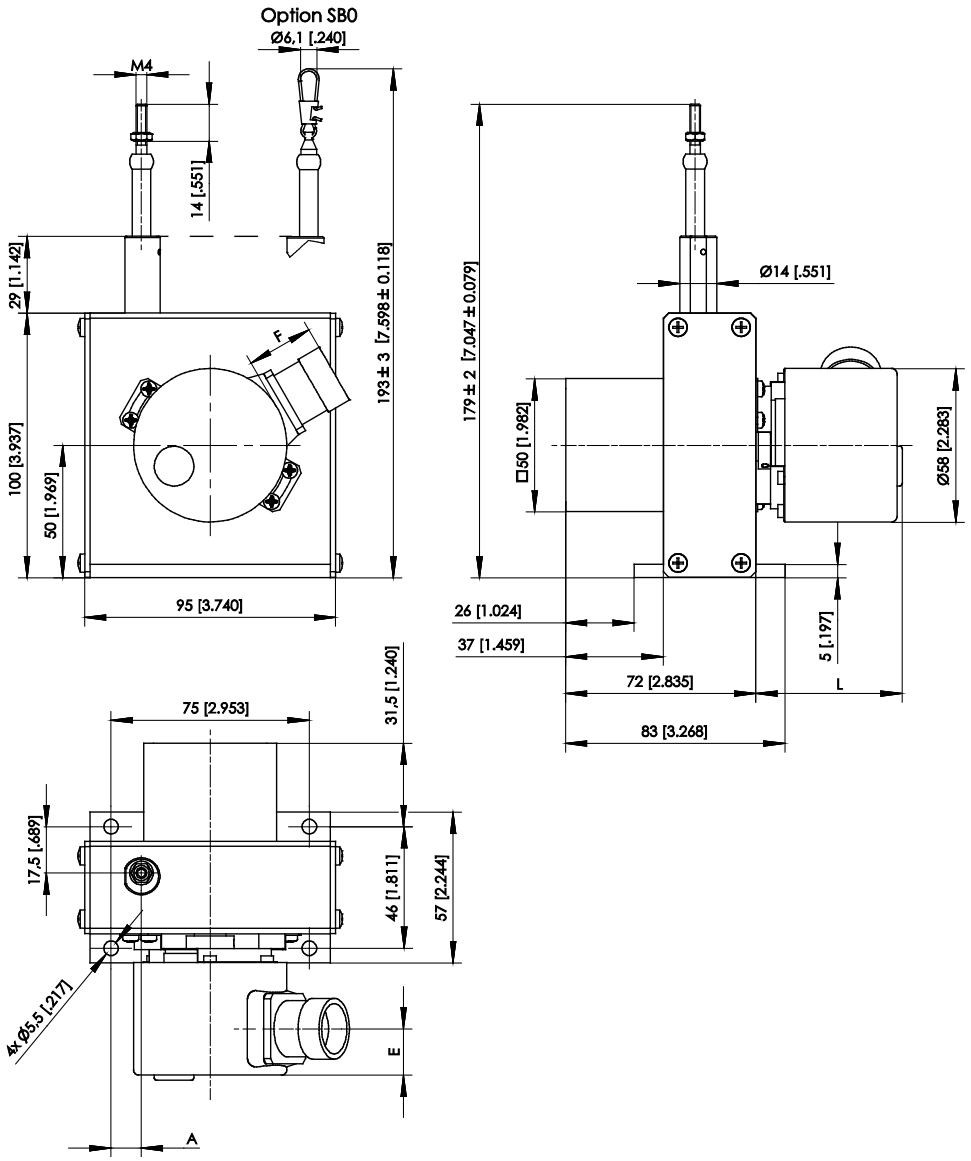
Order example

WS19KT – 5000 – LD5VC – M4

Accessories:
Mating connector CONN-CONIN-12F-G (see page 266)

Dimensions

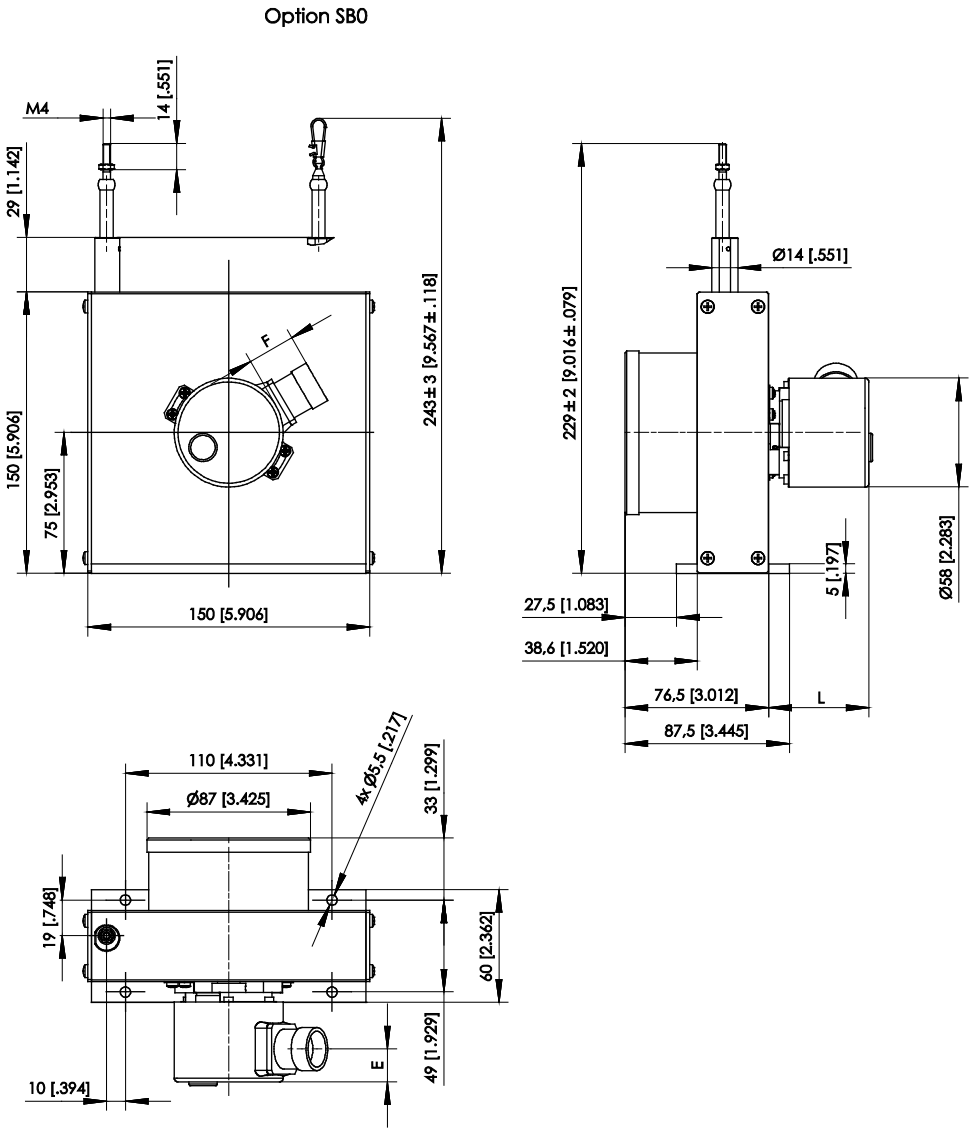
Measurement range 2000 … 3000 mm, absolute encoder output, incremental encoder output



Dimensions in mm	Measurement range	A
	2000	11.5
	3000	0

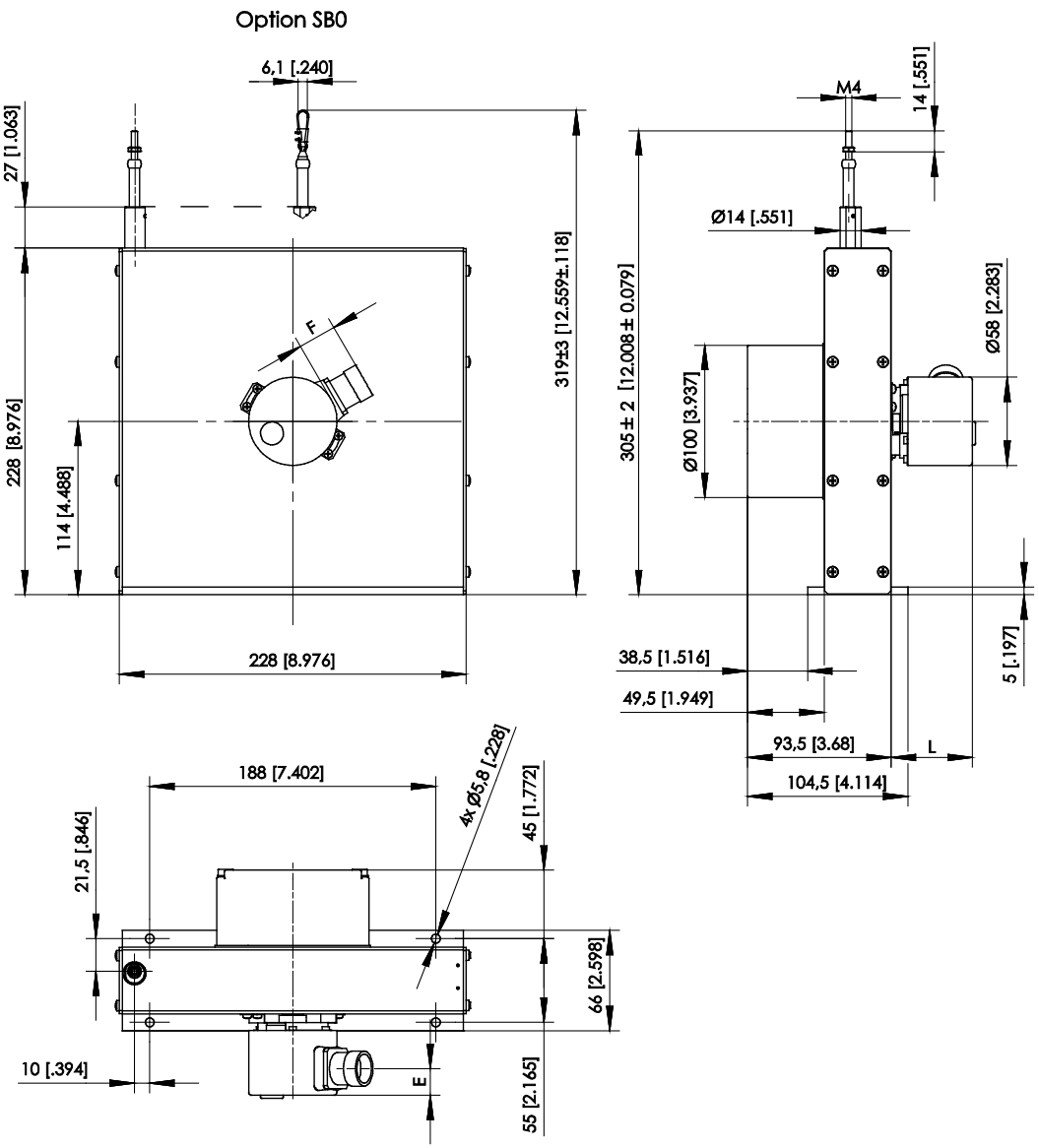
Dimensions in mm [inch]
Dimensions E, F and L depending on the encoder.
Dimensions informative only. For guaranteed dimensions consult factory.

Measurement range 5000 mm, absolute encoder output, incremental encoder output



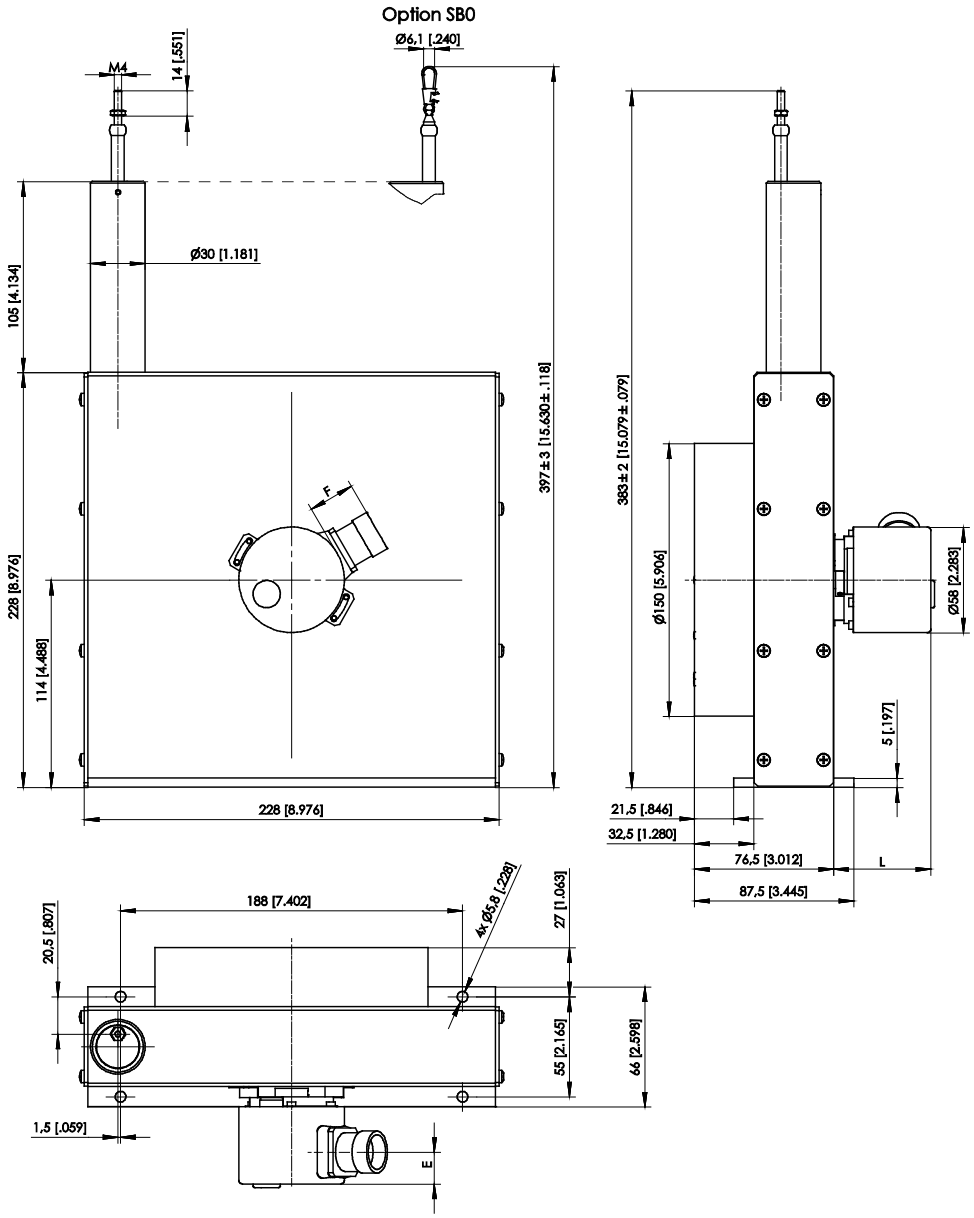
Dimensions in mm [inch]
Dimensions E, F und L depending on the encoder.
Dimensions informative only.
For guaranteed dimensions consult factory.

Measurement range 8000 mm, absolute encoder output, incremental encoder output



Dimensions in mm [inch]
Dimensions E, F und L depending on the encoder.
Dimensions informative only.
For guaranteed dimensions consult factory.

Measurement range 15000 mm, absolute encoder output, incremental encoder output



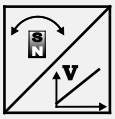
Dimensions in mm [inch]
Dimensions E, F und L depending on the encoder.
Dimensions informative only.
For guaranteed dimensions consult factory.

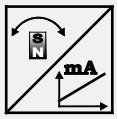
WS21

Magnetic encoder, analog output

Sensor features

- **With magnetic absolute encoder**
- **Measurement range up to 20000 mm**
- **Protection class IP67/IP69 (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	Aluminium and plastic measuring cable: stainless steel
Protection class	IP67/IP69 (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	8000 mm: 1.5 kg 10000 mm: 1.5 kg 12500 mm: 2.5 kg 15000 mm: 3.0 kg 17500 mm: 4.2 kg 20000 mm: 4.2 kg
EMC	DIN EN 61326-1:2013

Order code

WS21 – 1 – 2 – 3 – 4 – 5 – 6

1 Measurement range (in mm)

8000 / 10000 / 12500 / 15000 / 17500 / 20000

2 Output

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

3 Signal characterisitics

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

M12R5	= Connector M12, 5 pin

Order example

WS21 – 15000 – U2 – A – L10 – M4 – M12R5

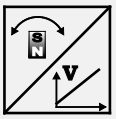
Accessories:

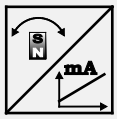
Connector cable (see page 262)

Magnetic encoder, analog output, programmable

Sensor features

- **With magnetic absolute encoder**
- **Measurement range up to 20000 mm**
- **Protection class IP67/IP69 (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	Aluminium and plastic measuring cable: stainless steel
Protection class	IP67/IP69 (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	8000 mm: 1.5 kg 10000 mm: 1.5 kg 12500 mm: 2.5 kg 15000 mm: 3.0 kg 17500 mm: 4.2 kg 20000 mm: 4.2 kg
EMC	DIN EN 61326-1:2013

Order code

WS21 – 1 – 2 – 3 – 4 – 5 – 6

1 Measurement range (in mm)

8000 / 10000 / 12500 / 15000 / 17500 / 20000

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

M12R5	= Connector M12, 5 pin

Order example

WS21 – 15000 – U2/PMU – A – L10 – M4 – M12R5

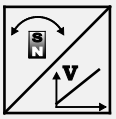
Accessories:

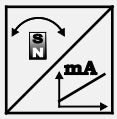
Connector cable (see page 263)

Magnetic encoder, analog output, redundant

Sensor features

- **With magnetic absolute encoder**
- **Measurement range up to 20000 mm**
- **Protection class IP67/IP69 (with mating connector only)**
- **Analog output, redundant**
- **Absolute measurement**





Specifications

Output	**U2R** = Voltage 0.5 ... 10 V, redundant **U8R** = Voltage 0.5 ... 4.5 V, redundant **I1R** = Current 4 ... 20 mA, 3 wire, redundant
Resolution	<0.002% f.s.
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)
Sensing device	Magnetic absolute encoder
Housing material	Aluminium and plastic measuring cable: stainless steel
Protection class	IP67/IP69 (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	8000 mm: 1.5 kg 10000 mm: 1.5 kg 12500 mm: 2.5 kg 15000 mm: 3.0 kg 17500 mm: 4.2 kg 20000 mm: 4.2 kg
EMC	DIN EN 61326-1:2013

Order code

WS21 – 1 – 2 – 3 – 4 – 5 – 6

1 Measurement range (in mm)

8000 / 10000 / 12500 / 15000 / 17500 / 20000

2 Output

U2R	= Voltage 0.5 ... 10 V, redundant
U8R	= Voltage 0.5 ... 4.5 V, redundant
I1R	= Current 4 ... 20 mA, 3 wire, redundant

3 Signal characteristics

A/A	= Output 1 increasing, output 2 increasing
A/D	= Output 1 increasing, output 2 decreasing
D/D	= Output 1 decreasing, output 2 decreasing

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

M12R8	= Connector M12, 8 pin

Order example

WS21 – 15000 – I1R – A/D – L10 – M4 – M12R8

Accessories:

Connector cable (see page 264)

Magnetic encoder, digital output SSI

Sensor features

- **With magnetic absolute encoder**
- **Measurement range up to 20000 mm**
- **Protection class IP67/IP69 (with mating connector only)**
- **Digital output SSI**
- **Absolute measurement**

Specifications

Output	**MSSI** = SSI synchronous serial interface
Resolution	50 / 100
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)
Sensing device	Magnetic absolute encoder
Housing material	Aluminium and plastic measuring cable: stainless steel
Protection class	IP67/IP69 (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	-40 ... +85 °C
Weight	8000 mm: 1.5 kg 10000 mm: 1.5 kg 12500 mm: 2.5 kg 15000 mm: 3.0 kg 17500 mm: 4.2 kg 20000 mm: 4.2 kg
EMC	DIN EN 61326-1:2013

Order code

WS21 – 1 – 2 – 3 – 4 – 5 – 6

1 Measurement range (in mm)

8000 / 10000 / 12500 / 15000 / 17500 / 20000

2 Resolution (in µm)

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

M12R8 = Connector M12, 8 pin

Order example

WS21 – 15000 – 50 – MSSI – L10 – M4 – M12R8

Accessories:
Connector cable (see page 264)

Magnetic encoder, digital output CAN Bus

Sensor features

- **With magnetic absolute encoder**
- **Measurement range up to 20000 mm**
- **Protection class IP67/IP69 (with mating connector only)**
- **Digital output CAN Bus**
- **Absolute measurement**
- **Optional redundant CAN Bus**

Specifications

Output	**MCANOP** = CANopen **MCANJ1939** = CAN SAE J1939 **MCANOPR** = CANopen redundant **MCANJ1939R** = CAN SAE J1939 redundant
Resolution	setting via CAN Bus
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)
Sensing device	Magnetic absolute encoder
Housing material	Aluminium and plastic measuring cable: stainless steel
Protection class	IP67/IP69 (with mating connector only)
Connection	Connector M12, 5 pin
Temperature range	-20 ... +85 °C
Weight	8000 mm: 1.5 kg 10000 mm: 1.5 kg 12500 mm: 2.5 kg 15000 mm: 3.0 kg 17500 mm: 4.2 kg 20000 mm: 4.2 kg
EMC	DIN EN 61326-1:2013

Cable forces for sensors with magnetic encoder

Cable forces typical at = 20 °C	Measurement range [mm]	Weight [kg]	Maximum pull-out force [N]	Minimum pull-in force [N]
	8000	1.5	4.3	2.9
	10000	1.5	4.3	2.9
	12500	2.5	11.3	7.9
	15000	3.0	8.8	4.4
	17500	4.2	6.8	4.5
	20000	4.2	6.8	4.5

Order code

WS21 – 1 – 2 – 3 – 4 – 5

1 Measurement range (in mm)

8000 / 10000 / 12500 / 15000 / 17500 / 20000

2 Output

MCANOP	= CANopen
MCANJ1939	= CAN SAE J1939
MCANOPR	= CANopen redundant
MCANJ1939R	= CAN SAE J1939 redundant

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

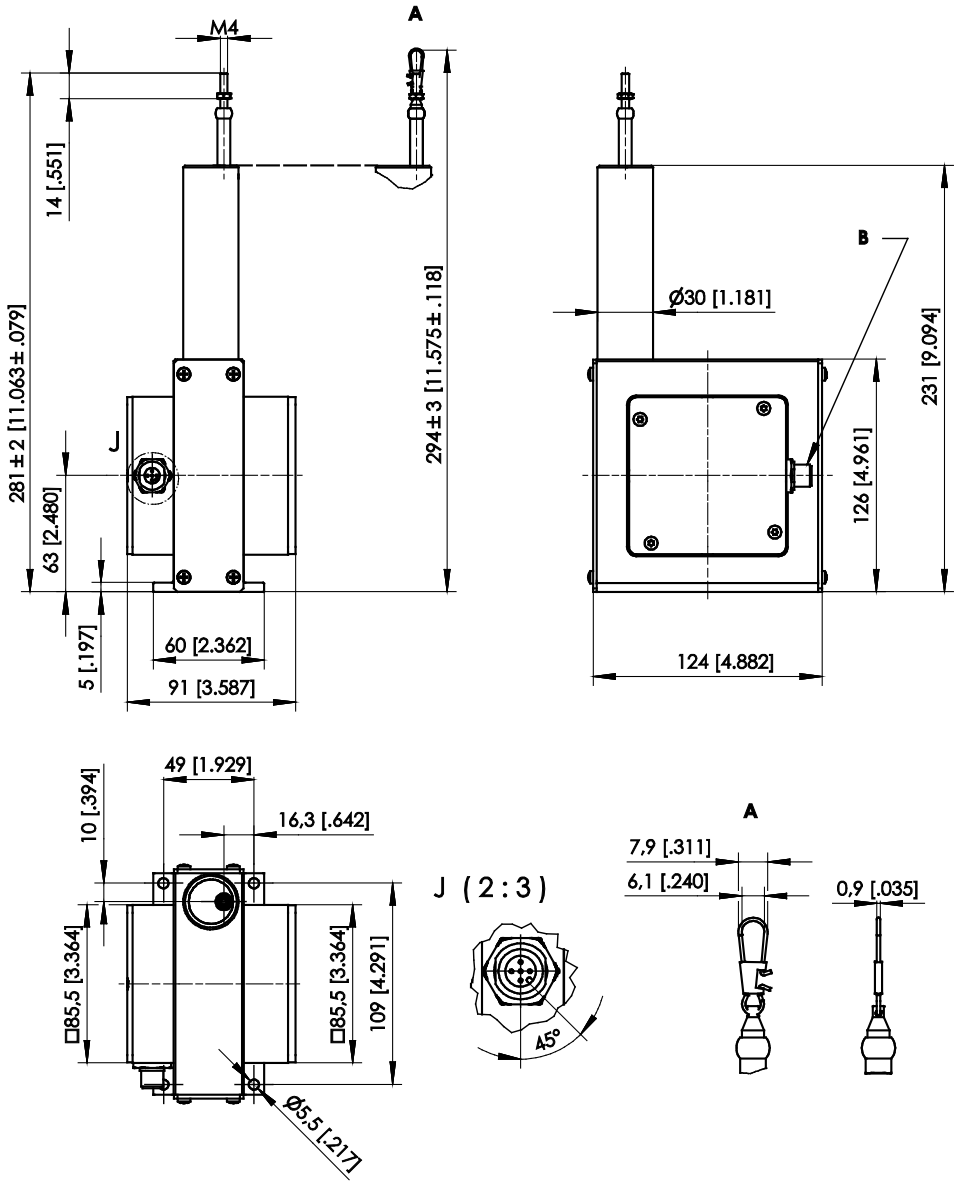
WS21 – 15000 – MCANOP – L10 – M4 – M12/CAN

Accessories:

Connector cable (see page 265)

Dimensions

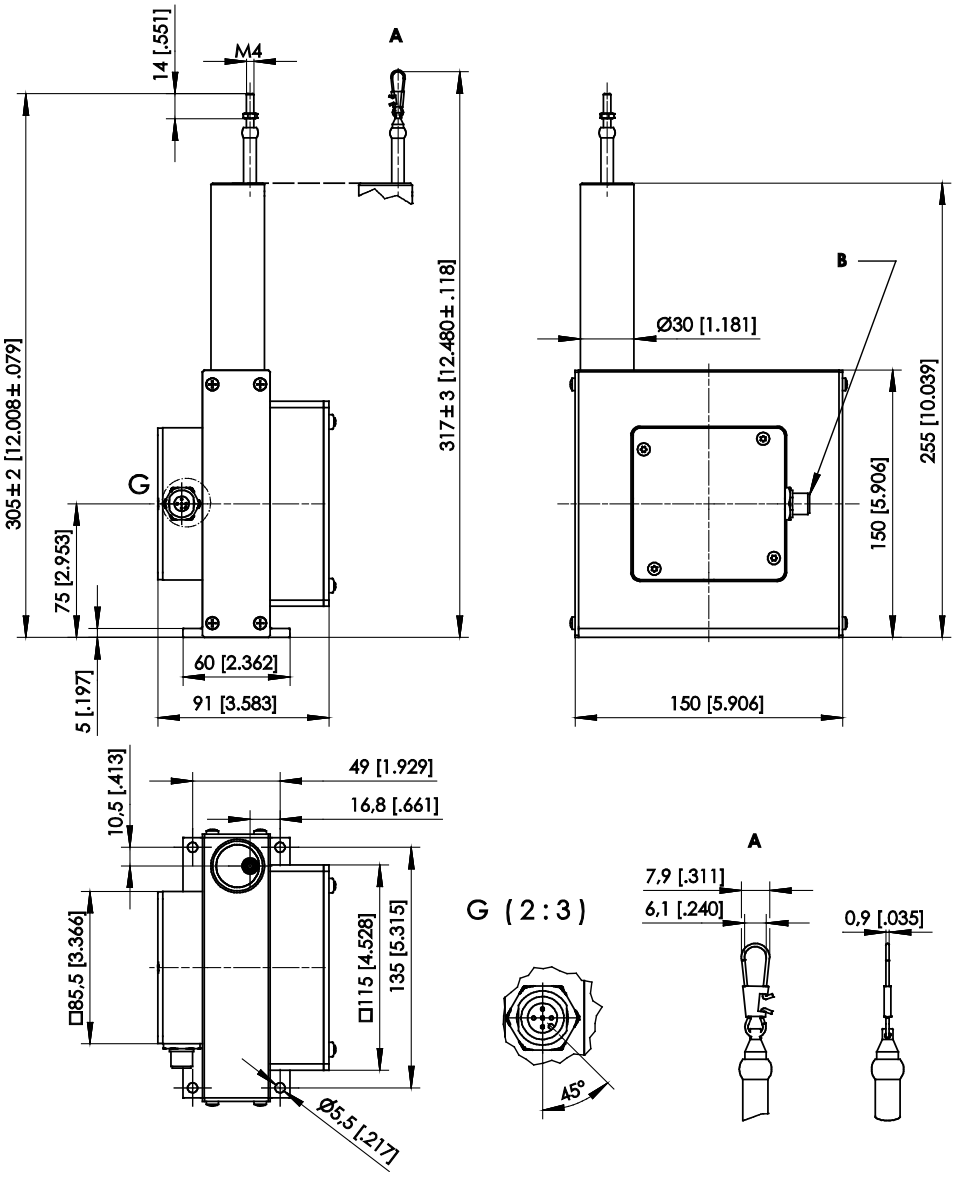
Measurement range 8000 … 10000 mm, magnetic encoder output



A – Option SB0
B – Connector M12

Dimensions in mm [inch]. Weight approx. 1.5 kg.
Dimensions informative only.
For guaranteed dimensions consult factory.

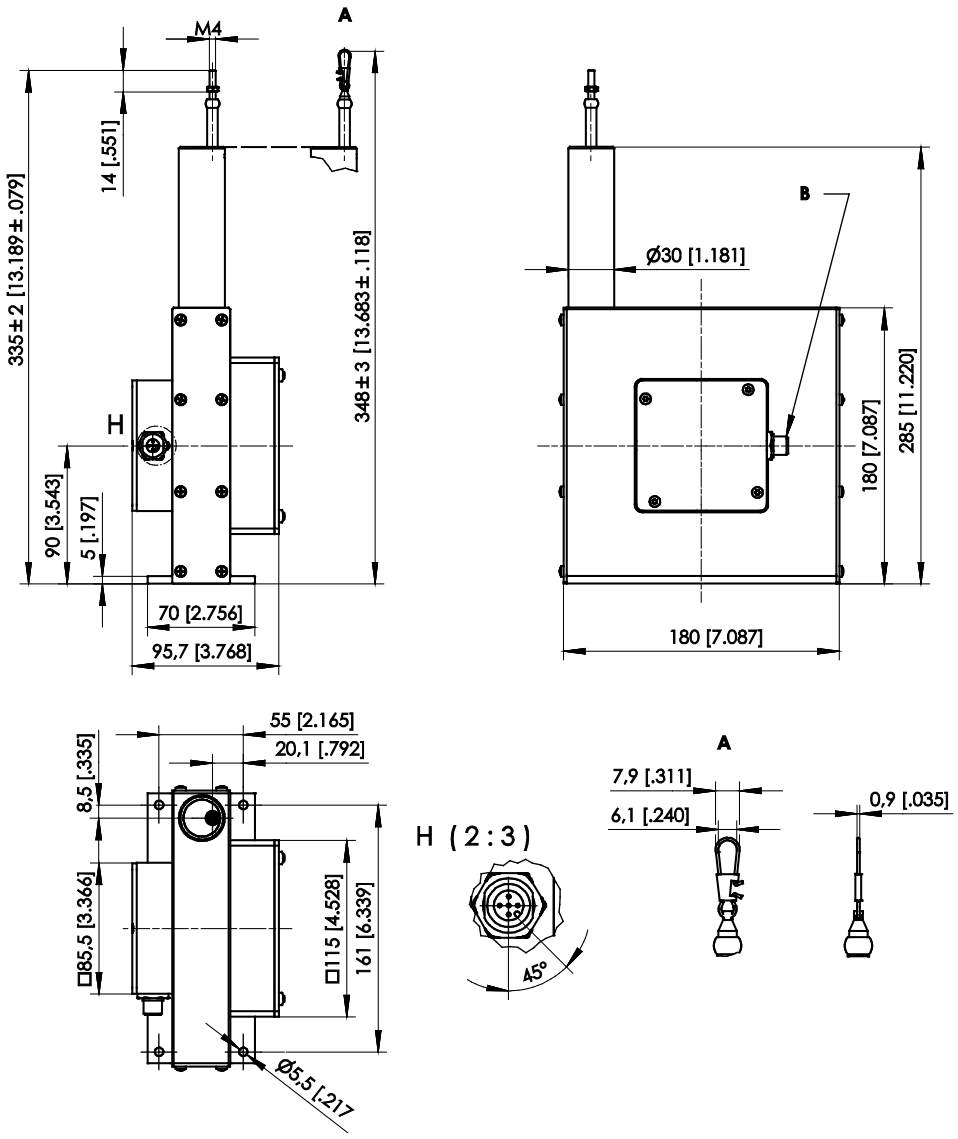
Measurement range 12500 mm, magnetic encoder output



A - Option SB0
B – Connector M12

Dimensions in mm [inch]. Weight approx. 2.5 kg.
Dimensions informative only.
For guaranteed dimensions consult factory.

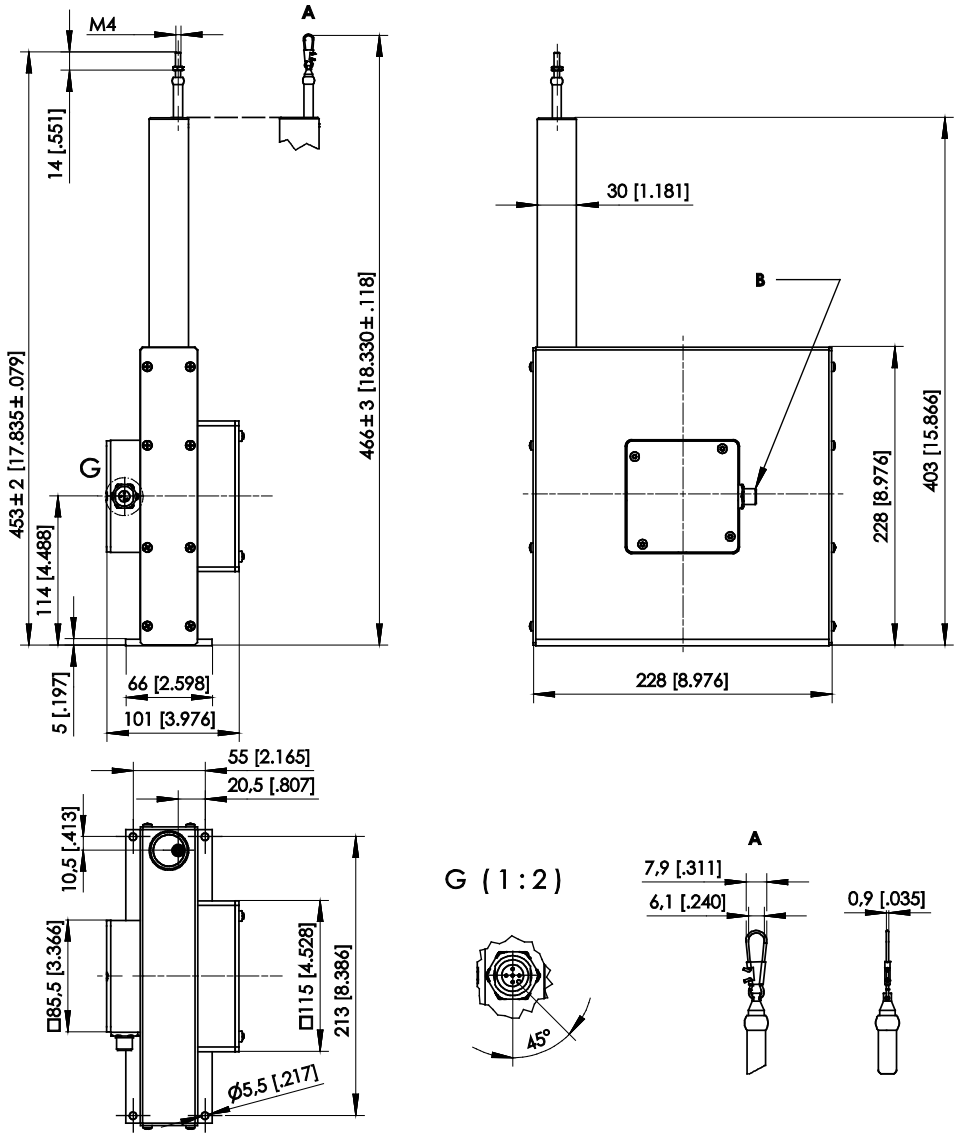
Measurement range 15000 mm, magnetic encoder output



A – Option SB0
B – Connector M12

Dimensions in mm [inch]. Weight approx. 3.0 kg.
Dimensions informative only.
For guaranteed dimensions consult factory.

Measurement range 17500 … 20000 mm, magnetic encoder output

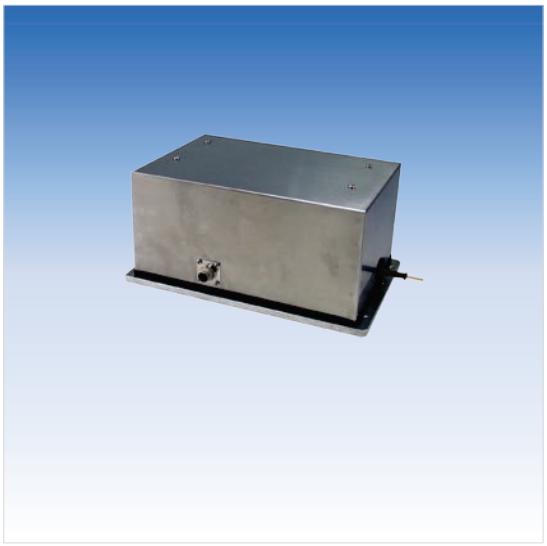


A – Option SB0
B – Connector M12

Dimensions in mm [inch]. Weight approx. 4.2 kg.
Dimensions informative only.
For guaranteed dimensions consult factory.

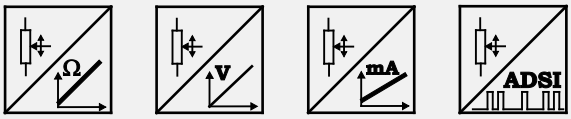
WS7.5

Analog output, SSI output



Sensor features

- **Measurement range up to 40000 mm**
- **Protection class IP52**
- **Analog output, SSI output**



Specifications

Output	**R1K** = Potentiometer 1 kΩ **10V** = Voltage 0 ... 10 V **420A** = Current 4 ... 20 mA, 2- wires **420T** = Current 4 ... 20 mA, 3 wires **PMUI** = Current output, programmable **PMUV** = Voltage output, programmable **ADSI** = Signal conditioner SSI 12 bit,replaced by MSSI12 **ADSI14** = Signal conditioner SSI 14 bit,replaced by MSSI14 **ADSI16** = Signal conditioner SSI 16 bit,replaced by MSSI16
Resolution	Analog: quasi infinite
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)
Sensing device	Precision potentiometer
Housing material	Aluminium, stainless steel and plastic; measuring cable: stainless steel
Protection class	IP52
Connection	Connector M12, 8 pin
Temperature range	-20 ... +85 °C
Weight	Approx. 10 kg
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]
	10000 – 30000	8.0	4.2
	40000	7.0	3.4

Order code

WS7.5 – [1] – [2] – [3] – [4] – [5]

1 Measurement range (in mm)

10000 / 20000 / 30000 / 40000

2 Output

R1K	= Potentiometer 1 kΩ
10V	= Voltage 0 ... 10 V
420A	= Current 4 ... 20 mA, 2- wires
420T	= Current 4 ... 20 mA, 3 wires
PMUI	= Current output, programmable
PMUV	= Voltage output, programmable
ADSI	= Signal conditioner SSI 12 bit,replaced by MSSI12
ADSI14	= Signal conditioner SSI 14 bit,replaced by MSSI14
ADSI16	= Signal conditioner SSI 16 bit,replaced by MSSI16

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

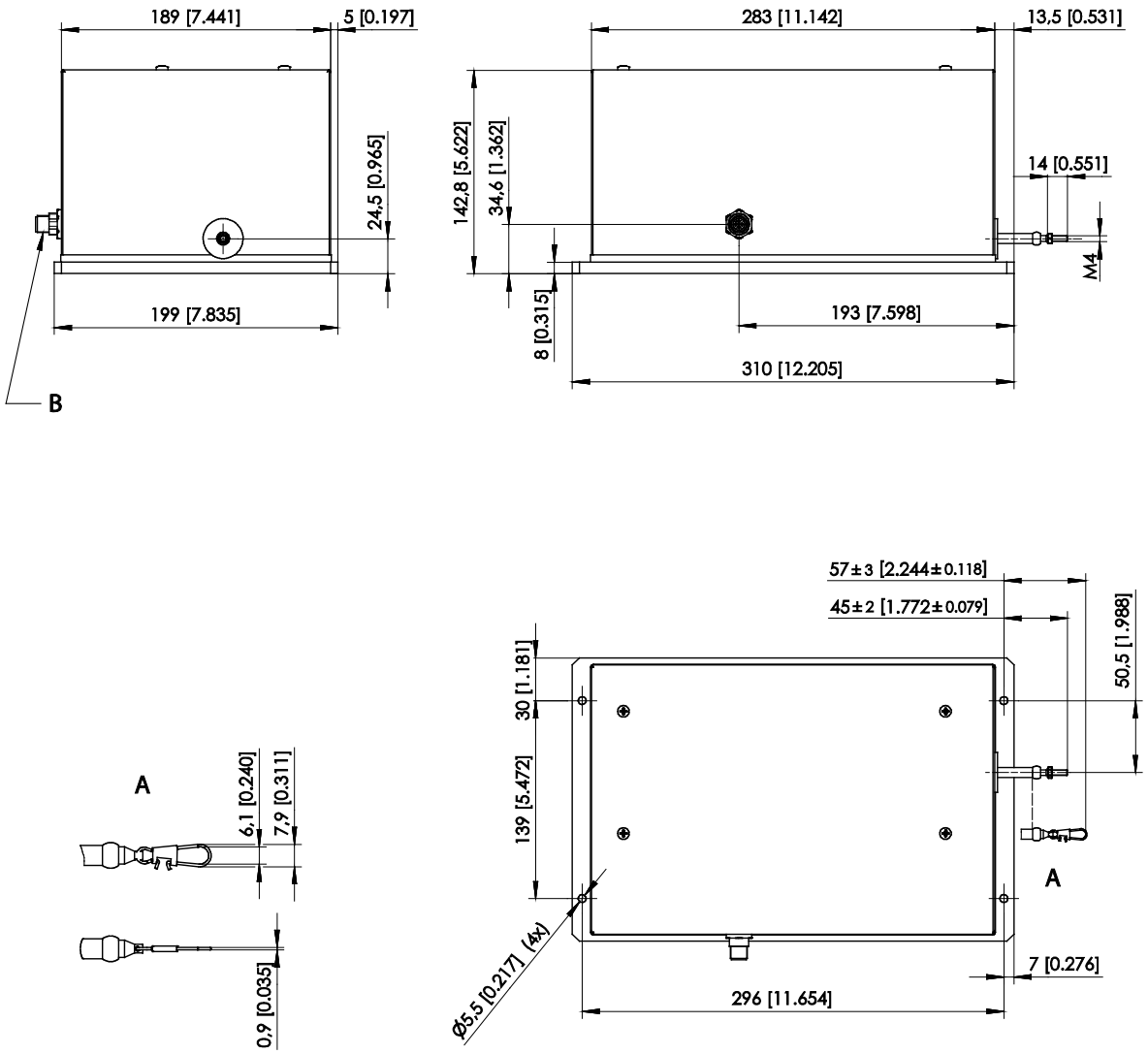
WS7.5 – 30000 – 420T – L10 – M4 – M12

Accessories:

Connector cable (see page 264)

Dimensions

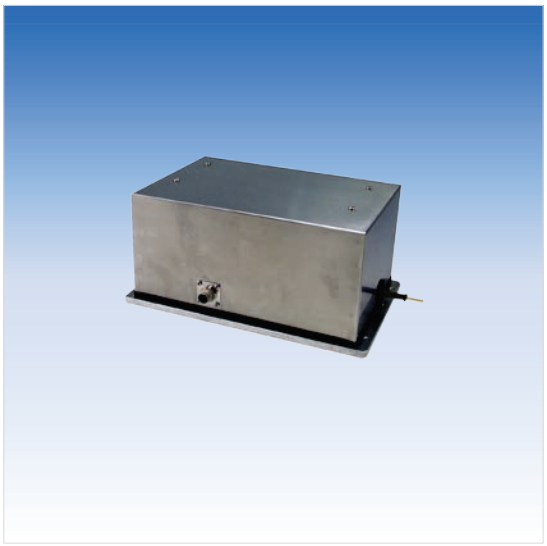
Measurement range 10000 … 40000 mm, analog output, SSI output



A – Option SB0
B – Connector M12

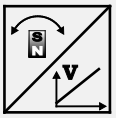
Dimensions in mm [inch]
Dimensions informative only.
For guaranteed dimensions consult factory.

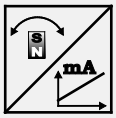
Magnetic encoder, analog output



Sensor features

- **With magnetic absolute encoder**
- **Measurement range up to 40000 mm**
- **Protection class IP52**
- **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	Aluminium, stainless steel and plastic; measuring cable: stainless steel
Protection class	IP52
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. 10 kg
EMC	DIN EN 61326-1:2013

Order code

WS7.5 – [1] – [2] – [3] – [4] – [5] – [6]

1 Measurement range (in mm)

10000 / 15000 / 20000 / 25000 / 30000 / 40000

2 Output

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

3 Signal characterisitics

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)

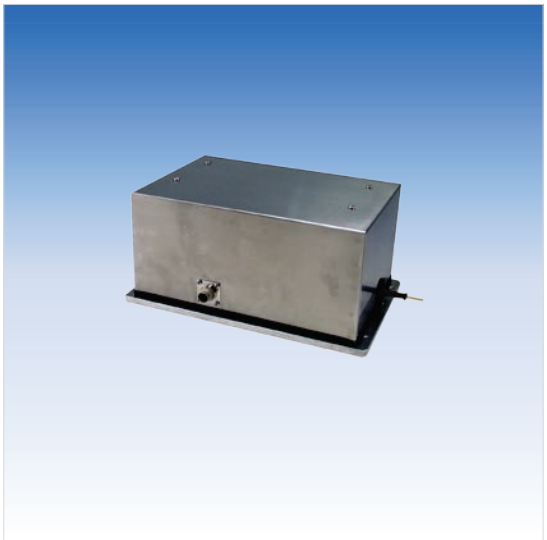
Order example

WS7.5 – 30000 – U2 – A – L10 – M4 – M12A5

Accessories:

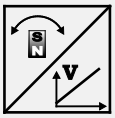
Connector cable (see page 262)
Optional connector cable 8 pin (see page 264)

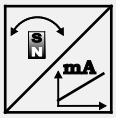
Magnetic encoder, analog output, programmable



Sensor features

- **With magnetic absolute encoder**
- **Measurement range up to 40000 mm**
- **Protection class IP52**
- **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	Aluminium, stainless steel and plastic; measuring cable: stainless steel
Protection class	IP52
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. 10 kg
EMC	DIN EN 61326-1:2013

Order code

WS7.5 – [1] – [2] – [3] – [4] – [5] – [6]

1 Measurement range (in mm)

10000 / 15000 / 20000 / 25000 / 30000 / 40000

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

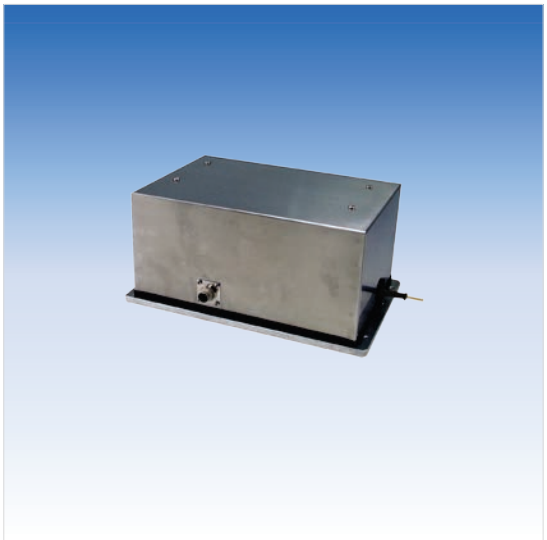
Order example

WS7.5 – 30000 – U2/PMU – A – L10 – M4 – M12A5

Accessories:

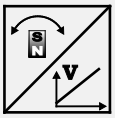
Connector cable (see page 263)

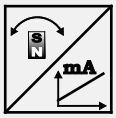
Magnetic encoder, analog output, redundant



Sensor features

- **With magnetic absolute encoder**
- **Measurement range up to 40000 mm**
- **Protection class IP52**
- **Analog output, redundant**
- **Absolute measurement**





Specifications

Output	**U2R** = Voltage 0.5 ... 10 V, redundant **U8R** = Voltage 0.5 ... 4.5 V, redundant **I1R** = Current 4 ... 20 mA, 3 wire, redundant
Resolution	<0.002% f.s.
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)
Sensing device	Magnetic absolute encoder
Housing material	Aluminium, stainless steel and plastic; measuring cable: stainless steel
Protection class	IP52
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. 10 kg
EMC	DIN EN 61326-1:2013

Order code

WS7.5 – [1] – [2] – [3] – [4] – [5] – [6]

1 Measurement range (in mm)

10000 / 15000 / 20000 / 25000 / 30000 / 40000

2 Output

U2R	= Voltage 0.5 ... 10 V, redundant
U8R	= Voltage 0.5 ... 4.5 V, redundant
I1R	= Current 4 ... 20 mA, 3 wire, redundant

3 Signal characteristics

A/A	= Output 1 increasing, output 2 increasing
A/D	= Output 1 increasing, output 2 decreasing
D/D	= Output 1 decreasing, output 2 decreasing

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

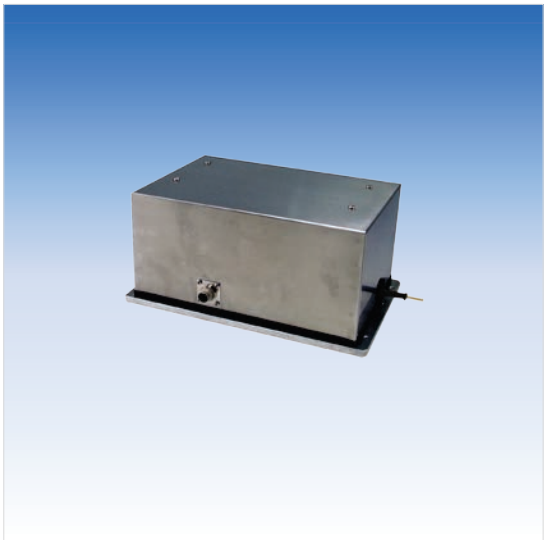
Order example

WS7.5 – 30000 – I1R – A/D – L10 – M4 – M12A8

Accessories:

Connector cable (see page 264)

Magnetic encoder, digital output SSI



Sensor features

- **With magnetic absolute encoder**
- **Measurement range up to 40000 mm**
- **Protection class IP52**
- **Digital output SSI**
- **Absolute measurement**

Specifications

Output	**MSSI** = SSI synchronous serial interface
Resolution	100
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)
Sensing device	Magnetic absolute encoder
Housing material	Aluminium, stainless steel and plastic; measuring cable: stainless steel
Protection class	IP52
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. 10 kg
EMC	DIN EN 61326-1:2013

Order code

WS7.5 – [1] – [2] – [3] – [4] – [5] – [6]

1 Measurement range (in mm)

10000 / 15000 / 20000 / 25000 / 30000 / 40000

2 Resolution (in µm)

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

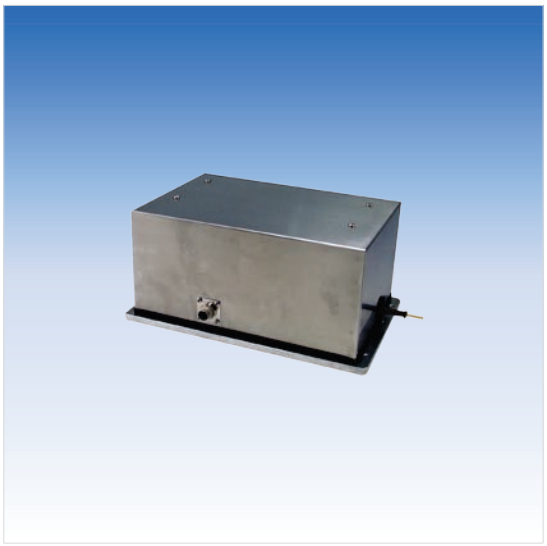
M12A8	= Connector M12, 8 pin

Order example

WS7.5 – 30000 – 100 – MSSI – L10 – M4 – M12A8

Accessories:
Connector cable (see page 264)

Magnetic encoder, digital output CAN Bus



Sensor features

- **With magnetic absolute encoder**
- **Measurement range up to 40000 mm**
- **Protection class IP52**
- **Digital output CAN Bus**
- **Absolute measurement**
- **Optional redundant CAN Bus**

Specifications

Output	**MCANOP** = CANopen **MCANJ1939** = CAN SAE J1939 **MCANOPR** = CANopen redundant **MCANJ1939R** = CAN SAE J1939 redundant
Resolution	setting via CAN Bus
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)
Sensing device	Magnetic absolute encoder
Housing material	Aluminium, stainless steel and plastic; measuring cable: stainless steel
Protection class	IP52
Connection	Connector M12, 5 pin
Temperature range	-20 ... +85 °C
Weight	Approx. 10 kg
EMC	DIN EN 61326-1:2013

Cable forces for sensors with magnetic encoder

Cable forces typical at 20 °C	**Measurement range**	**Maximum pull-out force**	**Minimum pull-in force**
	[mm]	[N]	[N]
	10000 – 30000	8.0	4.2
	40000	7.0	3.4

Order code

WS7.5 – [1] – [2] – [3] – [4] – [5]

1 Measurement range (in mm)

10000 / 15000 / 20000 / 25000 / 30000 / 40000

2 Output

MCANOP	= CANopen
MCANJ1939	= CAN SAE J1939
MCANOPR	= CANopen redundant
MCANJ1939R	= CAN SAE J1939 redundant

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

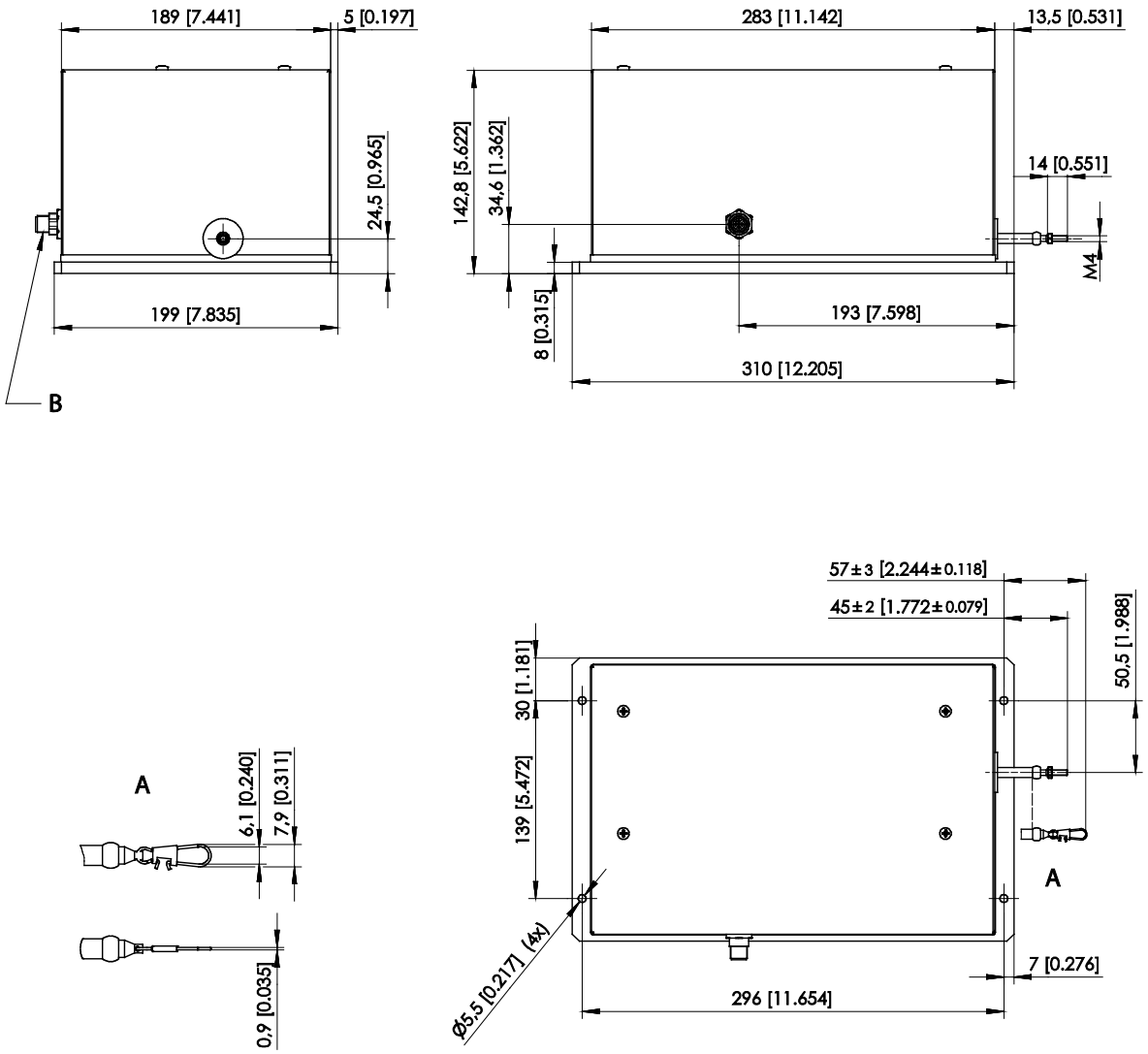
Order example

WS7.5 – 30000 – MCANOP – L10 – M4 – M12/CAN

Accessories:
Connector cable (see page 265)

Dimensions

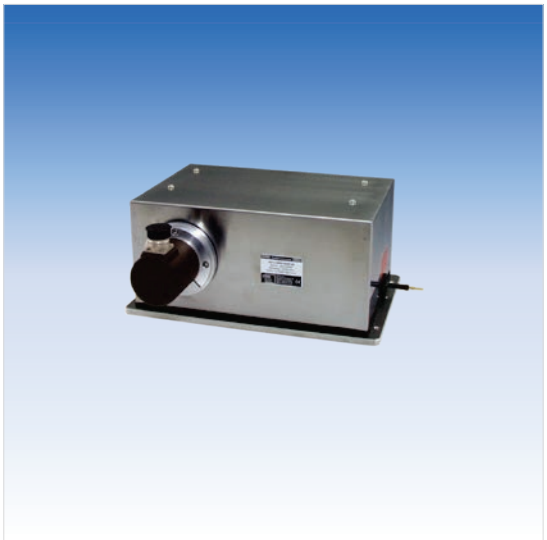
Measurement range 10000 … 40000 mm, magnetic encoder output



A – Option SB0
B – Connector M12

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

Absolute encoder output



Sensor features

- **Measurement range up to 40000 mm**
- **Protection class IP52, encoder IP64**
- **Absolute encoder output**

SSI PROFI DEV CAN

Specifications

Output	**HSSI** = Absolute encoder with synchronous serial output (SSI) **HPROF** = Absolute encoder with Profibus interface **HINT** = Absolute encoder with Interbus interface **HDEV** = Absolute encoder with DeviceNet interface **HCAN** = Absolute encoder with CAN-interface **HCANOP** = Absolute encoder with CANopen interface **ME** = Mechanism only for suitable multiturn encoders
Resolution for 12 bit per revolution (4096 steps/ revolution)	Up to 30000 mm: 0.073 mm 40000 mm: 0.088 mm
Linearity	±0.05% f.s. (standard) ±0.01% f.s. (optional)
Sensing device	Absolute encoder
Housing material	Aluminium, stainless steel and plastic; measuring cable: stainless steel
Protection class	IP52, encoder IP64
Connection	Depending on the type of encoder: connector or Bus cover
Temperature range	-20 ... +85 °C
Weight	Approx. 10 kg max.
EMC	DIN EN 61326-1:2013

Order code

WS7.5 – 1 – 2 – 3 – 4

1 Measurement range (in mm)

10000 / 15000 / 20000 / 25000 / 30000 / 40000

2 Output

HSSI	= Absolute encoder with synchronous serial output (SSI)
HPROF	= Absolute encoder with Profibus interface
HINT	= Absolute encoder with Interbus interface
HDEV	= Absolute encoder with DeviceNet interface
HCAN	= Absolute encoder with CAN-interface
HCANOP	= Absolute encoder with CANopen interface
ME	= Mechanism only for suitable multiturn encoders

3 Linearity (optional)

L01	= ±0.01% f.s.

4 Cable fixing

M4	= M4 cable fixing
SB0	= cable clip

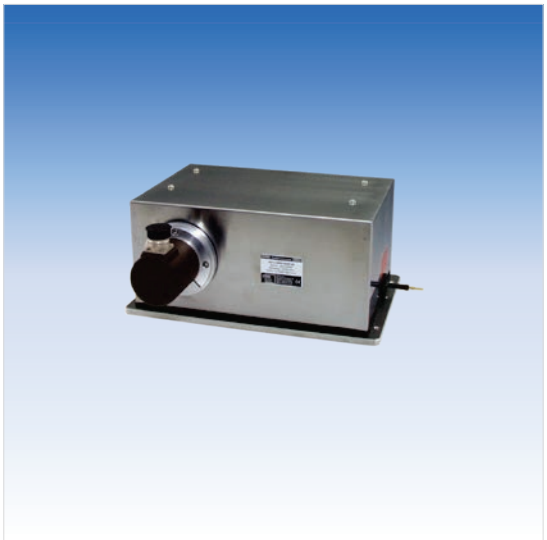
Order example

WS7.5 – 3000 – HSSI – M4

Accessories:

Mating connector CONN-CONIN-12F-G (see page 266)

Incremental encoder output



Sensor features

- **Measurement range up to 40000 mm**
- **Protection class IP52, encoder IP64**
- **Incremental encoder output**

Specifications

Output	**LD5VC** = Incremental encoder TTL compatible **PP24VC** = Incremental encoder HTL compatible
Resolution	Up to 30000 mm: 13,69 pulses / mm 40000mm: 11,36 pulses / mm
Linearity	±0.05% f.s. (standard) ±0.01% f.s. (optional)
Sensing device	Incremental encoder
Housing material	Aluminium, stainless steel and plastic; measuring cable: stainless steel
Protection class	IP52, encoder IP64
Connection	Connector 12 pin
Temperature range	-20 ... +85 °C
Weight	Approx. 10 kg max.
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]
	10000 – 30000	8.0	4.2
	40000	7.0	3.4

Order code

WS7.5 – 1 – 2 – 3 – 4

1 Measurement range (in mm)

10000 / 20000 / 30000 / 40000

2 Output

LD5VC	= Incremental encoder TTL compatible
PP24VC	= Incremental encoder HTL compatible

3 Linearity (optional)

L01	= ±0.01% f.s.

4 Cable fixing

M4	= M4 cable fixing
SB0	= cable clip

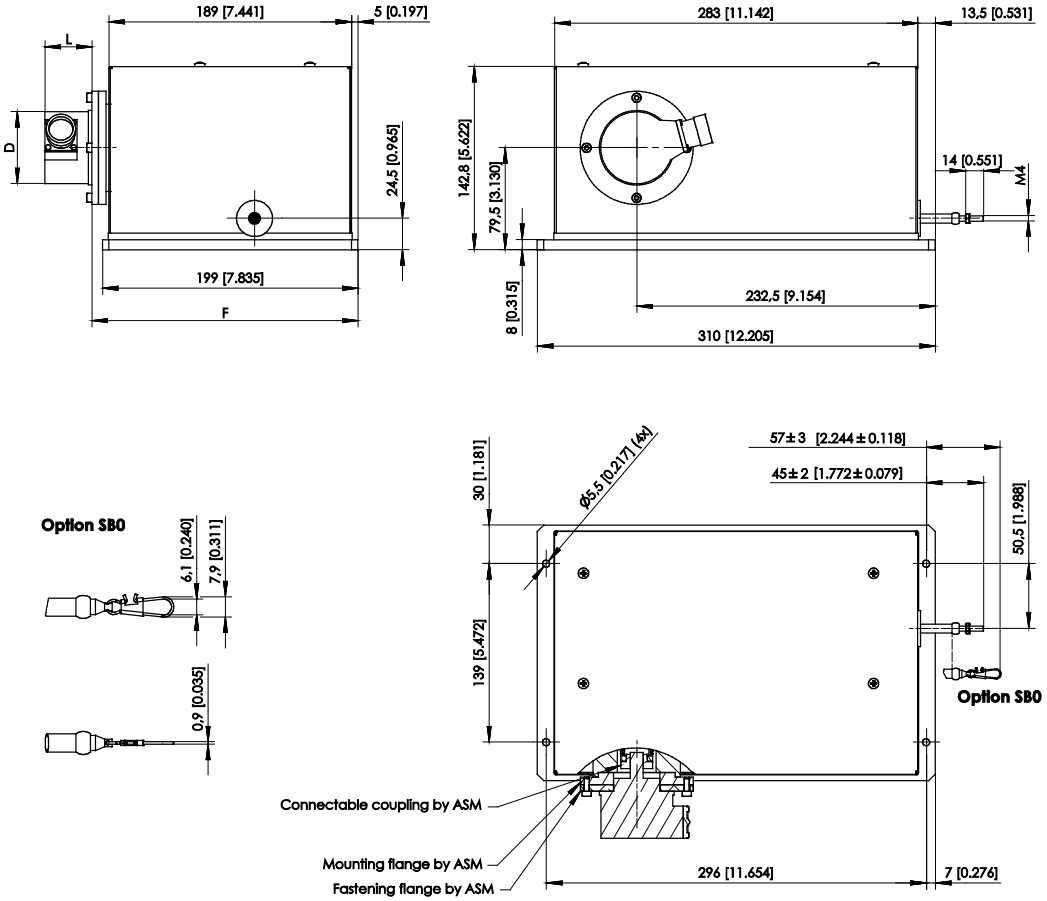
Order example

WS7.5 – 30000 – LD5VC – M4

Accessories:
Mating connector CONN-CONIN-12F-G (see page 266)

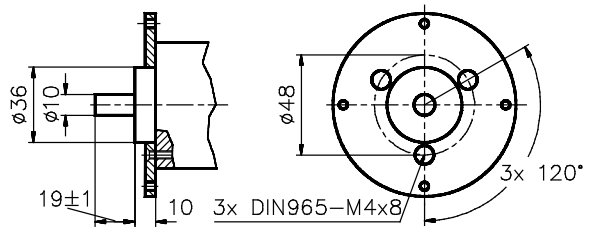
Dimensions

Measurement range 10000 … 40000 mm; output: magnetic encoder, absolute and incremental encoder



Dimensions in mm [inch]
Dimensions D, F and L depend on the encoder type and sensor fixing.
Dimensions informative only. For guaranteed dimensions consult factory.

Output ME

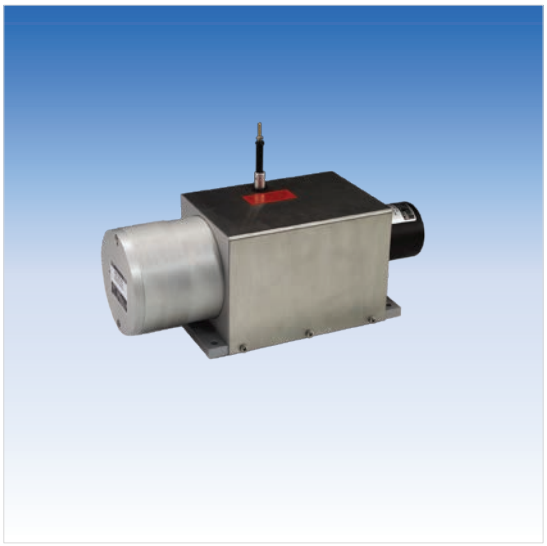


Dimensions for encoder mounting

Connectable coupling in two parts
The outer part of the coupling should be fitted to the encoder shaft. Adjust a 0.5 mm clearance between the fastening and the mounting flanges to give an initial tension on the coupling when the mounting bolts are tightened.

WS60

Absolute encoder output



Sensor features

- **Measurement range up to 60000 mm**
- **Protection class IP52, encoder IP64**
- **Absolute encoder output**

SSI PROFI DEV CAN

Specifications

Output	**HSSI** = Absolute encoder with synchronous serial output (SSI) **HPROF** = Absolute encoder with Profibus interface **HINT** = Absolute encoder with Interbus interface **HDEV** = Absolute encoder with DeviceNet interface **HCAN** = Absolute encoder with CAN-interface **HCANOP** = Absolute encoder with CANopen interface
Resolution for 12 bit per revolution (4096 steps/ revolution)	0.125 mm, (8 steps / mm)
Linearity	±0.10% f.s. (standard) ±0.025% f.s. (optional)
Sensing device	Absolute encoder
Housing material	Aluminium, stainless steel and plastic measuring cable: stainless steel
Protection class	IP52, encoder IP64
Connection	Depending on the type of encoder: connector or Bus cover
Temperature range	-20 ... +85 °C
Weight	Approx. 15 kg max.
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]
	60000	17.0	6.5

Order code

WS60 – 1 – 2 – 3 – 4

1 Measurement range (in mm)

60000

2 Output

HSSI	= Absolute encoder with synchronous serial output (SSI)
HPROF	= Absolute encoder with Profibus interface
HINT	= Absolute encoder with Interbus interface
HDEV	= Absolute encoder with DeviceNet interface
HCAN	= Absolute encoder with CAN-interface
HCANOP	= Absolute encoder with CANopen interface

3 Linearity (optional)

L025	= ±0.025% f.s.

4 Cable fixing

M4	= M4 cable fixing
SB0	= cable clip

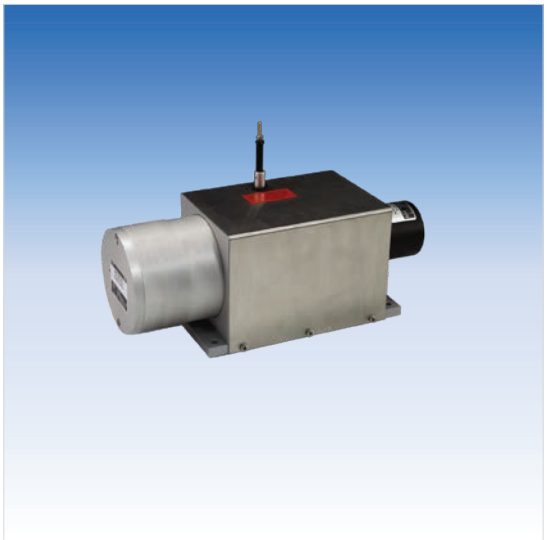
Order example

WS60 – 60000 – HSSI – M4

Accessories:

Mating connector CONN-CONIN-12F-G (see page 266)

Incremental encoder output



Sensor features

- **Measurement range up to 60000 mm**
- **Protection class IP52, encoder IP64**
- **Incremental encoder output**

Specifications

Output	**LD5VC** = Incremental encoder TTL compatible **PP24VC** = Incremental encoder HTL compatible
Resolution	8 pulses / mm (32 edges / mm)
Linearity	±0.10% f.s (standard) ±0.025% f.s. (optional)
Sensing device	Incremental encoder
Housing material	Aluminium, stainless steel and plastic measuring cable: stainless steel
Protection class	IP52, encoder IP64
Connection	Connector 12 pin
Temperature range	-20 ... +85 °C
Weight	Approx. 15 kg max.
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]
	60000	17.0	6.5

Order code

WS60 – 1 – 2 – 3 – 4

1 Measurement range (in mm)

60000

2 Output

LD5VC	= Incremental encoder TTL compatible
PP24VC	= Incremental encoder HTL compatible

3 Linearity (optional)

L025	= ±0.025% f.s.

4 Cable fixing

M4	= M4 cable fixing
SB0	= cable clip

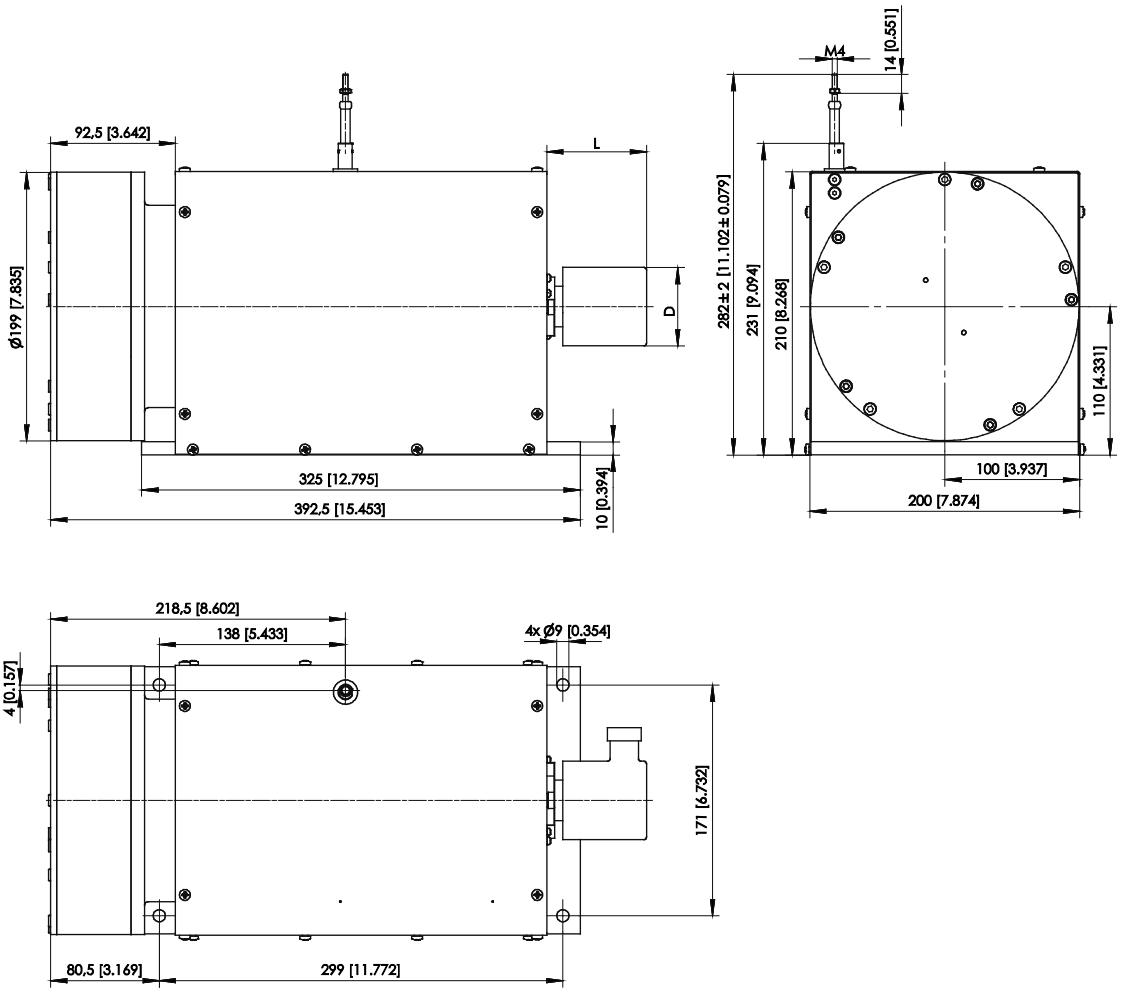
Order example

WS60 – 60000 – LD5VC – M4

Accessories:
Mating connector CONN-CONIN-12F-G (see page 266)

Dimensions

Measurement range 60000 mm, absolute encoder output, incremental encoder output,



Dimensions in mm [inch]
Dimensions D and L depending on the encoder.
Dimensions informative only.
For guaranteed dimensions consult factory.

WS58C

Absolute encoder output

Sensor features

- **Measurement range up to 2500 mm**
- **Protection class IP50 (IP64 optional), depending on encoder**
- **Absolute encoder output**

SSI PROFI DEV CAN

Specifications

Output	**HSSI** = Absolute encoder with synchronous serial output (SSI) **HPROF** = Absolute encoder with Profibus interface **HINT** = Absolute encoder with Interbus interface **HDEV** = Absolute encoder with DeviceNet interface **HCAN** = Absolute encoder with CAN-interface **HCANOP** = Absolute encoder with CANopen interface
Resolution for 12 bit per revolution (4096 steps/ revolution)	0.04 mm (25 steps / mm)
Linearity	±0.05% f.s. (standard) ±0.01% f.s. (optional)
Sensing device	Absolute encoder
Housing material	Aluminium, stainless steel and plastic measuring cable: stainless steel
Protection class	IP50 (IP64 optional), depending on encoder
Connection	Depending on the type of encoder: connector or Bus cover
Temperature range	-20 ... +85 °C
Weight	0.6 kg max. (depending on encoder)
EMC	DIN EN 61326-1:2013

Cable forces typical at = 20 °C	**Measurement range [mm]**	**Maximum pull-out force [N]**	**Minimum pull-in force [N]**
	2500	4.0	1.6

Order code

WS58C – 1 – 2 – 3 – 4

1 Measurement range (in mm)

2500

2 Output

HSSI	= Absolute encoder with synchronous serial output (SSI)
HPROF	= Absolute encoder with Profibus interface
HINT	= Absolute encoder with Interbus interface
HDEV	= Absolute encoder with DeviceNet interface
HCAN	= Absolute encoder with CAN-interface
HCANOP	= Absolute encoder with CANopen interface

3 Linearity (optional)

L01	= ±0.01% f.s.

4 Cable fixing

M4	= M4 cable fixing
SB0	= cable clip

Order example

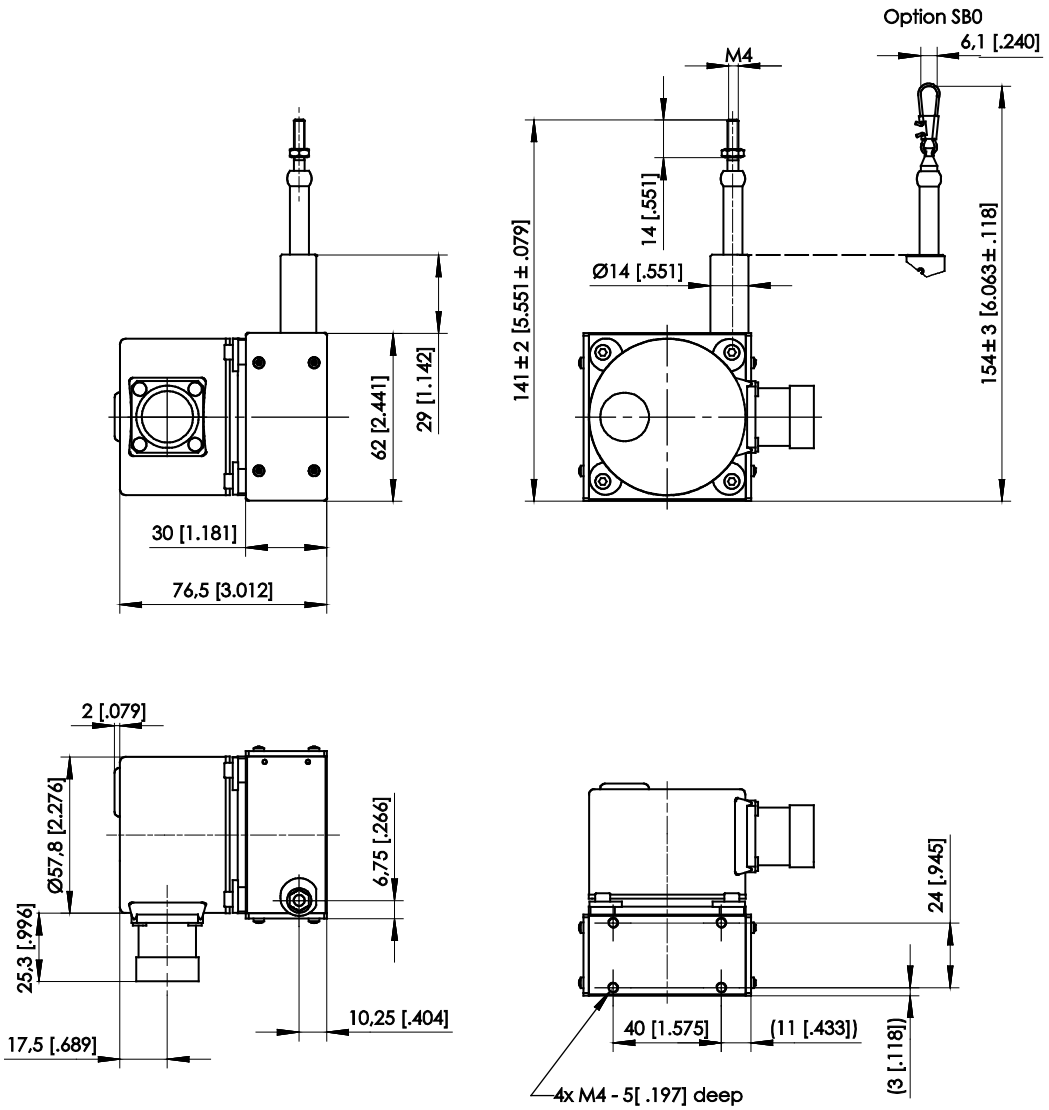
WS58C – 2500 – HSSI – M4

Accessories:

Mating connector CONN-CONIN-12F-G (see page 266)

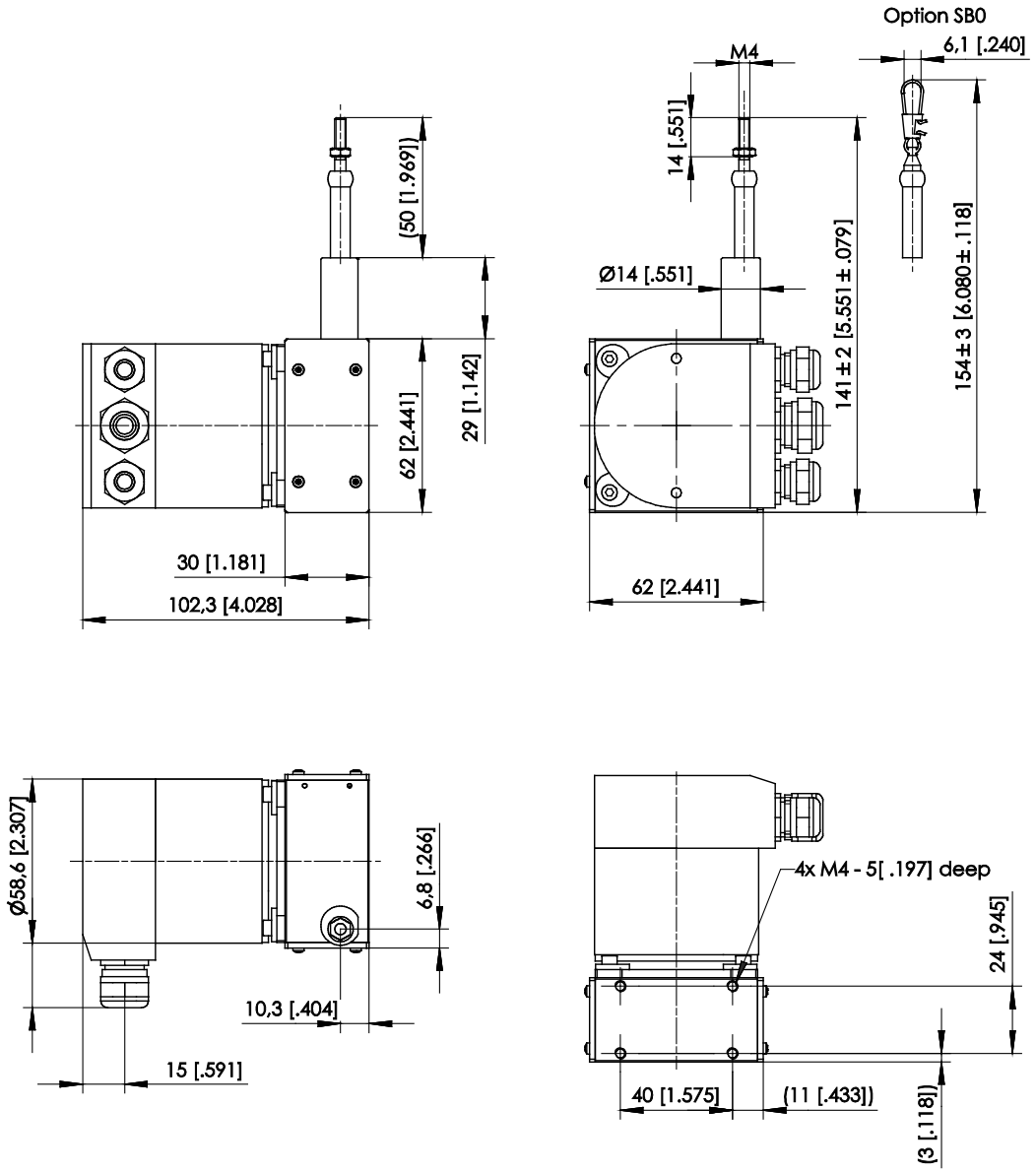
Dimensions

Measurement range 2500 mm, absolute encoder output HSSI



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

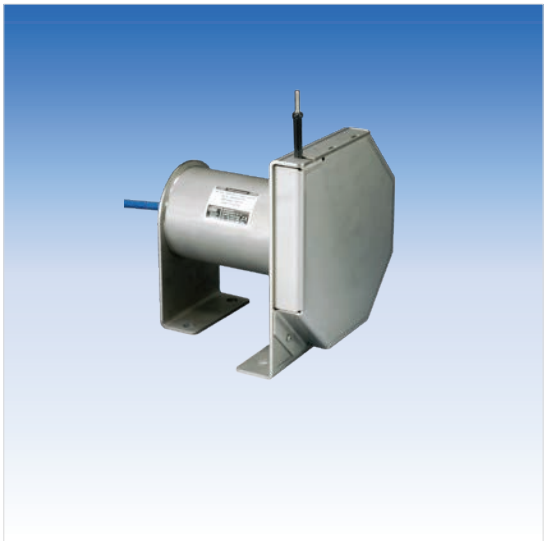
Measurement range 2500 mm, absolute encoder output HPROF / HINT / HDEV / HCAN / HCANOP



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

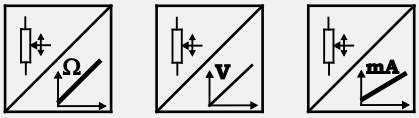
WS100M

Analog output



Sensor features

- **Measurement range up to 10000 mm**
- **Protection class IP68/IP69**
- **Analog 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
Resolution	Quasi infinite
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)
Sensing device	Precision potentiometer
Housing material	Stainless steel measuring cablel: stainless steel
Protection class	IP68/IP69
Connection	Cable output, standard lenght 2 m
Temperature range	-20 ... +85 °C
Weight	2000 mm: 4.5 kg 3500 mm: 4.6 kg 7500 mm: 5.6 kg 10000 mm: 6.8 kg
EMC	DIN EN 61326-1:2013

Cable forces typical at = 20 °C	**Measurement range [mm]**	**Weight [kg]**	**Max. pull-out force [N]**	**Min. pull-in force [N]**
	2000	4.5	7.5	5.7
	3500	4.6	4.6	3.3
	7500	5.6	11.6	8.0
	10000	6.8	8.6	6.0

Order code

WS100M – [1] – [2] – [3] – [4] – [5]

1 Measurement range (in mm)

2000 / 3500 / 7500 / 10000

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

3 Linearity

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

4 Cable fixing

M4VA	= M4 cable fixing

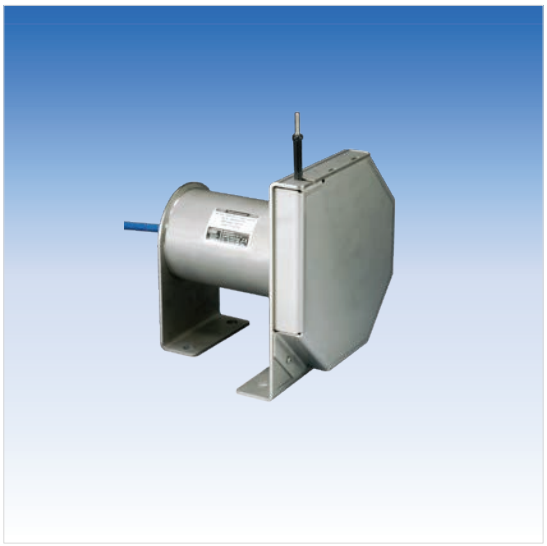
5 Connection

KAB2M	= Cable output, standard length 2 m

Order example

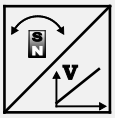
WS100M – 7500 – 420T – L10 – M4VA – KAB2M

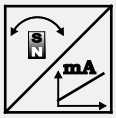
Magnetic encoder, analog output



Sensor features

- **With magnetic absolute encoder**
- **Measurement range up to 10000 mm**
- **Protection class IP68/IP69**
- **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	Stainless steel measuring cablel: stainless steel
Protection class	IP68/IP69
Connection	Cable output, standard lenght 2 m
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	2000 mm: 4.5 kg 3500 mm: 4.6 kg 7500 mm: 5.6 kg 10000 mm: 6.8 kg
EMC	DIN EN 61326-1:2013

Order code

WS100M – [1] – [2] – [3] – [4] – [5] – [6]

1 Measurement range (in mm)

2000 / 3500 / 7500 / 10000

2 Output

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

3 Signal characterisitics

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

M4VA	= M4 cable fixing

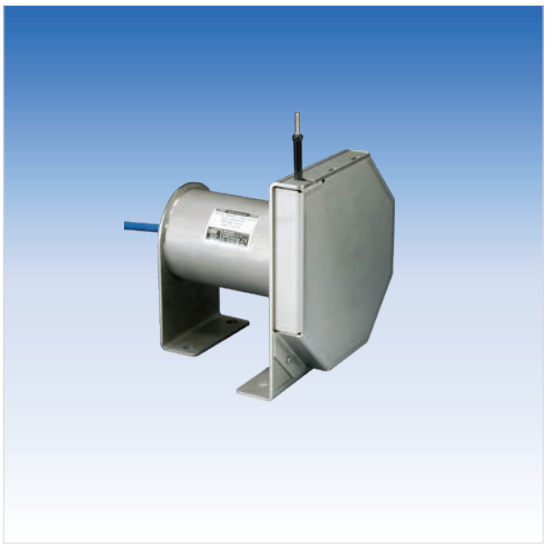
6 Connection

KAB2M	= Cable output, standard length 2 m

Order example

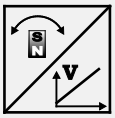
WS100M – 7500 – U2 – A – L10 – M4VA – KAB2M

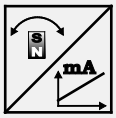
Magnetic encoder, analog output, programmable



Sensor features

- **With magnetic absolute encoder**
- **Measurement range up to 10000 mm**
- **Protection class IP68/IP69**
- **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	Stainless steel measuring cablel: stainless steel
Protection class	IP68/IP69
Connection	Cable output, standard lenght 2 m
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	2000 mm: 4.5 kg 3500 mm: 4.6 kg 7500 mm: 5.6 kg 10000 mm: 6.8 kg
EMC	DIN EN 61326-1:2013

Order code

WS100M – [1] – [2] – [3] – [4] – [5] – [6]

1 Measurement range (in mm)

2000 / 3500 / 7500 / 10000

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

M4VA	= M4 cable fixing

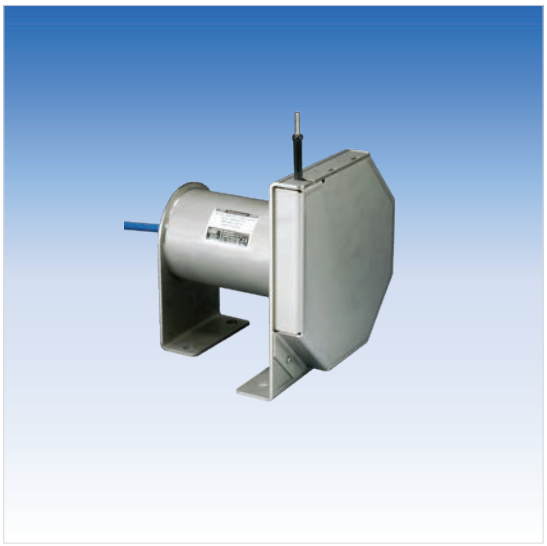
6 Connection

KAB2M	= Cable output, standard length 2 m

Order example

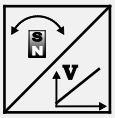
WS100M – 7500 – U2/PMU – A – L10 – M4VA – KAB2M

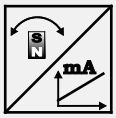
Magnetic encoder, analog output, redundant



Sensor features

- **With magnetic absolute encoder**
- **Measurement range up to 10000 mm**
- **Protection class IP68/IP69**
- **Analog output, redundant**
- **Absolute measurement**





Specifications

Output	**U2R** **U8R** **I1R**	= Voltage 0.5 ... 10 V, redundant = Voltage 0.5 ... 4.5 V, redundant = Current 4 ... 20 mA, 3 wire, redundant
Resolution	<0.002% f.s.	
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)	
Sensing device	Magnetic absolute encoder	
Housing material	Stainless steel measuring cablel: stainless steel	
Protection class	IP68/IP69	
Connection	Cable output, standard lenght 2 m	
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	2000 mm: 3500 mm: 7500 mm: 10000 mm:	4.5 kg 4.6 kg 5.6 kg 6.8 kg
EMC	DIN EN 61326-1:2013	

Order code

WS100M – [1] – [2] – [3] – [4] – [5] – [6]

1 Measurement range (in mm)

2000 / 3500 / 7500 / 10000

2 Output

U2R	= Voltage 0.5 ... 10 V, redundant
U8R	= Voltage 0.5 ... 4.5 V, redundant
I1R	= Current 4 ... 20 mA, 3 wire, redundant

3 Signal characteristics

A/A	= Output 1 increasing, output 2 increasing
A/D	= Output 1 increasing, output 2 decreasing
D/D	= Output 1 decreasing, output 2 decreasing

4 Linearity

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

5 Cable fixing

M4VA	= M4 cable fixing

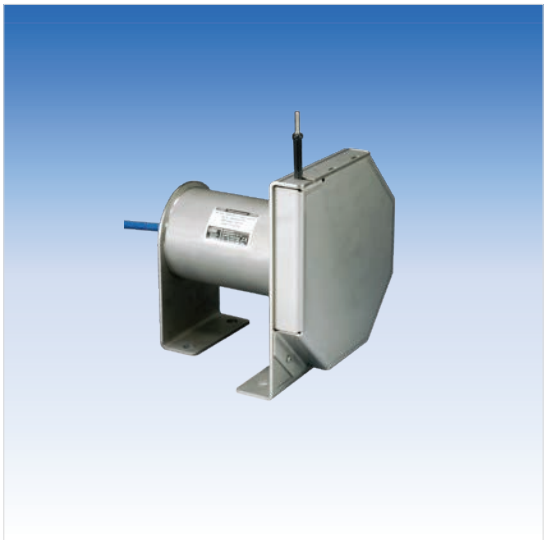
6 Connection

KAB2M	= Cable output, standard length 2 m

Order example

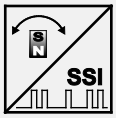
WS100M – 7500 – I1R – A/D – L10 – M4VA – KAB2M

Digital output SSI



Sensor features

- **With magnetic absolute encoder**
- **Measurement range up to 10000 mm**
- **Protection class IP68/IP69**
- **Digital output SSI**
- **Absolute measurement**



Specifications

Output	**MSSI** = SSI synchronous serial interface
Resolution	50
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)
Sensing device	Magnetic absolute encoder
Housing material	Stainless steel measuring cablel: stainless steel
Protection class	IP68/IP69
Connection	Cable output, standard lenght 2 m
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	2000 mm: 4.5 kg 3500 mm: 4.6 kg 7500 mm: 5.6 kg 10000 mm: 6.8 kg
EMC	DIN EN 61326-1:2013

Order code

WS100M – 1 – 2 – 3 – 4 – 5 – 6

1 Measurement range (in mm)

2000 / 3500 / 7500 / 10000

2 Resolution (in µm)

50

3 Output

MSSI	= SSI synchronous serial interface

4 Linearity

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

5 Cable fixing

M4VA	= M4 cable fixing

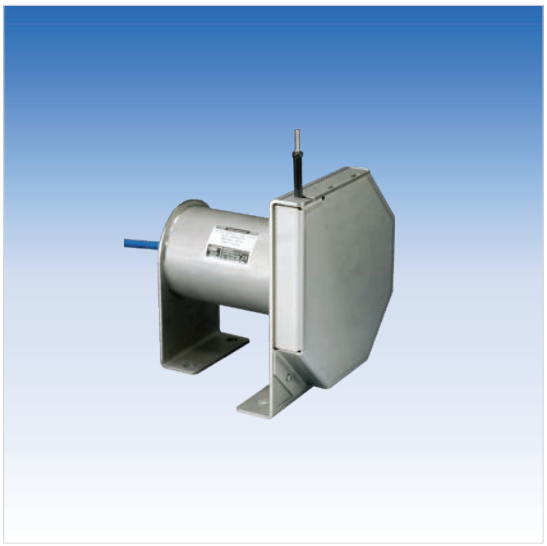
6 Connection

KAB2M	= Cable output, standard length 2 m

Order example

WS100M – 7500 – 50 – MSSI – L10 – M4VA – KAB2M

Magnetic encoder, digital output CAN Bus



Sensor features

- **With magnetic absolute encoder**
- **Measurement range up to 10000 mm**
- **Protection class IP68/IP69**
- **Digital output CAN**
- **Absolute measurement**
- **Optional redundant CAN Bus**

Specifications

Output	**MCANOP** = CANopen **MCANJ1939** = CAN SAE J1939 **MCANOPR** = CANopen redundant **MCANJ1939R** = CAN SAE J1939 redundant
Resolution	setting via CAN Bus
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)
Sensing device	Magnetic absolute encoder
Housing material	Stainless steel measuring cablel: stainless steel
Protection class	IP68/IP69
Connection	Cable output, standard lenght 2 m
Temperature range	-20 ... +85 °C
Weight	2000 mm: 4.5 kg 3500 mm: 4.6 kg 7500 mm: 5.6 kg 10000 mm: 6.8 kg
EMC	DIN EN 61326-1:2013

Cable forces for sensors with magnetic encoder

Cable forces typical at = 20 °C	**Measurement range [mm]**	**Weight [kg]**	**Max. pull-out force [N]**	**Min. pull-in force [N]**
	2000	4.5	7.5	5.7
	3500	4.6	4.6	3.3
	7500	5.6	11.6	8.0
	10000	6.8	8.6	6.0

Order code

WS100M – [1] – [2] – [3] – [4] – [5]

1 Measurement range (in mm)

2000 / 3500 / 7500 / 10000

2 Output

MCANOP	= CANopen
MCANJ1939	= CAN SAE J1939
MCANOPR	= CANopen redundant
MCANJ1939R	= CAN SAE J1939 redundant

3 Linearity

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

4 Cable fixing

M4VA	= M4 cable fixing

5 Connection

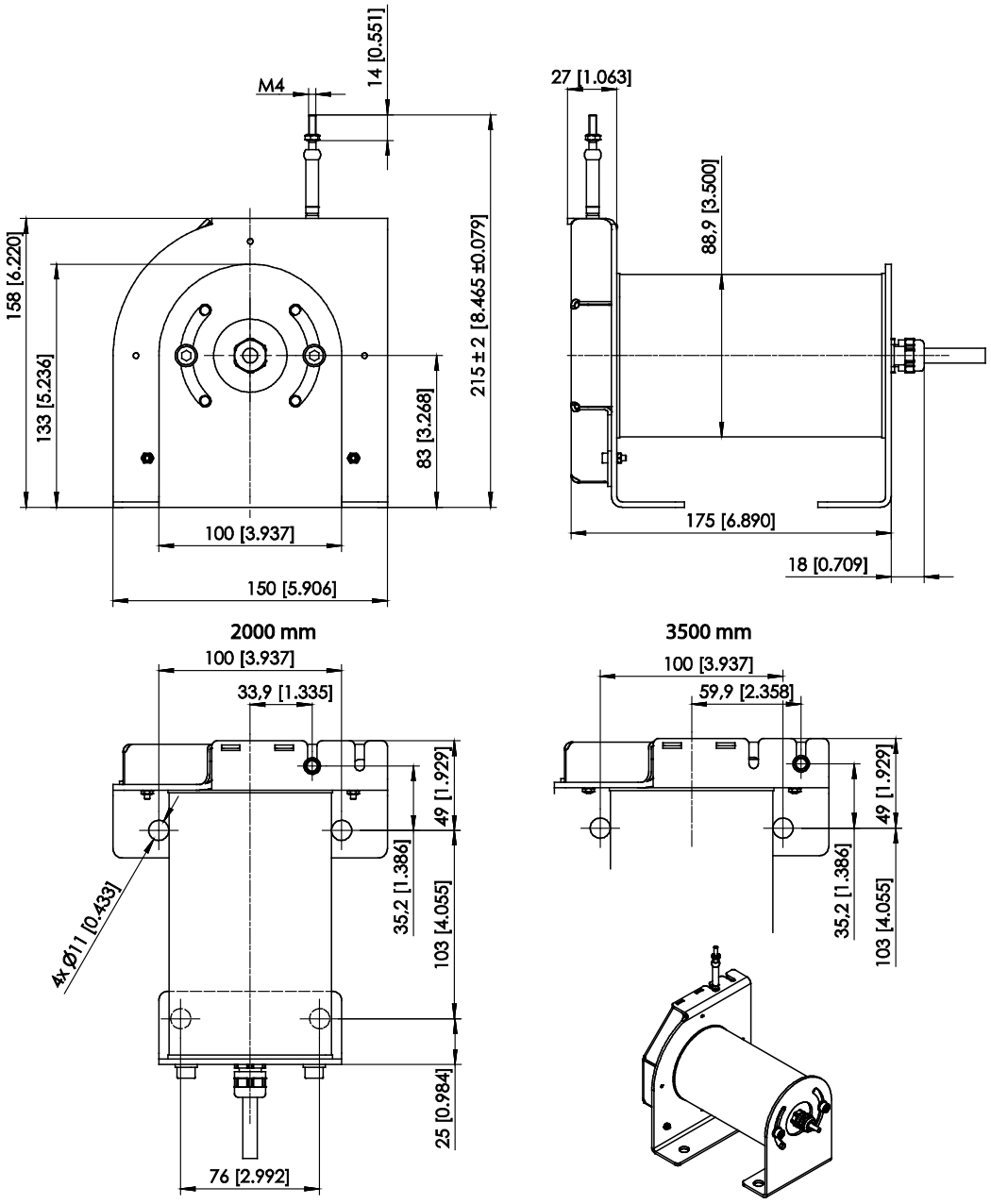
KAB2M	= Cable output, standard length 2 m

Order example

WS100M – 7500 – MCANOP – L10 – M4VA – KAB2M

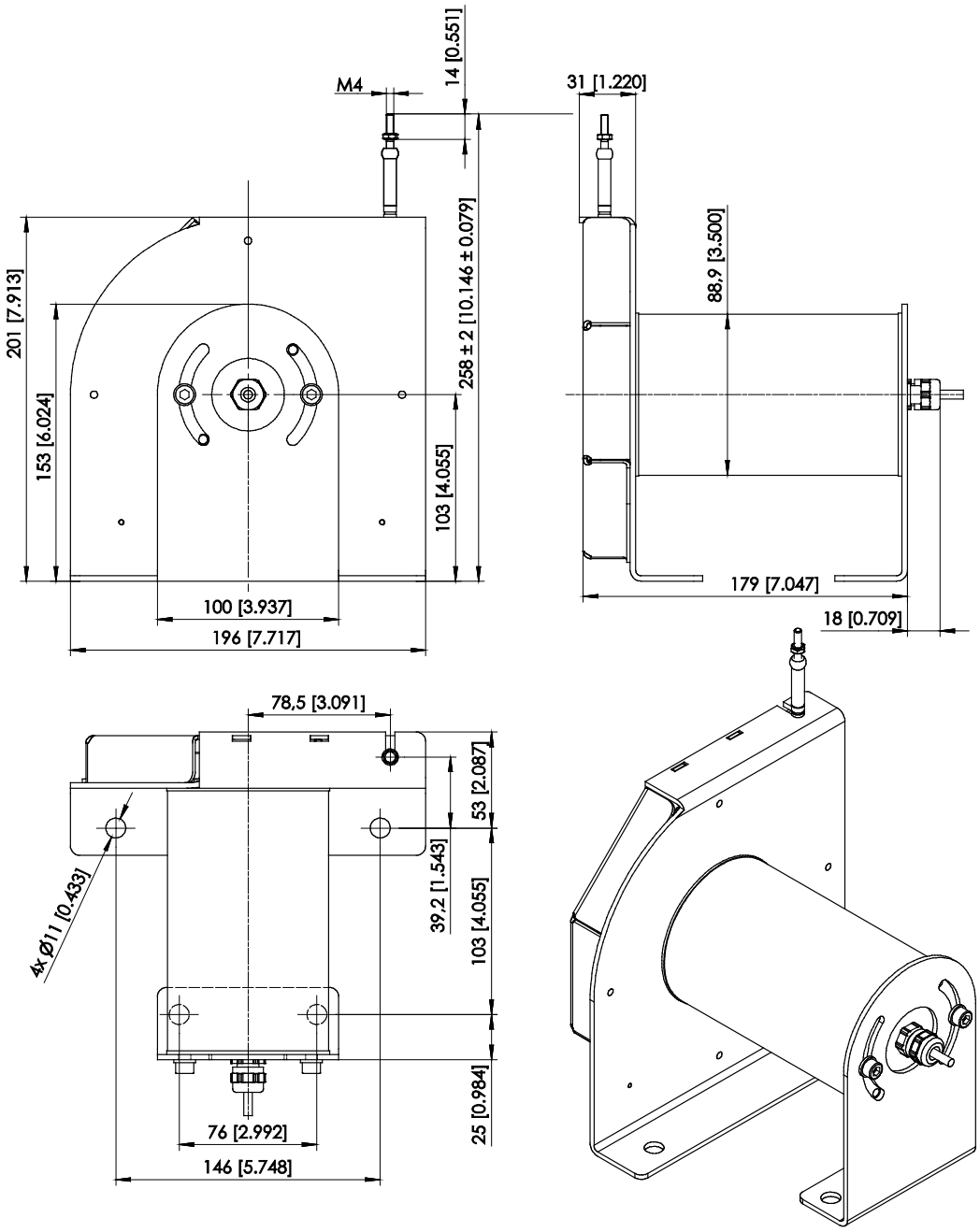
Dimensions

Measurement range 2000 … 3500 mm, analog output, SSI output, magnetic encoder output



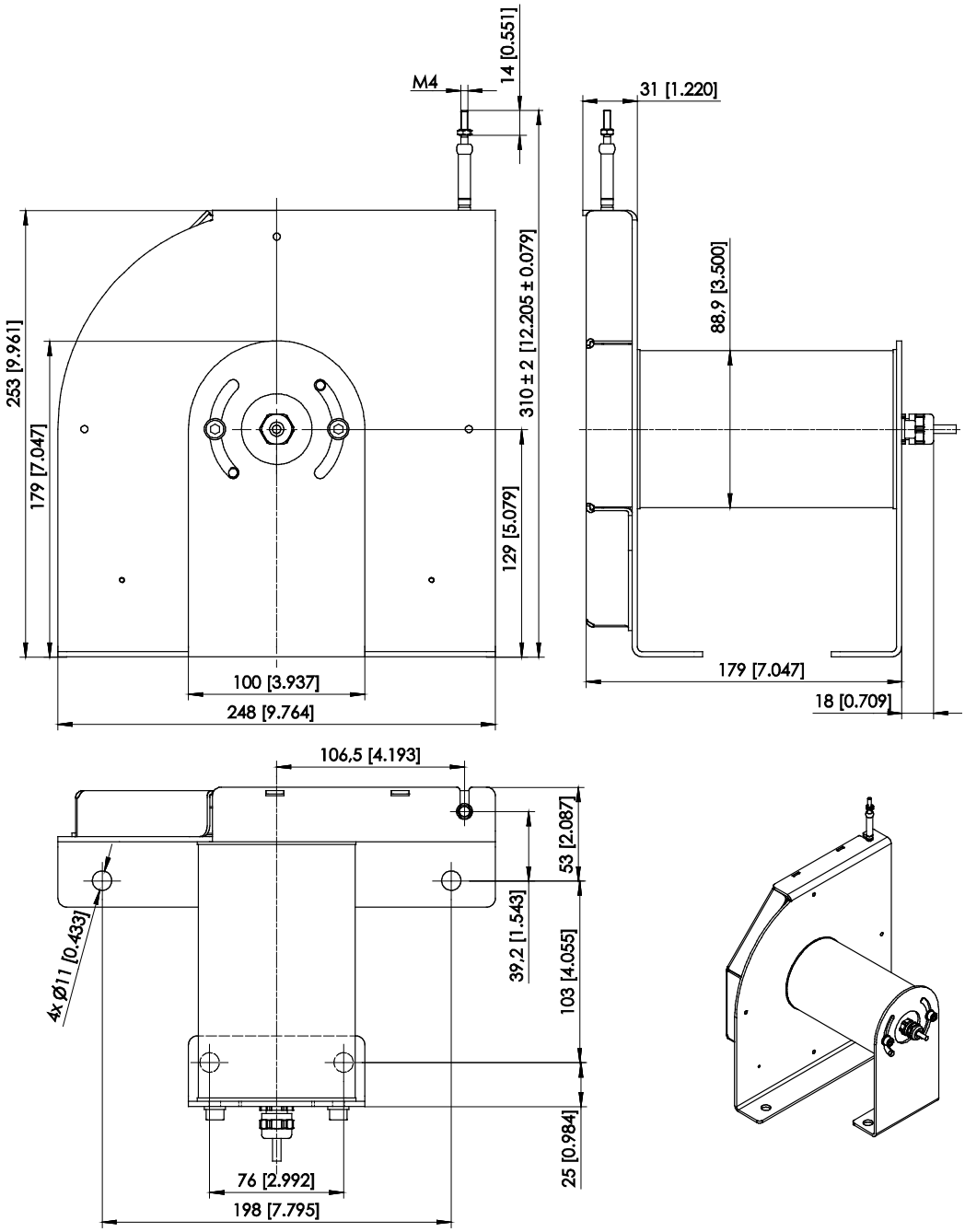
Dimensions in mm [inch]
Dimensions informative only.
For guaranteed dimensions consult factory.

Measurement range 7500 mm, analog output, SSI output, magnetic encoder output



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

Measurement range 10000 mm, analog output, SSI output, magnetic encoder output

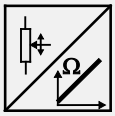


Dimensions in mm [inch]
Dimensions informative only.
For guaranteed dimensions consult factory.

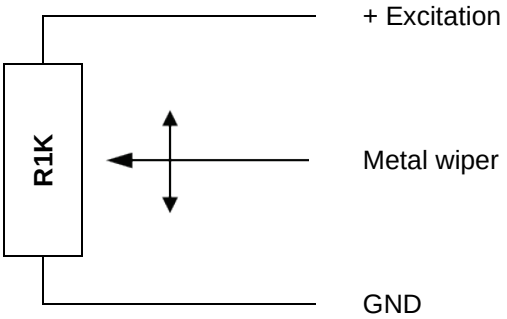
Output specifications

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.

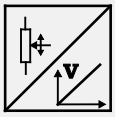
Additional information:

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

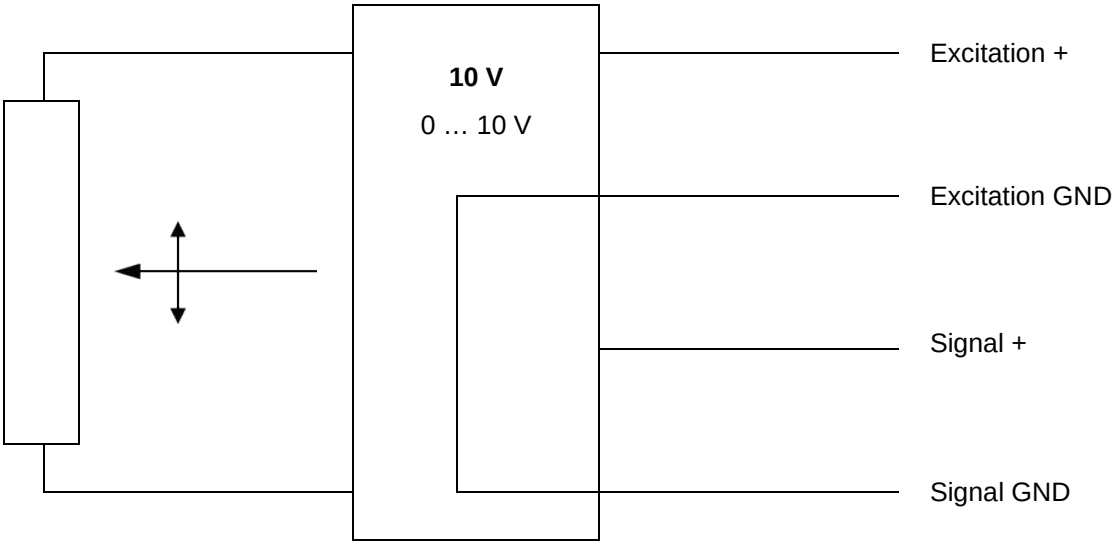
Signal wiring

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	 CONN-M8-4F (only WS31C, WS42C)

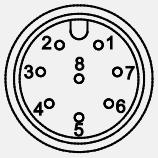
Signal conditioner 10V and 10V5

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

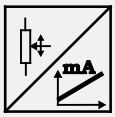
Output signals



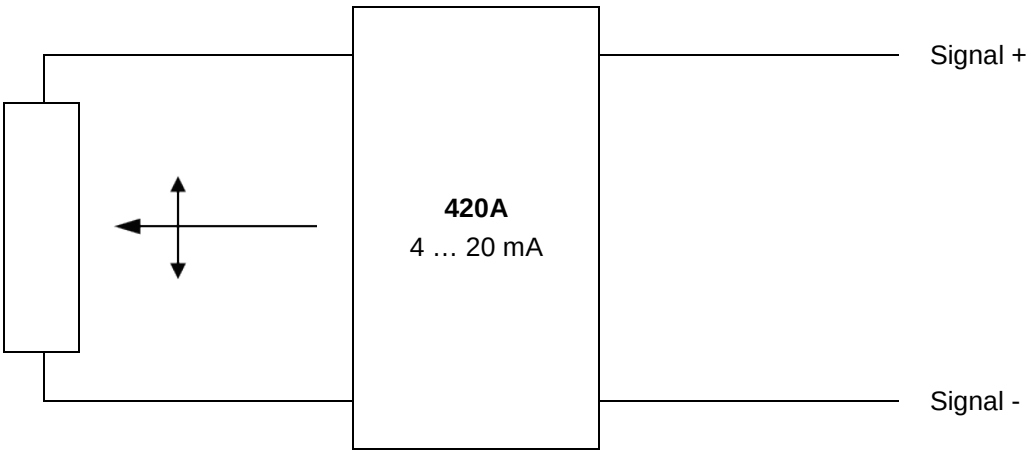
Signal wiring

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

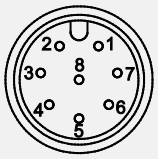
Signal conditioner 420A

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)	±100 x 10^{-6} / °C f.s.
	Protection	Reversed polarity, short circuit
	Output noise	0.5 mV_{eff}
	Operating temperature	Refer to output specification
	EMC	DIN EN 61326-1:2013

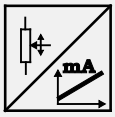
Output signals



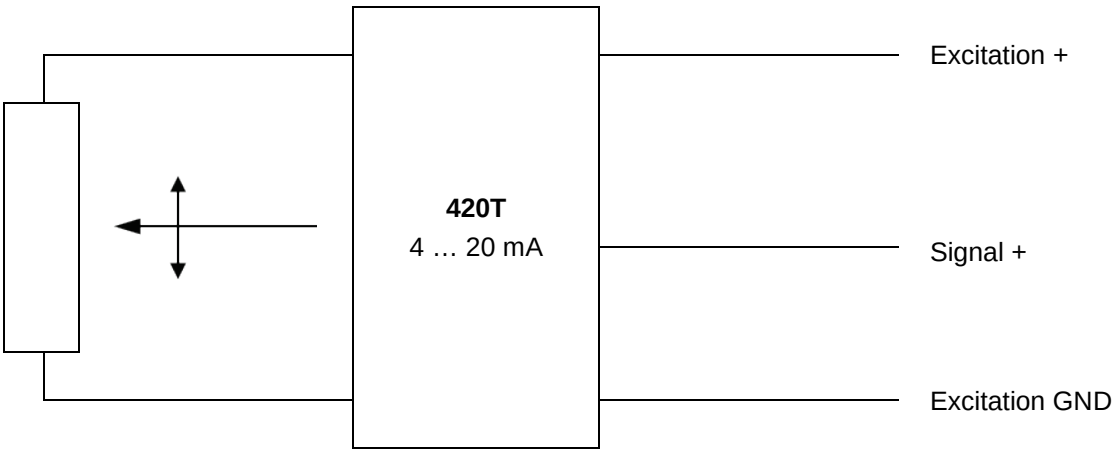
Signal wiring

Signal	Connector pin no.	Cable color	View to 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	CONN-M12-8F

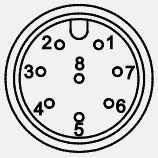
Signal conditioner 420T

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

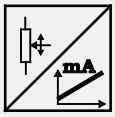
Output signals



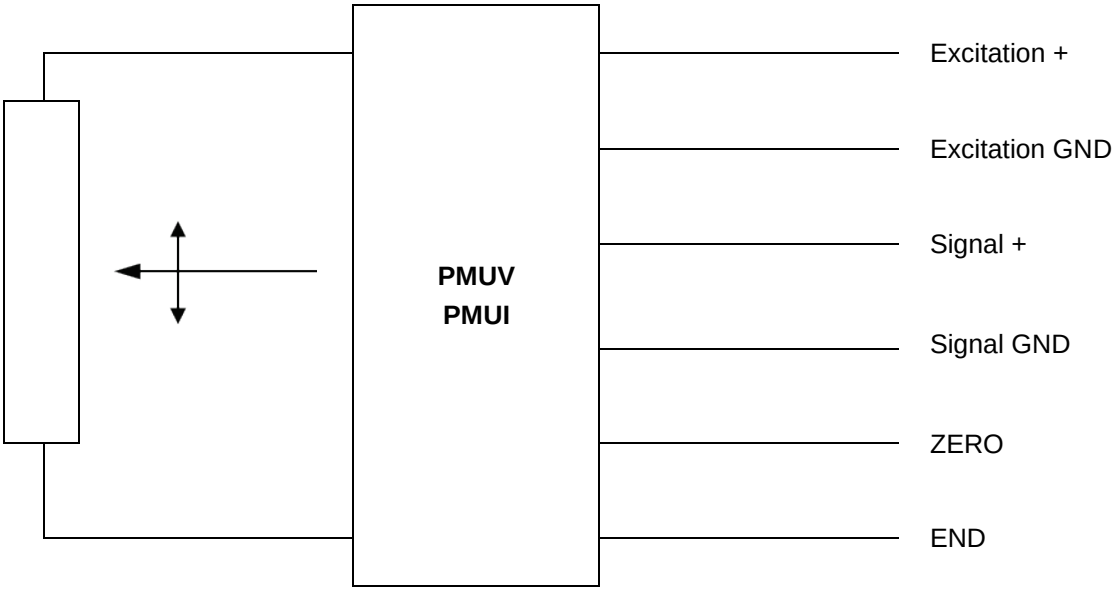
Signal wiring

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	CONN-M12-8F

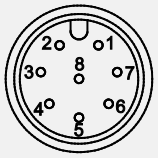
Signal conditioner PMUI / PMUV

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

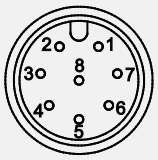
Output signals



Signal wiring PMUV / PMUI

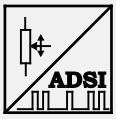
Signal	Connector pin no.	Cable color	View to sensor connector
Excitation +	1	white	
Excitation GND	2	brown	
Signal +	3	green	
Signal GND	4	yellow	
Not connected	5	grey	
Not connected	6	pink	
ZERO	7	blue	
END	8	red	CONN-M12-8F

Signal wiring PMUI2

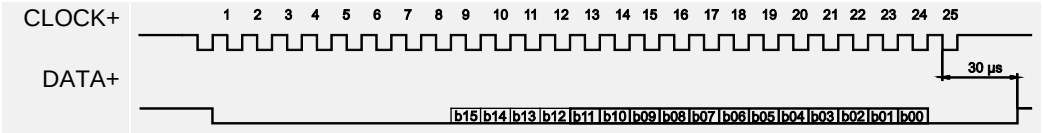
Signal	Connector pin no.	Cable color	View to sensor connector
Excitation +	1	white	
Excitation GND	2	brown	
Not connected	3	green	
Not connected	4	yellow	
Signal +	5	grey	
Signal GND	6	pink	
ZERO	7	blue	
END	8	red	CONN-M12-8F

SSI output

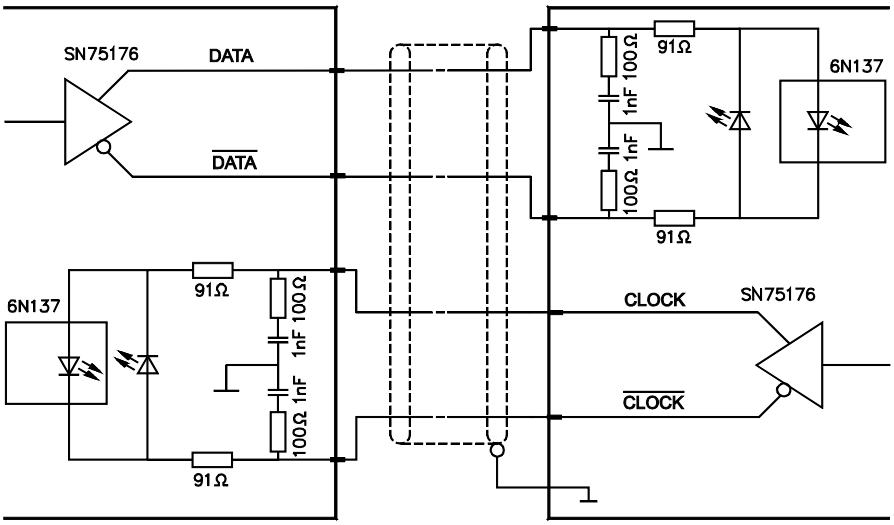
Signal conditioner ADSI

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

Data format
(train of 26 pulses)



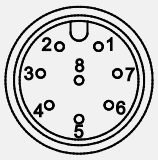
Recommended processing circuit



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

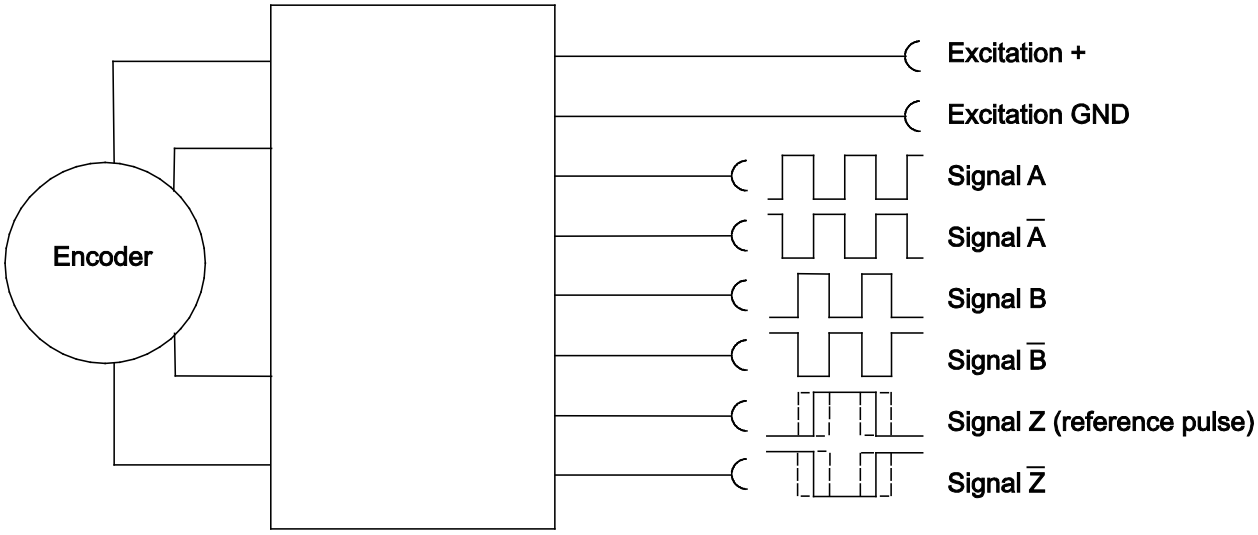
Signal	Connector pin no.	Cable color	View to sensor connector
Excitation +	1	white	
Excitation GND (0 V)	2	brown	
CLOCK	3	green	
$\overline{\text{CLOCK}}$	4	yellow	
DATA	5	grey	
$\overline{\text{DATA}}$	6	pink	
Shield, not connected	7	blue	
Not connected	8	red	CONN-M12-8F

Incremental outputs

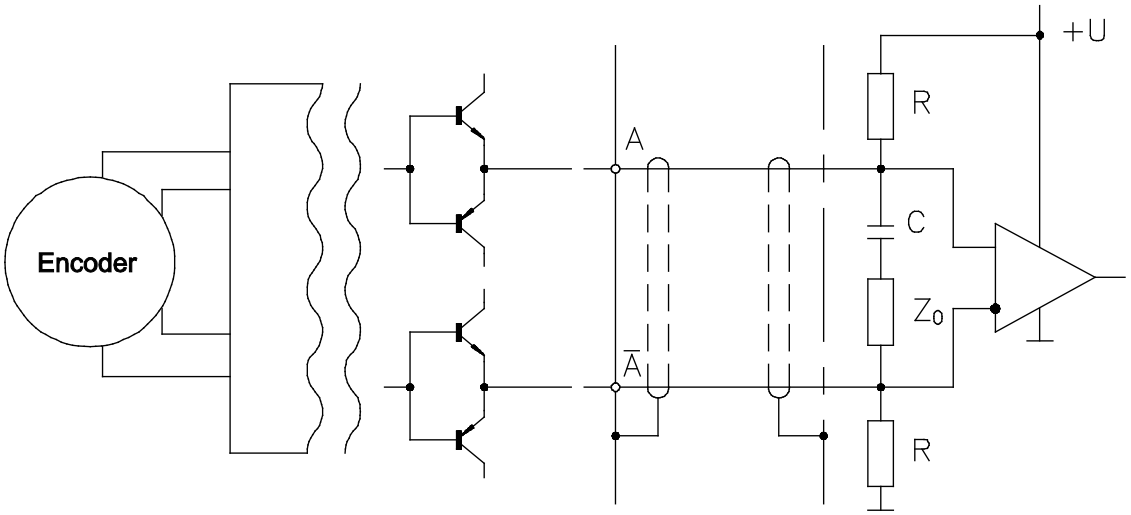
Signal conditioner PP530

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 mA, U_b 5 V/24 V: < 0,5 V I_a < 30 mA, U_b 5 V/24 V: < 1 V
	Stability (temperature)	±20 x 10^{-6} / °C f.s. (sensor mechanism)
	Operation temperature	-10 … +70 °C
	Storage temperature	-30 … +80 °C
	Transition time positive edge	< 200 ns
	Transition time negative edge	< 200 ns
	Protection	Reverse polarity, short circuit
	EMC	DIN EN 61326-1:2013

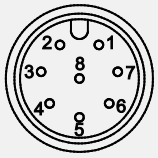
Output signals



Recommended processing circuit



Signal wiring

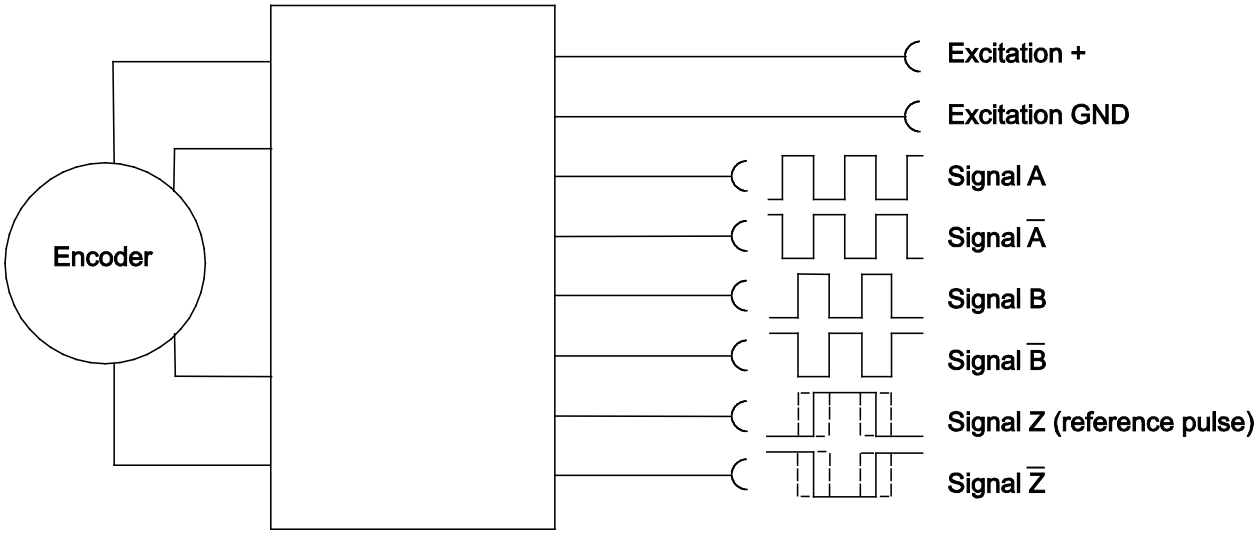
Signal	Connector pin no.	Cable color	View to sensor connector
Excitation +	1	white	
Excitation GND	2	brown	
Signal A	3	green	
Signal $\overline{A}$	4	yellow	
Signal B (A + 90°)	5	grey	
Signal $\overline{B}$	6	pink	
Signal Z (reference pulse)	7	blue	
Signal $\overline{Z}$	8	red	CONN-M12-8F

Signal conditioner IE24LI and IE24HI

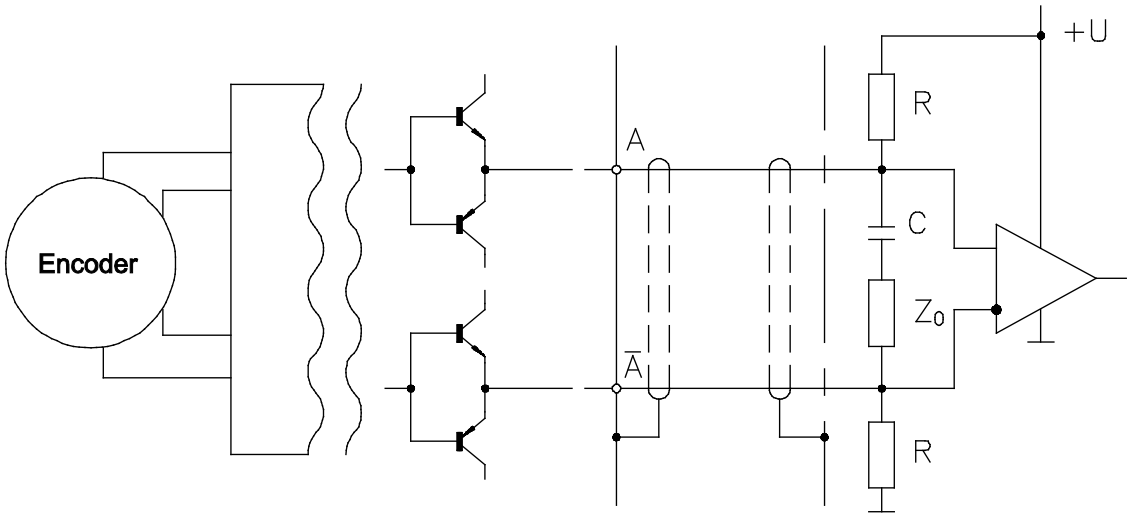
Incremental

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

Output signals



Recommended processing circuit



Signal wiring

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

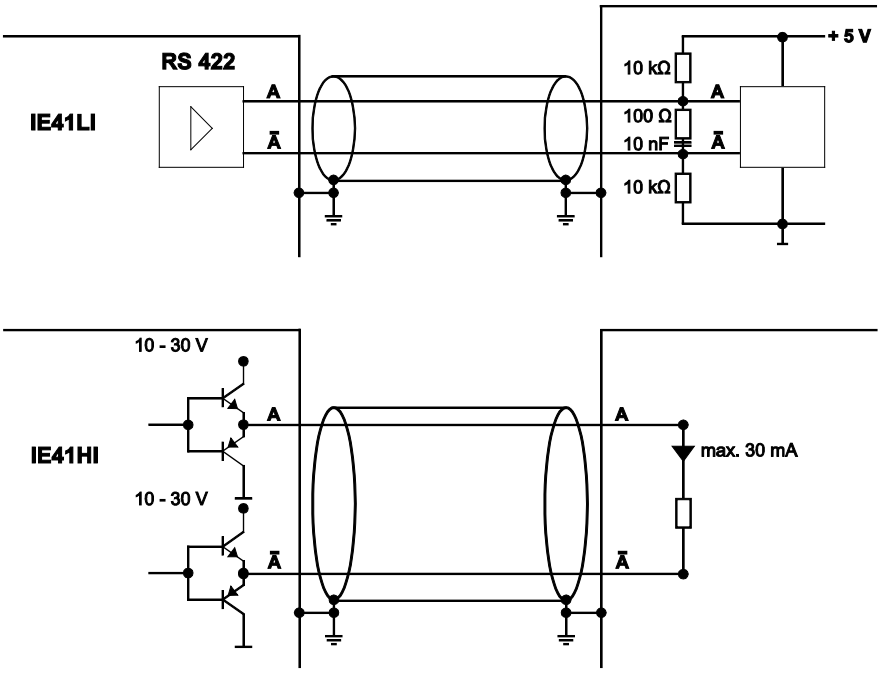
Signal conditioner IE41LI and IE41HI

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	

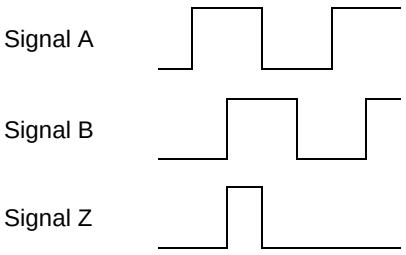
Signal wiring

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

Recommended processing circuit



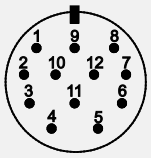
Output signals



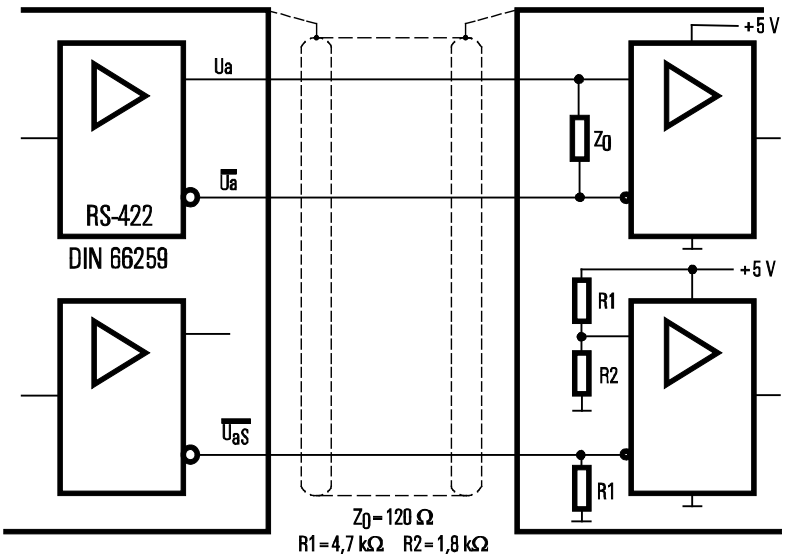
Signal conditioner LD5VC

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

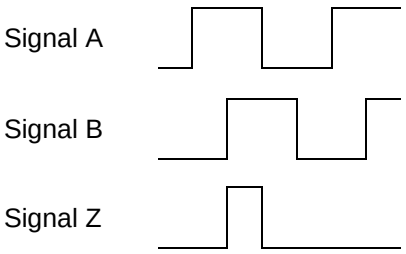
Signal wiring

Signal	Connector pin no.	View to sensor connector
Excitation +	12	
Excitation GND	10	
Signal A	5	
Signal $\overline{A}$	6	
Signal B (A + 90°)	8	
Signal $\overline{B}$	1	
Signal Z (reference pulse)	3	
Signal $\overline{Z}$	4	
Fault detection signal	7	
Schirm	housing	CONN-CONIN-12F

Recommended processing circuit



Output signals



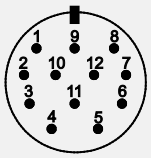
Signal conditioner PP24VC

Incremental

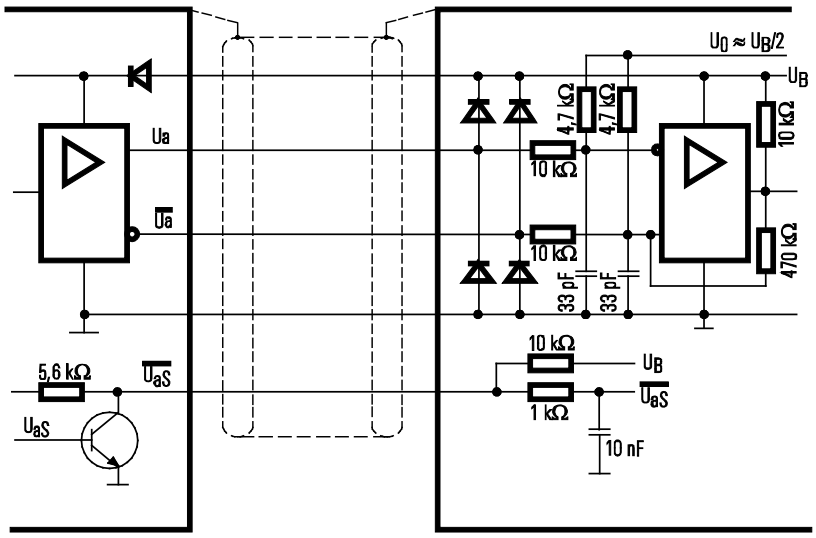
Excitation voltage	10 ... 30 V DC
Excitation current	150 mA max. w/o load
Interface	Push-pull line driver (24 V-HTL)
Output frequency	300 kHz max.
Output current	100 mA per channel
Signal level	
Ud High at Id = 20 mA, Ub = 24 V	≥ 21 V
Ud Low at Id = 20 mA, Ub = 24 V	≥ 2.8 V
Transition time positive edge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

Signal wiring

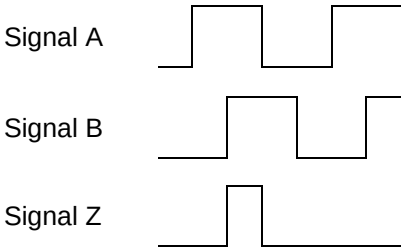
Signal	Connector pin no.	View to sensor connector
Excitation +	12	
Excitation GND	10	
Signal A	5	
Signal $\overline{A}$	6	
Signal B (A + 90°)	8	
Signal $\overline{B}$	1	
Signal Z (reference pulse)	3	
Signal $\overline{Z}$	4	
Fault detection signal	7	
Shield	housing	CONN-CONIN-12F



Recommended circuit



Output signals



Absolute encoder outputs

Signal conditioner HSSI

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

Data format (Mx = Multiturn bits, Sx = Singleturn bits)

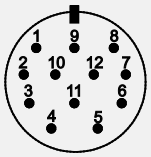
Resolution	**Clock**												
	T1	T2	T3	…	T12	T13	…	T21	T22	T23	T24	T25	T26
	Data bits												
24 Bit	M11	M10	M09	…	M0	S11	…	S3	S2	S1	S0	0	

Transmission rate

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

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

Signal wiring

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

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

Interface HPROF

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

Signal wiring

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

Interface HINT

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

Data format K2 / K3

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

Signal wiring

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

Interface HDEV

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

Recommended transmission

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

Transmission rate

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

Signal wiring

Signal	Cable terminal no. (bus cover)
U_b in	1
0 V in	2
CAN-L	4
CAN-H	6
Drain	3
Drain	5
CAN-H	7
CAN-L	8

Interface HCAN / HCANOP

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

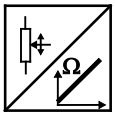
Signal wiring

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

Output information

Voltage divider R1K

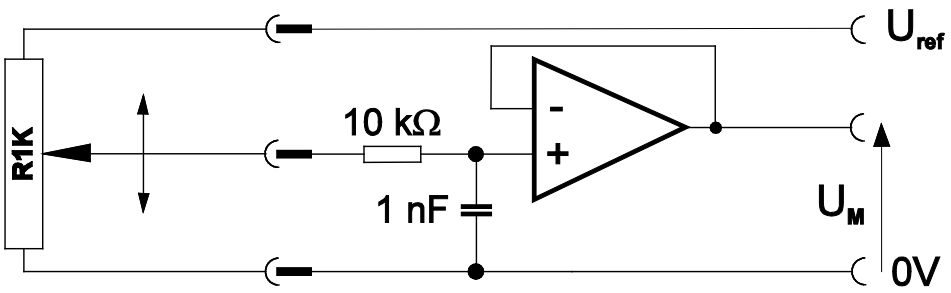
Potentiometer



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.

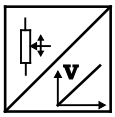
The output signal is the ratiometric voltage of a potentiometer. The potentiometer is supplied by a reference voltage source. The ratio of the output signal to the reference voltage is proportional to the measuring cable extension. For optimum performance of the sensor 94% (3% to 97%) of the potentiometers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

Suggested output circuit



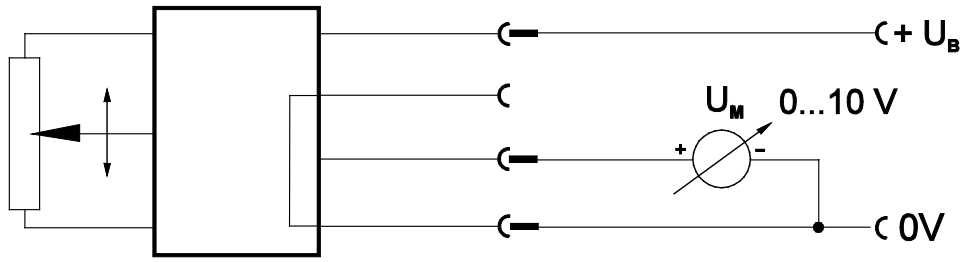
Voltage output 10V

0 … 10 V

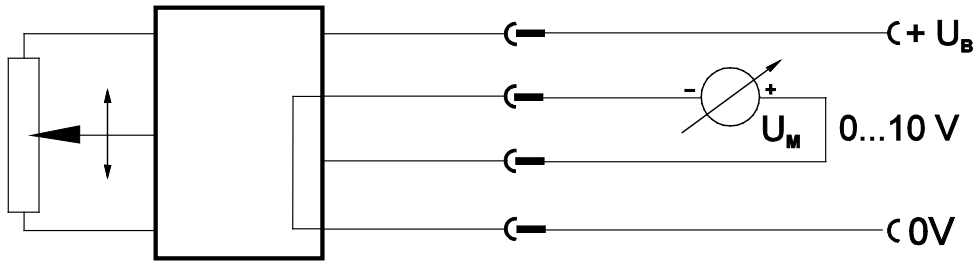


This output signal is 0 to 10 Volts proportional to the measuring cable extension of 0 to 100%. This is an industry standard output which is widely accepted because of its simple signal processing and suitability for all display, recording and automation systems. For analog signal processing the voltage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

Suggested output circuit



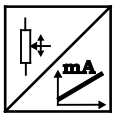
3 wire



4 wire

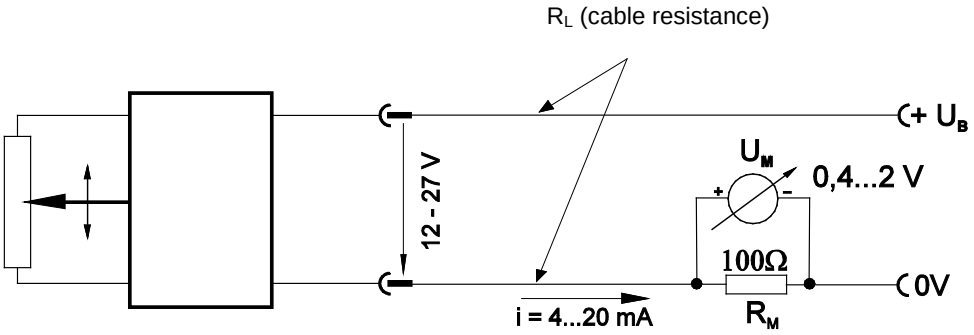
Current output 420A

4 … 20 mA (2 wire)



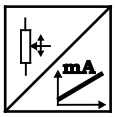
This output signal is a 4 to 20 mA current loop proportional to the measuring cable extension of 0 to 100%. It is an industry standard two-wire system for the transmission of measured values. The current loop is both measurement signal and sensor excitation current. The measured value is represented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

Suggested output circuit



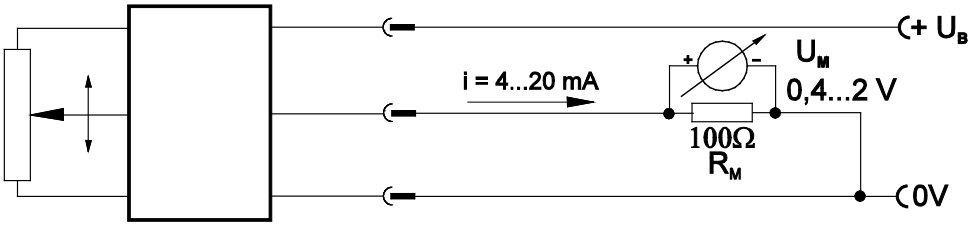
Current output 420T

4 … 20 mA (3 wire)



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

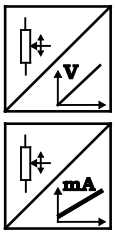
Suggested output circuit



Signal conditioner PMUV / PMUI, adjustable

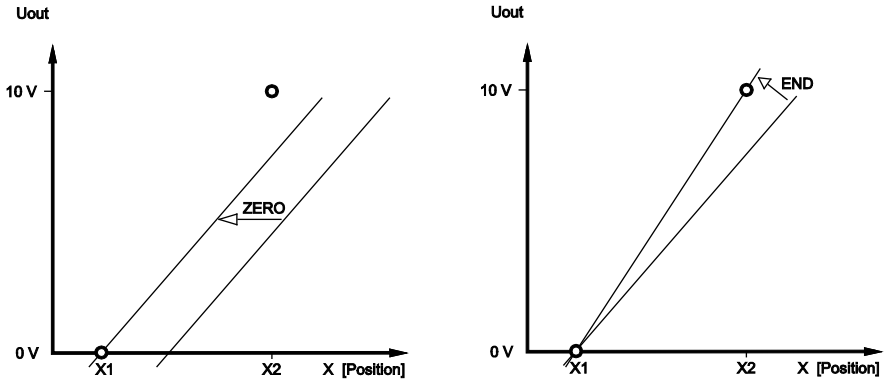
Programming of the start and end value by the customer

Voltage or current output

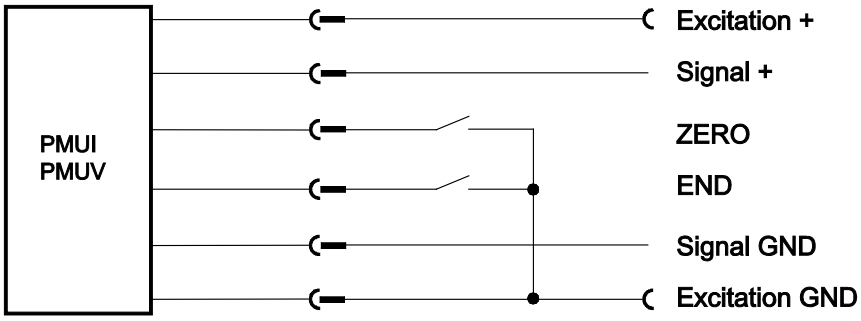


Teach-In of start and end value for the outputs PMUI and PMUV is provided by two binary signals ZERO and END. At the start position connect signal ZERO for a short period to GND via push button. At the end position connect signal END for a short period to GND. The scaling teached in that way will be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

Adjustment of the -minimum and -maximum value



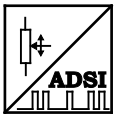
PMUV / PMUI (Two-wire programming)



Interfaces ADSI, IExxLI and IExxHI

ADSI

A/D converted synchronous serial output



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

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

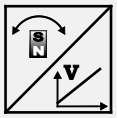
Interface IExxLI and IExxHI

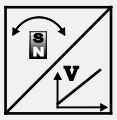
Incremental output

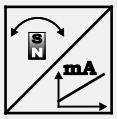
The cable extension is measured and incrementally transmitted as a sequence of square pulses. Output signals A, B in quadrature format are provided. After switching on the power the signal processing circuit can be synchronized by a periodic index (reference) pulse Z and/or a reference switch placed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

Output specifications – magnetic encoder

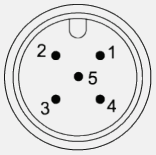
Analog output

U2 Voltage output 0.5 ... 10 V 	Excitation voltage	8 … 36 V DC
	Excitation current	20 mA typical at 24 V DC 38 mA typical at 12 V DC max. 50 mA
	Output voltage	0.5 ... 10 V DC
	Output current	2 mA max.
	Measuring rate	1 kHz standard
	Stability (temperature)	±50 x 10^{-6} / °C f.s. (typical)
	Protection	Reverse polarity, short circuit
	Operating temperature	See specification of the respective sensor
	EMC	DIN EN 61326-1:2013

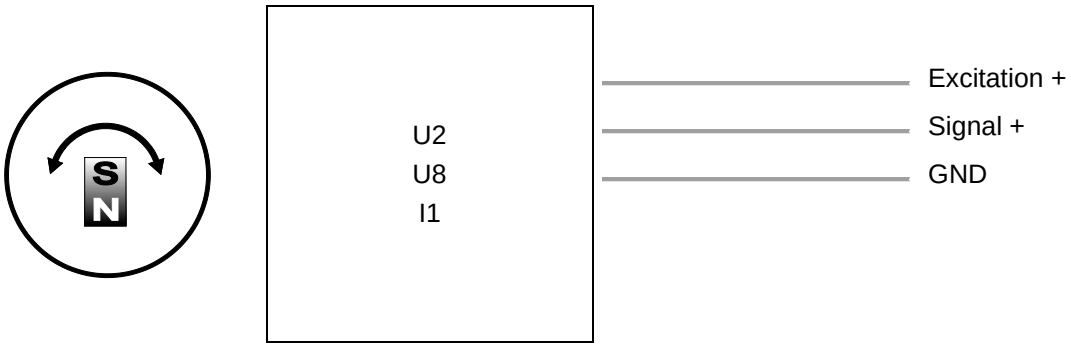
U8 Voltage output 0.5 … 4.5 V 	Excitation voltage	8 … 36 V DC
	Excitation current	17 mA typical at 24 V DC 32 mA typical at 12 V DC 50 mA max.
	Output voltage	0.5 … 4.5 V DC
	Output current	2 mA max.
	Measuring rate	1 kHz standard
	Stability (temperature)	±50 x 10^{-6} / °C f.s. (typical)
	Protection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

I1 Current output 4 … 20 mA, 3 wires 	Excitation voltage	8 … 36 V DC
	Excitation current	typical 36 mA at 24 V DC typical 70 mA at 12 V DC 120 mA max.
	Load R_L	500 Ω max.
	Output current	4 … 20 mA
	Measuring rate	1 kHz standard
	Stability (temperature)	±50 x 10^{-6} / °C f.s. (typical)
	Protection	Reverse polarity, short circuit
	Operating temperature	See specification of the respective sensor
	EMC	DIN EN 61326-1:2013

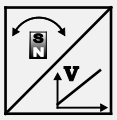
Signal wiring

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)	

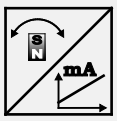
Signal diagram



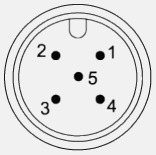
Analog output, programmable

U2/PMU Voltage output 0.5 ... 10 V 	Excitation voltage	8 … 36 V DC
	Excitation current	20 mA typical at 24 V DC 38 mA typical at 12 V DC max. 50 mA
	Output voltage	0,5 ... 10 V DC
	Output current	2 mA max.
	Measuring rate	1 kHz standard
	Stability (temperature)	±50 x 10^{-6} / °C f.s. (typical)
	Protection	Reverse polarity, short circuit
	Operating temperature	See specification of the respective sensor
	EMC	EN 61326-1:2013

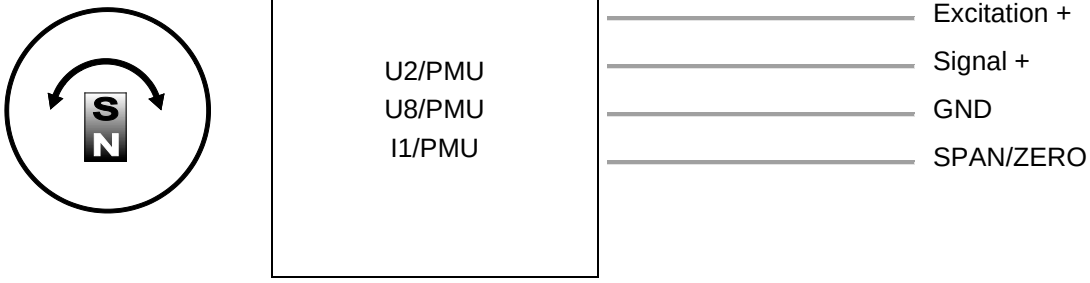
U8/PMU Voltage output 0.5 … 4.5 V 	Excitation voltage	8 … 36 V DC
	Excitation current	17 mA typical at 24 V DC 32 mA typical at 12 V DC max. 50 mA
	Output voltage	0.5 … 4.5 V DC
	Output current	2 mA max.
	Measuring rate	1 kHz standard
	Stabilität (Temperatur)	±50 x 10^{-6} / °C f.s. (typical)
	Protection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

I1/PMU Current output 4 … 20 mA, 3 wires 	Excitation voltage	8 … 36 V DC
	Excitation current	typical 36 mA at 24 V DC typical 70 mA at 12 V DC max. 120 mA
	Load R_L	500 Ω max.
	Output current	4 … 20 mA
	Measuring rate	1 kHz standard
	Stability (temperature)	±50 x 10^{-6} / °C f.s. (typical)
	Protection	Reverse polarity, short circuit
	Operating temperature	See specification of the respective sensor
	EMC	DIN EN 61326-1:2013

Signal wiring

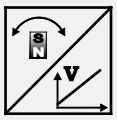
Signal	Connector pin no.	Cable color	View to sensor connector
Excitation +	1	brown	
Signal	2	white	
GND	3	blue	
Do not connect!	4	black	
SPAN/ZERO	5	grey	

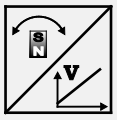
Signal diagram

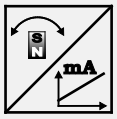


Option -PMU
Programming of the start and end value by the customer
Teach-In of start and end value for the options U2/PMU, I1/PMU, U8/PMU is provided by a binary signal SPAN/ZERO. At the start position connect signal SPAN/ZERO for a period of 2 … 3 seconds to GND via push button. At the end position connect signal SPAN/ZERO for a period of 5 … 6 seconds to GND via a push button. The scaling teached 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.

Analog output, redundant

U2R Voltage output 0.5 ... 10 V 	Excitation voltage	8 … 36 V DC
	Excitation current	20 mA typical at 24 V DC 38 mA typical at 12 V DC max. 50 mA per channel
	Output voltage	0.5 ... 10 V DC
	Output current	2 mA max.
	Measuring rate	1 kHz standard
	Stability (temperature)	±50 x 10^{-6} / °C f.s. (typical)
	Protection	Reverse polarity, short circuit
	Operating temperature	See the specification of the respective sensor
	EMC	DIN EN 61326-1:2013

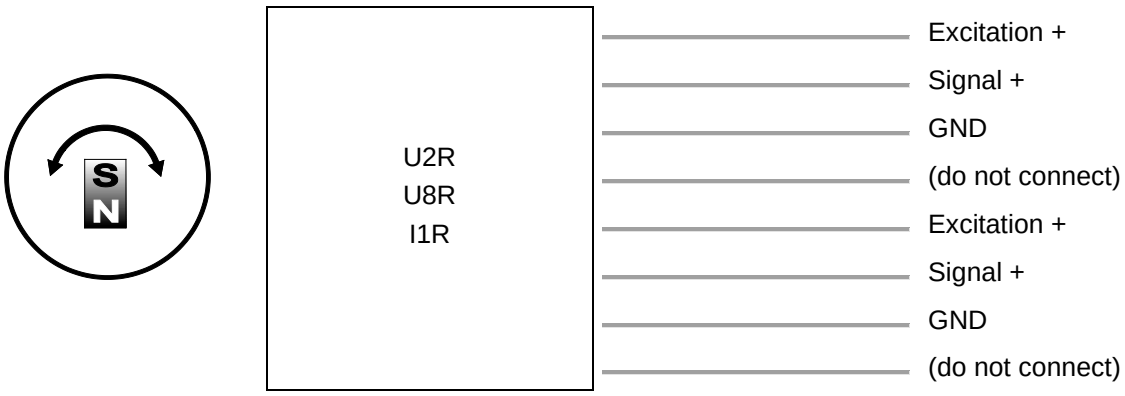
U8R Voltage output 0.5 … 4.5 V 	Excitation voltage	8 … 36 V DC
	Excitation current	17 mA typical at 24 V DC 32 mA typical at 12 V DC max. 50 mA per channel
	Output voltage	0.5 … 4.5 V DC
	Output current	2 mA max.
	Measuring rate	1 kHz standard
	Stability (temperature)	±50 x 10^{-6} / °C f.s. (typical)
	Protection	Reverse polarity, short circuit
	Operating temperature	See the specification of the respective sensor
	EMC	DIN EN 61326-1:2013

I1R Current output 4 … 20 mA, 3 wires 	Excitation voltage	8 … 36 V DC
	Excitation current	36 mA typical at 24 V DC 70 mA typical at 12 V DC max. 120 mA per channel
	Load R_L	500 Ω max.
	Output current	4 … 20 mA
	Measuring rate	1 kHz standard
	Stability (temperature)	±50 x 10^{-6} / °C f.s. (typical)
	Protection	Reverse polarity, short circuit
	Operating temperature	See specification of the respective sensor
	EMC	DIN EN 61326-1:2013

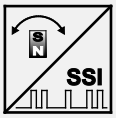
Signal wiring

Channel	Signal	Connector pin no.	Cable color	View to the sensor connector
1	Excitation +	1	white	
1	Signal	2	brown	
1	GND	3	green	
1	Do not connect!	4	yellow	
2	Excitation +	5	grey	
2	Signal	6	pink	
2	GND	7	blue	
2	Do not connect!	8	red	

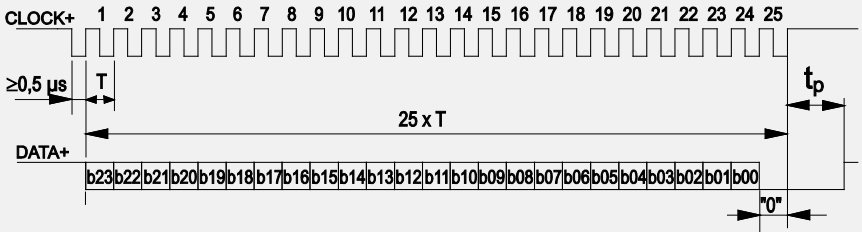
Signal diagram



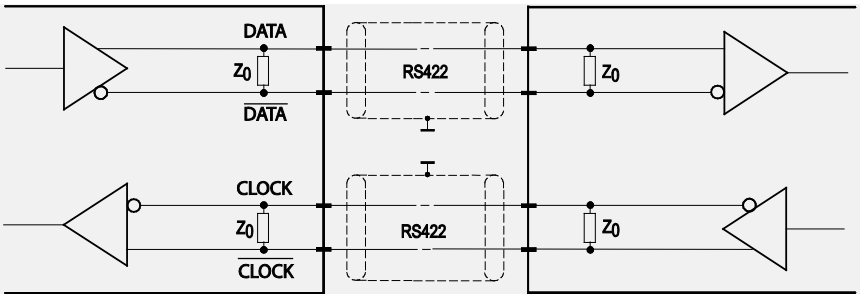
Digital output SSI

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 µs min.
	Stability (temperature)	±50 x 10^{-6} / °C f.s. (typical)
	Operating temperature	See specification of the respective sensor
	Protection	Reverse polarity, short circuit
	EMC	DIN EN 61326-1:2013

Data format
(Train of 26 pulses)



Recommended processing circuit



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.

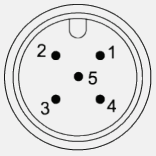
Signal wiring

Signal	Connector pin no.	Cable color	View to sensor connector
Excitation +	1	brown	
Excitation GND	2	white	
CLOCK	3	green	
$\overline{\text{CLOCK}}$	4	yellow	
DATA	5	grey	
$\overline{\text{DATA}}$	6	pink	
-	7	blue	
-	8	red	

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, 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, default: 125 kBit
	Bus connection	M12 conncector, 5 pin
	Integrated bus terminating resistor	120Ω adjustable by the customer
	Bus, galvanic isolated	no

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

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

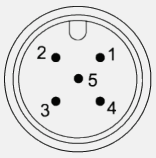
Digital output CAN SAE J1939

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

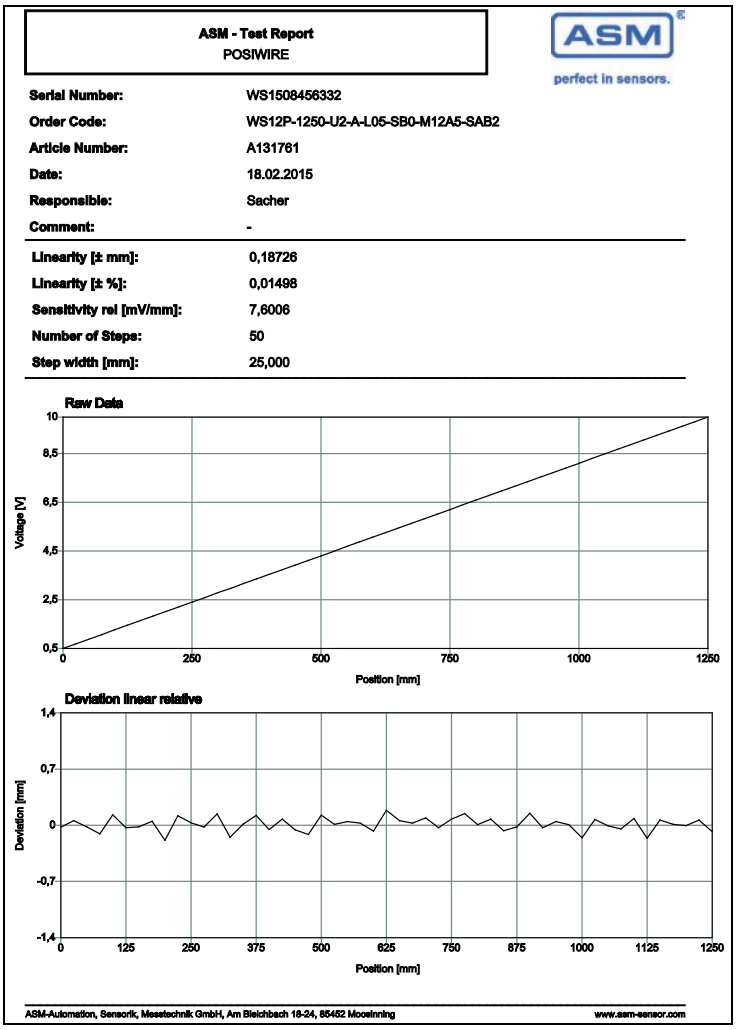
Signal wiring	**Signal**	**Connector pin no.**	**View to the sensor connector**
	Shield	1	
	Excitiation +	2	
	GND	3	
	CAN-H	4	
	CAN-L	5	

Measurement protocol and manufacturers test certificate (ISO9001)

Measurement protocol document

ASM carries out a full and complete calibration procedure on all new position sensors manufactured to ensure all units meet the required performance parameters and to maintain the highest quality standards. Each sensor is checked using state-of-the-art measuring equipment which is fully traceable to national standards. All test results are recorded. A Measurement Protocol Document and a Manufacturers Test Certificate can be issued for each sensor supplied to a customer. Both can be ordered with a new sensor or will be supplied when the sensor is re-tested. The recommended re-test period is 1 year.

A minimum of 50 measurement values are recorded at equidistant points along the sensors measurement range. These values are then processed to show the ideal “best-fit” line. The “best-fit” line and the measured values are shown on the graph. The sensitivity and linearity results are printed above the graph.



Order code

MESSPROTOKOLL – WS – 1 – 2 MM

1	Language

D = German
E = English
F = French

2	Measurement range up to (mm)

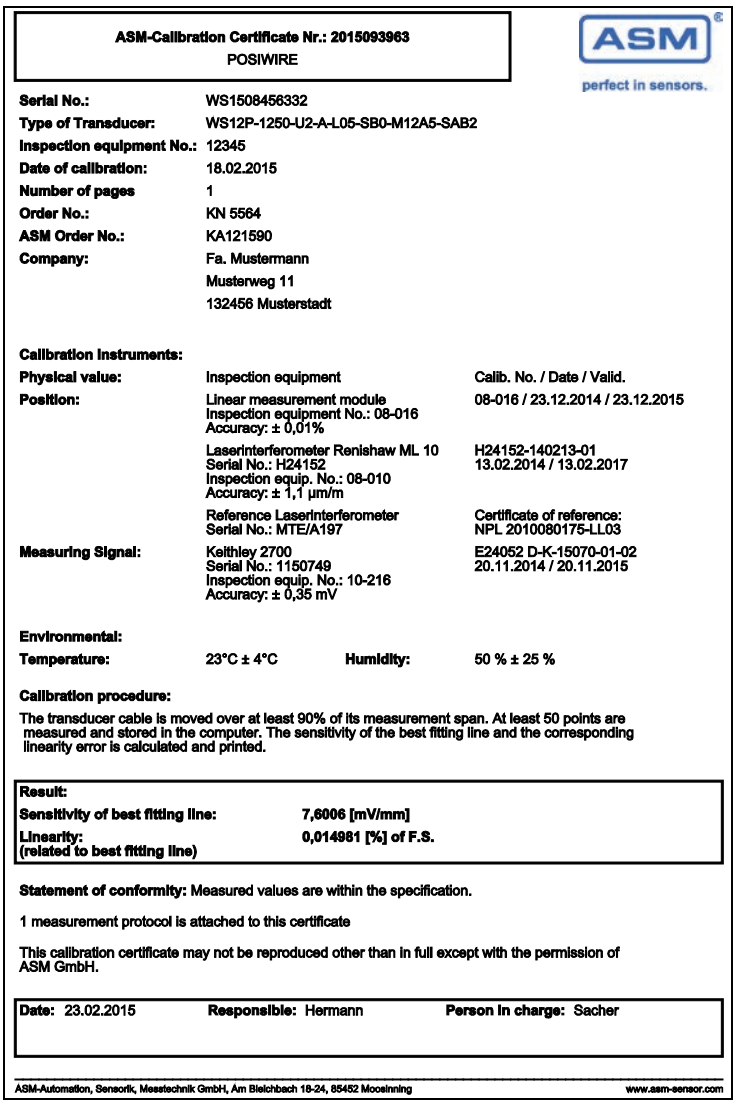
1250 / 2500 / 5000 / 25000

Order example

MESSPROTOKOLL – WS – D – 5000 MM

Manufacturers test certificate

The Manufacturers Test Certificates produced by ASM meet the requirements of quality control standards ISO 9001, etc. The measurement system used and its traceability to national standards are fully described on the certificate and a record of all 50 measurement values is provided.



ASM-Calibration Certificate Nr.: 2015093963
POSIWIRE

perfect in sensors.

Serial No.:	WS1508456332		
Type of Transducer:	WS12P-1250-U2-A-L05-SB0-M12A5-SAB2		
Inspection equipment No.:	12345		
Date of calibration:	18.02.2015		
Number of pages	1		
Order No.:	KN 5564		
ASM Order No.:	KA121590		
Company:	Fa. Mustermann Musterweg 11 132456 Musterstadt		
Calibration instruments:			
Physical value:	Inspection equipment		Calib. No. / Date / Valid.
Position:	Linear measurement module Inspection equipment No.: 08-016 Accuracy: ± 0,01%		08-016 / 23.12.2014 / 23.12.2015
	Laserinterferometer Renishaw ML 10 Serial No.: H24152 Inspection equip. No.: 08-010 Accuracy: ± 1,1 µm/m		H24152-140213-01 13.02.2014 / 13.02.2017
	Reference Laserinterferometer Serial No.: MTE/A197		Certificate of reference: NPL 2010080175-LL03
Measuring Signal:	Keithley 2700 Serial No.: 1150749 Inspection equip. No.: 10-216 Accuracy: ± 0,35 mV		E24052 D-K-15070-01-02 20.11.2014 / 20.11.2015
Environmental:			
Temperature:	23°C ± 4°C	**Humidity:**	50 % ± 25 %

Calibration procedure:
The transducer cable is moved over at least 90% of its measurement span. At least 50 points are measured and stored in the computer. The sensitivity of the best fitting line and the corresponding linearity error is calculated and printed.

Result:

Sensitivity of best fitting line:	**7,6006 [mV/mm]**
Linearity: **(related to best fitting line)**	**0,014981 [%] of F.S.**

Statement of conformity: Measured values are within the specification.

1 measurement protocol is attached to this certificate

This calibration certificate may not be reproduced other than in full except with the permission of ASM GmbH.

Date: 23.02.2015 **Responsible:** Hermann **Person in charge:** Sacher

ASM-Automation, Sensorik, Messtechnik GmbH, Am Bleichbach 18-24, 85452 Moosinning www.asm-sensor.com

Order code

ZERTIFIKAT – WS – 1 – 2 MM

1 Language

D = German
E = English
F = French

2 Measurement range up to (mm)

1250 / 2500 / 5000 / 25000

Order example

ZERTIFIKAT – WS – D – 2500 MM

Mounting hints

Important Information

Electromagnetic interference and cabling

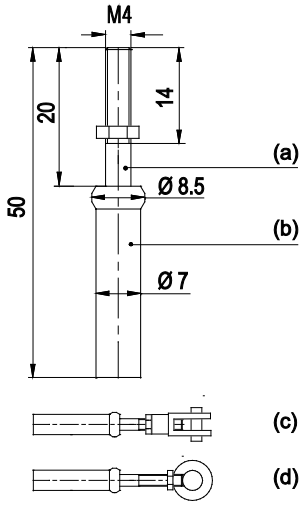
Screened cables should always be used for the sensors electrical connection. If the GND (Common) connection between the sensor and signal processing unit is not of a low resistance or different reference potentials exist then the common cable screen should only be connected at the signal processing unit end. To limit high frequency effects on sensors and signal cables the common screen should be connected at both ends and a separate GND connection between the sensor and signal processing unit must be installed. If a separate ground connection is not possible, then only one end of the cable screen should be connected to avoid current flow in the cable screen.

Cable fixing M4

The M4 connection consists of a M4 grub screw with locknut and a compound sleeve as cable stop block. The compound sleeve reduces the risk of cable breakage as far as possible during an uncontrolled cable return. In addition corrosion is prevented between the cable crimp and the stop block. Connection to the moving part of the machine or system 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!

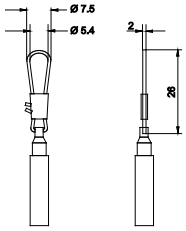
The M4 cable connection is easy to use, it can be combined with the GK1 attachment head (a) or with a fastening eye (b) OE1 (accessories).



Cable clip SB0

The cable clip consists of a rotatable steel clip and an compound sleeve. Connection to the moving part of the machine or system is made with an M5 set screw (Allen screw) preferably using the GK1/GK2 attachment head.

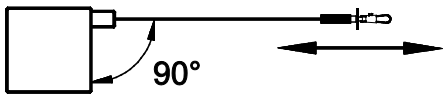
The steel cable clip can be opened for easy fixing.



Cable alignment

When mounting the WS Position Sensor, linear travel of the cable must be at 90° to the sensor body face on which the cable outlet is situated (see diagram).

Important:
Any deviation from the 90° angle will reduce the lifecycle of both cable and cable outlet!

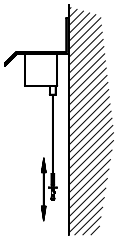


Mounting position

The POSIWIRE® Position Sensor must be firmly mounted in a position which allows free cable movement and where damage to the sensor or cable from foreign objects is unlikely. The sensor will operate in any orientation but where cable contamination by oil, water or particulate matter is possible the sensor should be mounted in the vertical plane with the cable pointing down (as per diagram).

Where necessary a sensor shield should be incorporated in the mounting assembly to protect the sensor from falling solids or liquid media.

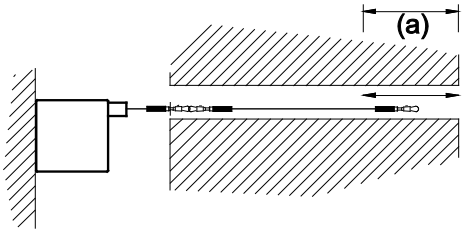
It is also good practice to mount the sensor onto or close by a rigid part of the machine or system (see diagram).



Cable extension

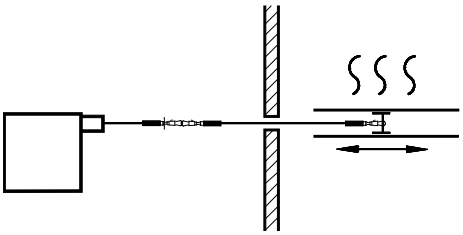
In certain restricted access situations it is impossible to mount the sensor close to the part of the machine or system where the linear motion is measured. In this case the SV1 cable extension (see accessories) can be used to connect the sensor cable to the moving part (see diagram).

The SV1 cable extension is also ideal for applications where measurement under water is -required. The WS Position sensor can be mounted in a dry, protected position above the surface and the SV1 cable extension used to connect the sensor cable to the underwater moving part.



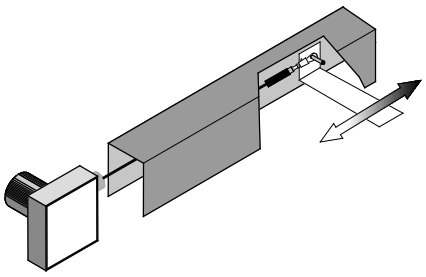
High Temperature

Standard WS Position Sensors and measuring cables are rated at a maximum of 85 °C ambient operating temperature. The SV1 cable extension can be used on temperatures up to 200°C.



Hostile environments

POSIWIRE® position sensors can be used in very hostile environments if suitable shielding and and protection of the sensor and cable is provided. A shielding channel of metal or rigid plastic is recommended where cable damage or contamination may occur.

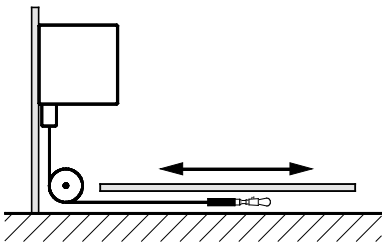


Cable runs using pulleys

The SR2 low friction cable pulley (see accessories) can be used where it is necessary to have the cable linear movement in a different plane to the sensor mounting or restricted access makes direct mounting of the sensor impossible.

The angle should not exceed 90°!

Note: The use of cable pulleys will reduce the lifecycle of the cable, so the use should be avoided whenever it is possible!

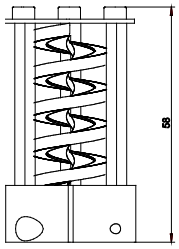


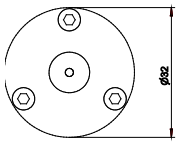
Accessories

Cable protection and sensor mounting

Cable dust wiper SAB5

The SAB5 cable dust wiper avoids the penetration of troublesome particles and media through the cable outlet by using a fiber brush. The sensor is protected against non abrasive particles and thin liquids. SAB5 is not useable with abrasive dust and thick liquids.
With SAB5 the height of the cable outlet will be raised by 50 mm max. (for guaranteed dimensions consult factory).
Note: SAB5 can be used with the following sensors: WS7.5, WS10, WS10ZG, WS12, WS17KT, WS19KT, WS60 and WS21.

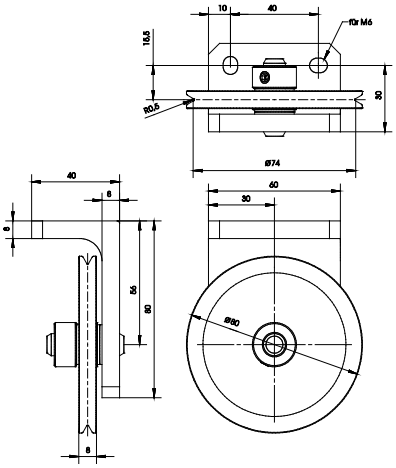




Order code **SAB5**

Cable pulley SR2

The cable pulley SR2 is necessary for installation situations where straight-line motion of the sensor cable is not possible or where the sensor must be located outside of the motion area due to limited space.
Turn angle: 0 to 90°



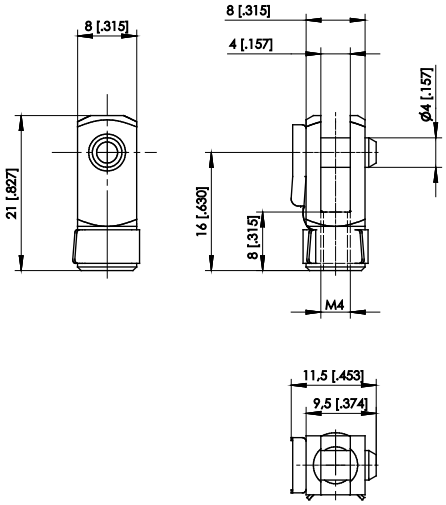
Order code **SR2**

Note: The use of cable pulleys will reduce the lifecycle of the cable, so the use should be avoided whenever it is possible!

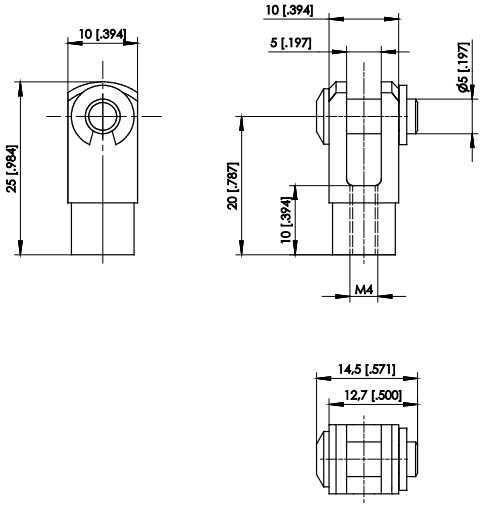
Attachment head GK1 / GK2

The cable attachment head GK1/GK2 can be used in many cases to attach the measurement cable to the moving object, and makes an easy to remove connection.

Order code **GK1**
Metal version

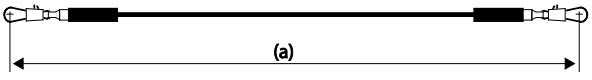


Order code **GK2**
Plastic version
(for isolated installation)



Cable extension SV1

Cable extension for ASM position sensors with cable clip.

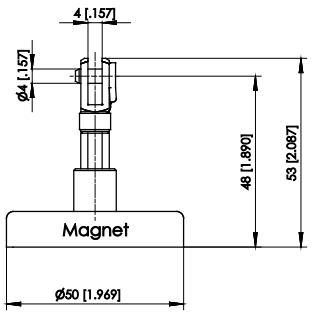


Order code **SV1** — ☐ **M**

Cable length (a) in m (from 0.2 m)

Magnetic clamp MAG1

The magnetic clamp MAG1 is an easy way to fasten the measurement cable to ferromagnetic materials on the moving parts. The user can easily change from one application to another using this device.



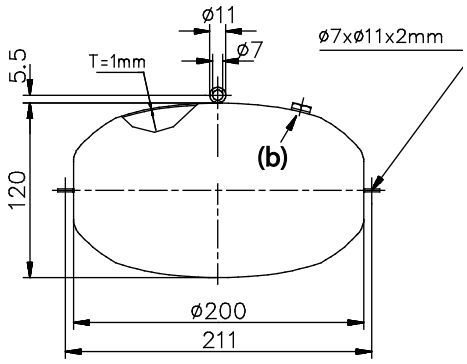
Minimum Adhesive Force: ≥200 N (on bare steel)

Note: Coated surfaces will reduce the adhesive force.

Order code **MAG1**

Float

For best accuracy half the volume of the float has to be immersed in the fluid. The float should be filled with the same or a neutral liquid.



Weight: 1 kg approx.

Material: V4A steel, DIN 1.4571

In running media the float can be stabilized by two guiding cables.

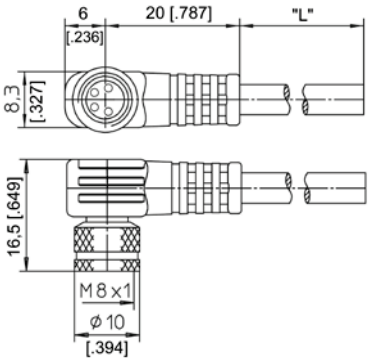
Order code **SCHWIMMER-200MM**

Guiding eye (a), Filler plug M8 (b)

Connector cable M8, 4 pin
(angular coupling)

shielded

The 4-lead shielded cable is supplied with a mating 4-pin 90° M8 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 0.14 mm²



Order code

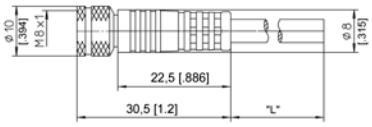
	KAB - xM – M8/4F/W - LITZE
IP69:	**KAB - xM – M8/4F/W/69K - LITZE**

xM = length in m

Connector cable M8, 4 pin
(straight coupling)

shielded

The 4-lead shielded cable is supplied with a mating 4-pin M8 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 0.14 mm²



Order code

	KAB - xM – M8/4F/G - LITZE
IP69:	**KAB - xM – M8/4F/G/69K - LITZE**

xM = length in m

Signal wiring M8, 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^2
Minimum bending radius	10 x cable diameter

Connector cable M12, 4 pin

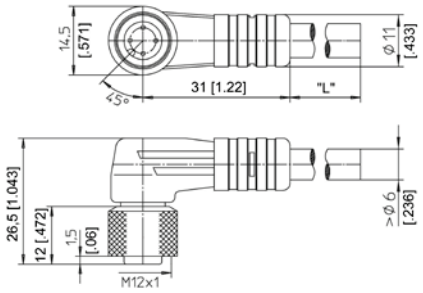
(angular coupling)

M12, 4 pin

shielded connector

Suitable for 5-pin sensor connectors M12A5 and M12R5

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^2
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

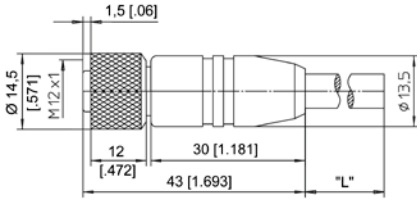
(straight coupling)

M12, 4 pin

shielded connector

Suitable for 5-pin sensor connectors M12A5 and M12R5

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

Applicable for cable carriers

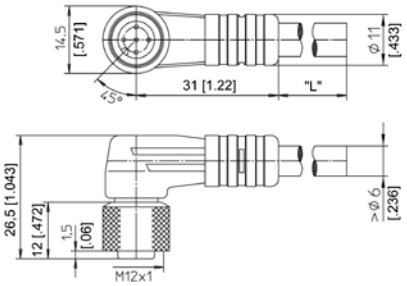
Maximum movement speed	3 m/s
Maximum acceleration	5 m/s^2
Minimum bending radius	10 x cable diameter

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 mm^2
Cable diameter: 5.6 ±0.2 mm



Order code

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

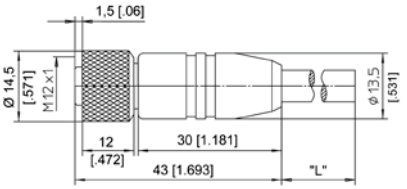
xM = length in m

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^2
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

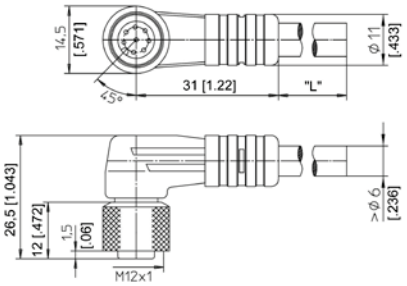
Maximum movement speed	3 m/s
Maximum acceleration	5 m/s^2
Minimum bending radius	10 x cable diameter

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**

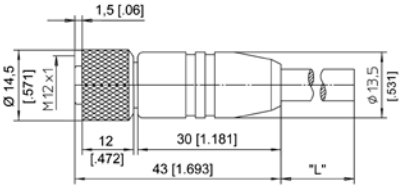
xM = length in m

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

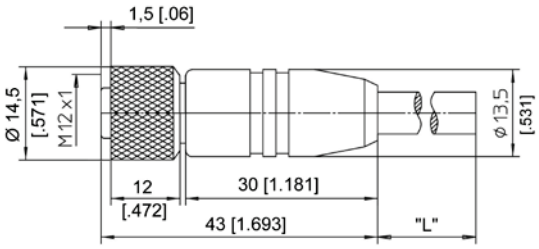
Signal wiring M12, 8 pin	**Plug connection / cable color**							
	1	2	3	4	5	6	7	8
	white	brown	green	yellow	grey	pink	blue	red

Applicable for cable carriers

Maximum movement speed	3 m/s
Maximum acceleration	5 m/s^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-piece for bus cable M12, 5 pin CAN-Bus

Order code:

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

Terminating resistance M12, 5 pin CAN-Bus

Order code:

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

Applicable for cable carriers

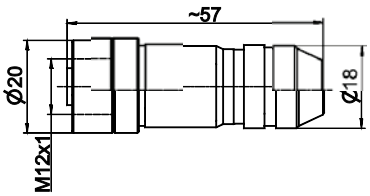
Maximum movement speed	3 m/s
Maximum acceleration	5 m/s^2
Minimum bending radius	10 x cable diameter

Plug-in connectors

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

Order code: **CONN-M12-8F-G**

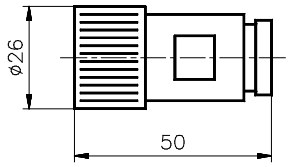
Cable diameter
max. 6 … 8 mm



Plug-in connector CONIN, 12 pin (straight coupling)

Order code: **CONN-CONIN-12F-G**

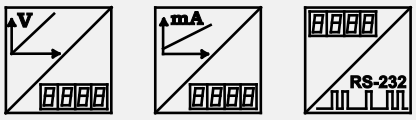
Cable diameter
max. 6 … 8 mm



PRODIS-ADC

Digital Process Meter for sensors with analog output

- **Voltage (e.g. 0 ... 10 V)**
  Current (e.g. 4 ... 20 mA)
  Voltage divider (Potentiometer)
- **Integrated sensor supply**
- **6-digit LED display**
- **RS-232-interface**



Description and specifications

PRODIS®-ADC is designed for use with analog position sensors to display angles and -displacements. A high resolution A/D converter processes signals from sensors with voltage or current output. The meter is programmable to display values within preset start/end range or values in units as inches, mm or degrees. A tare function or programming lock can be activated with two control terminals. Sensor excitation is supplied by the meter. With four membrane keys all parameters can be programmed for the special applications. Optional comparator functions with 4 NPN open-collector output are available, additional 2 of them have relay output.

Specifications

Display	6-digit, 7-segment LED, height 14 mm,
Counting rate	decimal point programmable
Measurement accuracy	1 ... 25/s programmable
Excitation voltage/current	24 V DC ±10%/150 mA, residual ripple 1%SS; 85-250 V AC, 50-60 Hz/180 mA max.
Sensor excitation	24 V DC/300 mA / voltage divider 5 V, 10 mA
Input	Two channels each for: Voltage: 0 ... 10 V; 0.5 … 4.5 V, 0.5 … 10 V, max. 24V, Current: 0...20 mA 3 wires; 4 … 20 mA 2 wires/3 wires Voltage divider R_{min}=500Ω, 0 … 5 V Load 100 Ω, I_{max}<30 mA One input or the difference between both inputs can be chosen by programming.
Control input	2 control inputs 24 V, active low
Comparator output (option)	Relay: 250 V AC/5 A, 30 V DC/5 A NPN: 24 V max./50 mA to GND

Connection	Terminal strip 12 pole, excitation 3 pole
Temperature coefficient	±20 x 10^{-6} / °C
Operating temperature	-10...+40 °C
Storage temperature	-20...+85 °C
Weight	24 V DC: approx. 250 g; 230 V AC: approx. 400 g
Protection class	Front IP60, rear IP40
Humidity	Max. 80 % R. H., non-condensing
Safety of equipment	Directive 2014/35/EU: EN 61010-1:2010
EMC	Directive 2014/30/EU: EN 61326-1:2013

Programmable parameters / value range

Value range offset	-999999 to +999999
Divisor, multiplier	0 to 999999
Other programmable parameters	Decimal point position, display brightness
Control input terminals	Key lock, display value hold, tare function

Interface RS-232

Level	RS-232: ±8 V, galvanically isolated
Data format	1 start bit, 8 data bits, 1 stop bit, no parity
Transmission rate	9600 Baud

Order code

PD-ADC – **1** – **2**

1 Excitation voltage

24VDC = 24 V DC
230VAC = 85 … 230 V AC

2 Options

REL2 = Comparator
DT = Desktop version

Order example

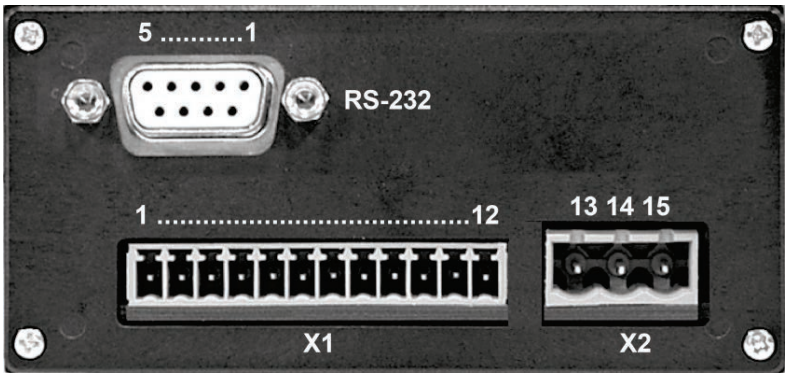
PD – ADC – 24VDC – REL2

Wiring basic unit

Signals	Connector X1 Pin no.	Connector X2 Pin no.
Sensor excitation +UB 24 V	1	
Sensor excitation 0 V (GND)	2	
Control input terminal 1: tare function	3	
Control input terminal 2: programming lock	4	
Voltage input terminal (e.g. 0 ... 10 V), channel 1	5	
Voltage input terminal (e.g. 0 ... 10 V), channel 2	6	
Current input terminal (e.g. 0 ... 20 mA), channel 1	7	
Current input terminal (e.g. 0 ... 20 mA), channel 2	8	
Voltage divider input terminal, channel 1	9	
Voltage divider input terminal, channel 2	10	
Reference voltage 5 V for voltage divider	11	
GND	12	
PD-ADC-24VDC Excitation +24 V Excitation 0 V (GND)		 13 14
PD-ADC-230VAC Excitation Protective ground		 13, 15 14

Signals	D-Sub, pin no.
TxD	2
RxD	3
GND	5

Rear view without comparator output

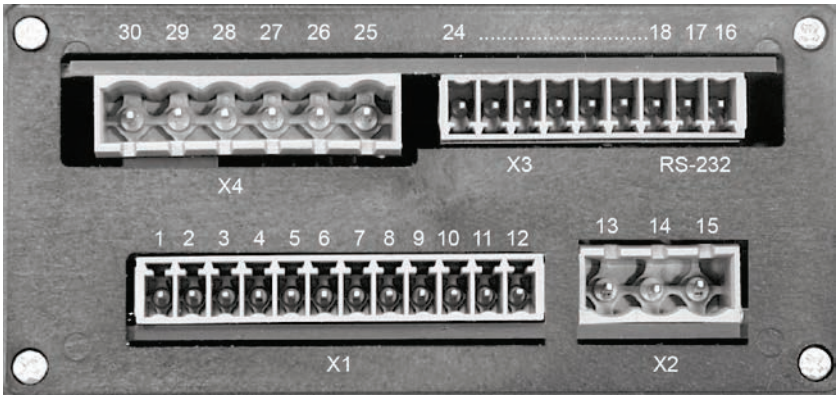


Wiring basic unit

Signals	Connector X1 Pin no.	Connector X2 Pin no.
Sensor excitation +UB 24 V	1	
Sensor excitation 0 V (GND)	2	
Control input terminal 1: tare function	3	
Control input terminal 2: programming lock	4	
Voltage input terminal (e.g. 0 ... 10 V), channel 1	5	
Voltage input terminal (e.g. 0 ... 10 V), channel 2	6	
Current input terminal (e.g. 4 ... 20 mA), channel 1	7	
Current input terminal (e.g. 4 ... 20 mA), channel 2	8	
Voltage divider input terminal, channel 1	9	
Voltage divider input terminal, channel 2	10	
Reference voltage 5 V for voltage divider	11	
GND	12	
PD-ADC-24VDC Excitation +24 V Excitation 0 V (GND)		 13 14
PD-ADC-230VAC Excitation Protective ground		 13, 15 14

Signals	Connector X3 Pin no.
TxD	17
RxD	16
GND	18

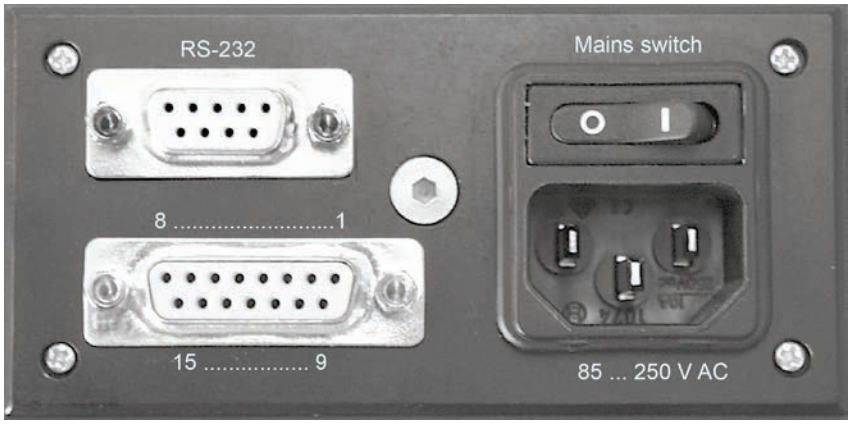
Rear view with comparator output (option „REL2“)



Comparator function (option)

Comparator	Comparator output				
	NPN collector	Connector X3 Pin no.	Relay	Connector X4 Pin no.	LED
Comparator 1	NPN1	20	Relay 1 NO NC Common	 25 27 26	LED1
Comparator 2	NPN2	21	Relay 2 NO NC Common	 28 30 29	LED2
Comparator 3	NPN3	22			
Comparator 4	NPN4	23			
	NPN GND NPN U_8 (+24V)	24 19			

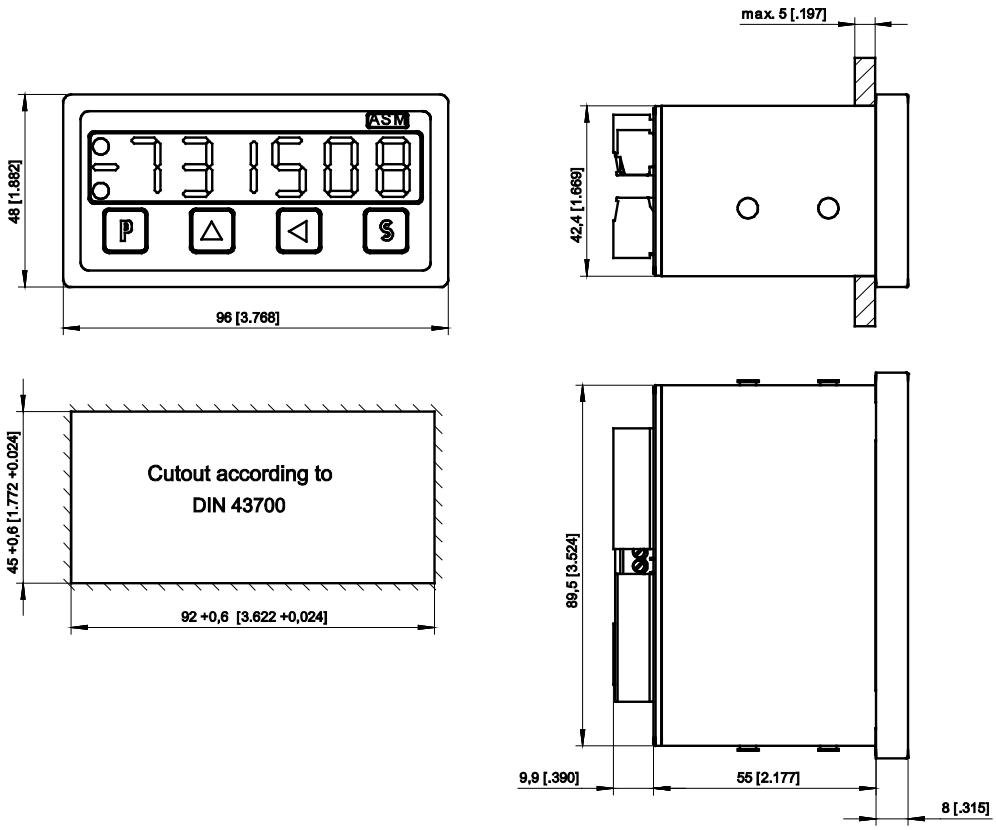
Desktop version (option „DT")



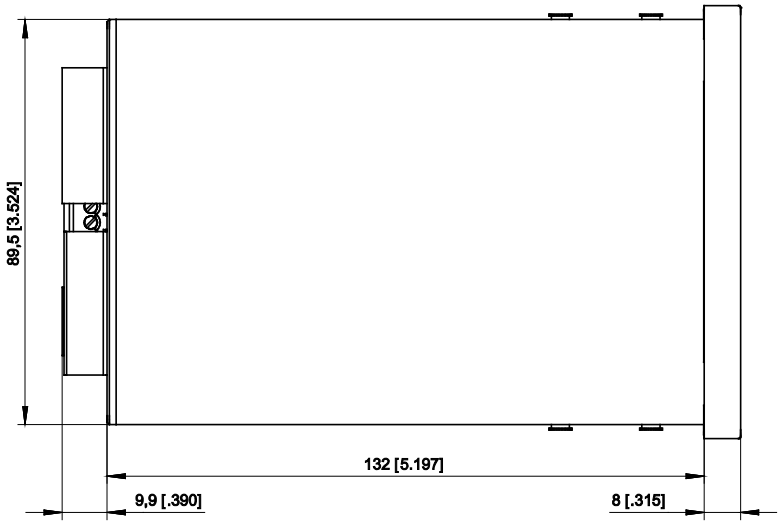
Wiring of connector X1 see table "Wiring basic unit".

Dimensions

PD-ADC-24VDC



PD-ADC-230VAC

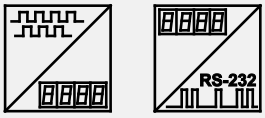


Dimensions in mm [inch]
Dimensions informative only. For guaranteed dimensions consult factory.

PRODIS-INC

Digital Process Meter for position sensors with incremental output

- **Counting rate up to 250 kHz (<1 MHz edge frequency)**
- **Integrated sensor supply**
- **6-digit LED display**
- **RS-232 interface**



Description and specifications

PRODIS®-INC is designed for use with incremental position sensors to display angles and displacements. The fast counter processes 90° phase shifted A, B signals (quadrature signals) for direction and counting information. Sensor excitation is supplied from the meter. With four membrane keys all parameters can be programmed for the special application. A zero signal and a reference signal can be used for calibration of the measurement system. Optional comparator functions with 4 NPN open-collector outputs are available, additional 2 of them have relay output.

Specifications

Display	6-digit, 7-segment LED, height 14 mm, decimal point programmable
Counting frequency	250 kHz max., 1 MHz edge frequency
Excitation voltage/current	24 V DC ±10%/150 mA, residual ripple $1\%_{ss}$; 85-250 V AC, 50-60 Hz/180 mA max.
Sensor excitation	24 V DC/300 mA or 5V DC/500 mA
Inputs	A, B, Z, T (reference signal)
Comparator outputs (option)	Relais: 250 V AC/5 A, 30 V DC/5 A NPN: 24 V max./50 mA to GND
Connection	Terminal strip 12 pole, excitation 3 pole
Temperature coefficient	$\pm 20 \times 10^{-6}$ / °C
Operating temperature	-10...+40 °C
Storage temperature	-20...+85 °C
Weight	24 V DC: approx. 250 g; 230 V AC: approx. 400 g
Protection class	Front IP60, rear IP40
Humidity	Max. 80 % R.H., non condensing
Safety of equipment	Directive 2014/35/EU: EN 61010-1:2010
EMC	Directive 2014/30/EU: EN 61326-1:2013

Programmable parameters / value range

Value range display, offset, limit values	-999999 to +999999
Divisor, Multiplier	0 to 999999
Other programmable parameters	Counting direction, decimal point position, last-value memory, Z signal evaluation, display brightness
Signal T	Manual zero, key lock, display value hold, Z release, relative measurement activation

Interface RS-232

Level	RS-232: ±8 V, galvanically isolated
Data format	1 start bit, 8 data bits, 1 stop bit, no parity
Transmission rate	4800 / 9600 / ... / 115200 Baud

Order code

PD-INC – **1** – **2** – **3** – **4**

1 Excitation voltage

24VDC = 24 V DC
230 VAC = 85 … 230 V AC

2 Sensor excitation voltage

G24V = 24 V DC
G5V = 5 V DC

3 Sensor signal

HTL = HTL level with excitation voltage G24V
TTL = TTL level with excitation voltage G5V or G24V

4 Options

REL2 = Comparator
DT = Desktop version

Order example

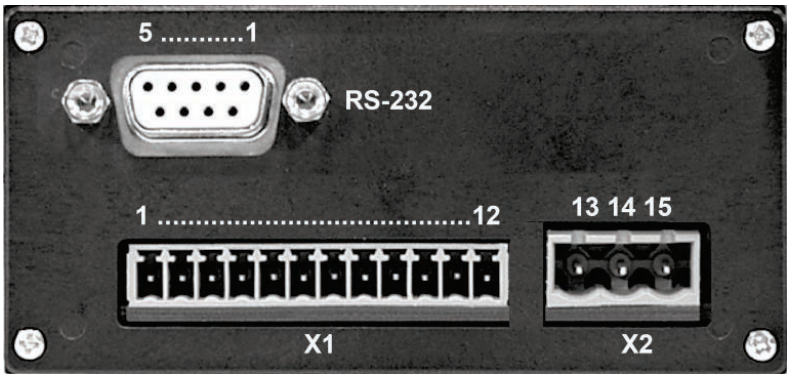
PD – INC – 24VDC – G24V – HTL – REL2

Wiring basic unit

Signals	Connector X1 Pin no.	Connector X2 Pin no.
Sensor excitation $+U_B$	1	
Sensor excitation 0 V (GND)	2	
Signal A	4	
Signal $\overline{A}$	5	
Signal B	6	
Signal $\overline{B}$	7	
Signal Z (zero signal)	8	
Signal $\overline{Z}$ (zero signal)	9	
Signal T (reference signal)	10	
Signal $\overline{T}$ (reference signal)	11	
GND	12	
PD-INC-24VDC Excitation +24 V Excitation 0 V (GND)		 13 14
PD-INC-230VAC Excitation Protective ground		 13, 15 14

Signals	D-Sub Pin no.
TxD	2
RxD	3
GND	5

Rear view without comparator output

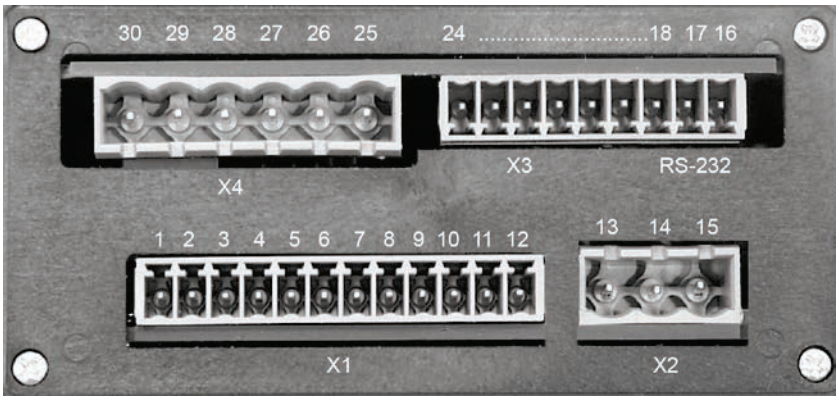


Wiring basic unit

Signals	Connector X1 Pin no.	Connector X2 Pin no.
Sensor excitation +U_B	1	
Sensor excitation 0 V (GND)	2	
Signal A	4	
Signal $\overline{A}$	5	
Signal B	6	
Signal $\overline{B}$	7	
Signal Z (zero signal)	8	
Signal $\overline{Z}$ (zero signal)	9	
Signal T (reference signal)	10	
Signal $\overline{T}$ (reference signal)	11	
GND	12	
PD-ADC-24VDC Excitation +24 V Excitation 0 V (GND)		 13 14
PD-ADC-230VAC Excitation +24 V Protective ground		 13, 15 14

Signals	Connector X3 Pin no.
TxD	17
RxD	16
GND	18

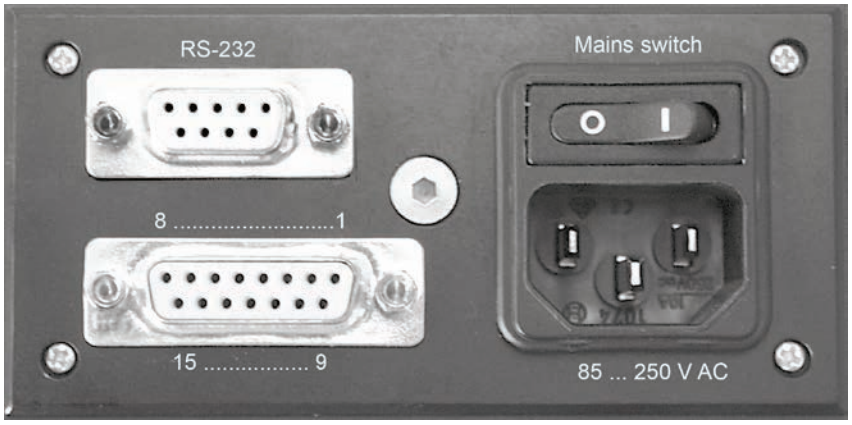
Rear view with comparator output (option „REL2“)



Comparator function (option)

Comparator	Comparator output				
	NPN collector	Connector X3 Pin no.	Relay	Connector X4 Pin no.	LED
Comparator 1	NPN1	20	Relay 1 NO NC Common	 25 27 26	LED1
Comparator 2	NPN2	21	Relay 2 NO NC Common	 28 30 29	LED2
Comparator 3	NPN3	22			
Comparator 4	NPN4	23			
	NPN GND NPN U_8 (+24V)	24 19			

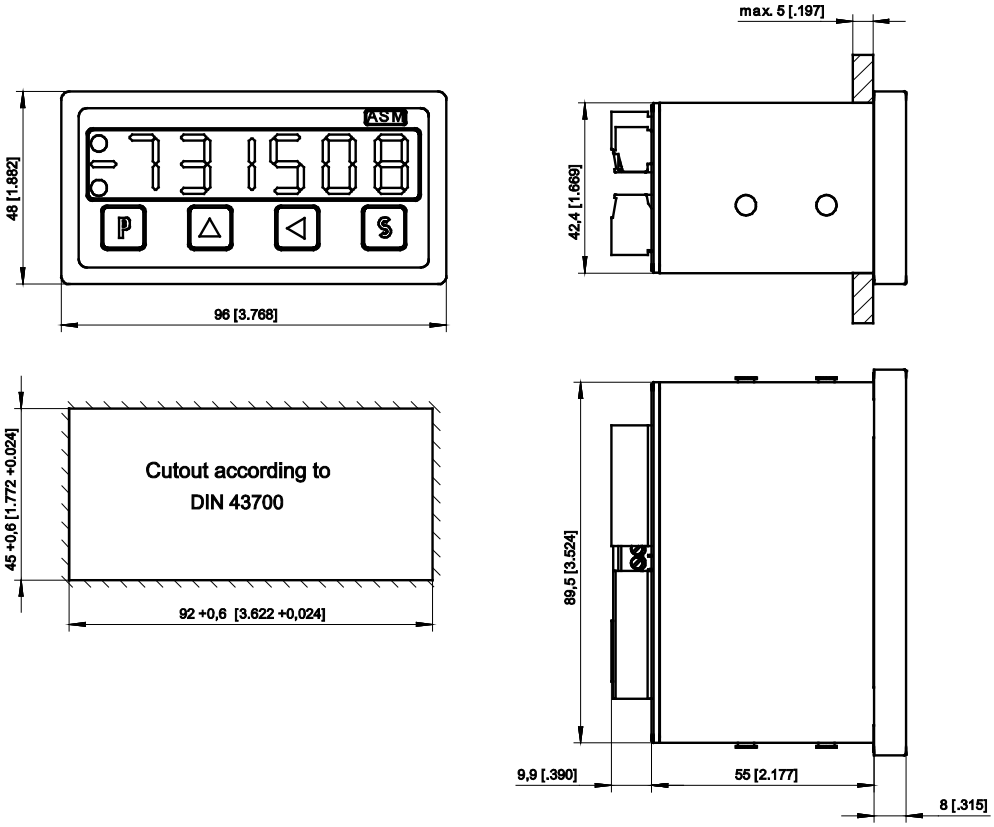
Desktop version (option „DT”)



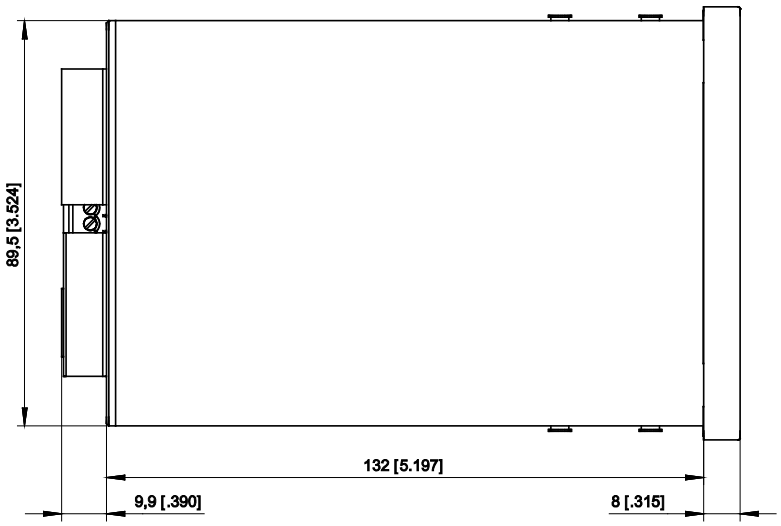
Wiring of connector X1 see table “Wiring basic unit”.

Dimensions

PD-INC-24VDC



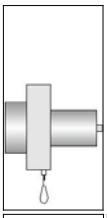
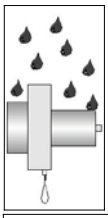
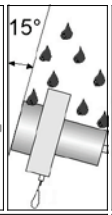
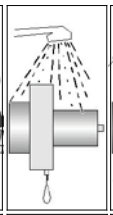
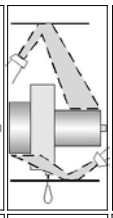
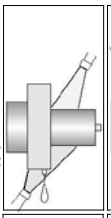
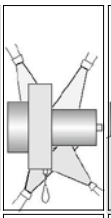
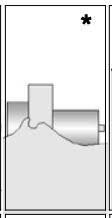
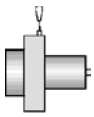
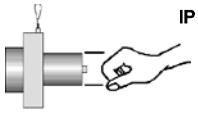
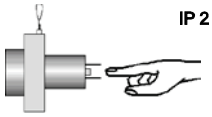
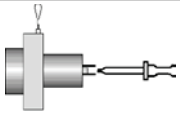
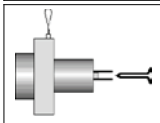
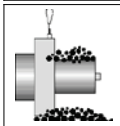
PD-INC-230VAC



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

General Information

Protection Classes according to DIN EN 60529

2nd char. numeral: Protection against ingress of water / 1nd char. numeral: Protection against solid foreign objects								 *	 *
Protection against...	Not protected	Falling water drops vertical / 15°		Spraying water	Splashing water	Water jets	Powerful water jets	Temporary immersion	Continuous immersion
DIN EN 60529	IP .. 0	IP .. 1	IP .. 2	IP .. 3	IP .. 4	IP .. 5	IP .. 6	IP .. 7	IP .. 8
IP 0 ..  Not protected	IP 00								
IP 1 ..  Solid foreign objects diameter ≥ 50 mm	IP 10	IP 11	IP 12						
IP 2 ..  Solid foreign objects diameter ≥ 12,5 mm	IP 20	IP 21	IP 22	IP 23					
IP 3 ..  Solid foreign objects diameter ≥ 2,5 mm	IP 30	IP 31	IP 32	IP 33	IP 34				
IP 4 ..  Solid foreign objects diameter ≥ 1 mm	IP 40	IP 41	IP 42	IP 43	IP 44				
IP 5 ..  Dust-protected	IP 50		IP 52	IP 53	IP 54	IP 55	IP 56		
IP 6 ..  Dust-tight	IP 60				IP 64	IP 65	IP 66	IP 67	IP 68*

* Depth and duration of immersion must be specified!

ASM Product Catalogs

POSIWIRE® – Cable Extension Position Sensors

POSITAPE® – Tape Extension Position Sensors

POSICHRON® – Magnetostrictive Position Sensors

POSIMAG® – Magnetic Band Position Sensors

POSIROT® – Magnetic Angle Sensors and Encoders
POSIHALL® – Magnetic Multiturn Angle Sensors

POSITILT® – Inclinometers

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