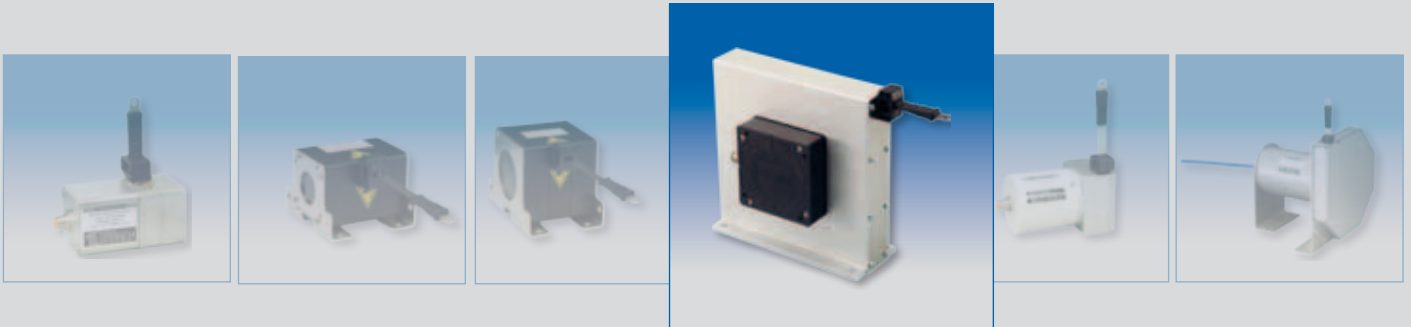




perfect in sensors.



POSITAPE[®]

Tape Extension
Position Sensors
Product Catalog

POSITAPE® – Tape Extension Position Sensors

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ASM is a leading company in the development and production of linear and angular position sensors. ASM sensors are used in industrial and commercial applications, where angle, inclination, displacement or position measurements are used to automate, test or monitor processes.

Innovative Technologies that solve your Measuring Requirements

Our product range consists of various technologies to measure linear and rotative positions. With over 33 years of experience in the position sensor market, ASM offers innovative solutions for the most demanding applications.

ASM Products Represent Quality and Reliability

The quality and precision of our products ensures consistent productivity. Our continuous research and development in our laboratories as well as our DIN EN ISO 9001:2008 certified quality management system guarantee these high standards.

ASM – Global Supplier of Position Sensors

ASM products are sold world-wide through sales offices, subsidiaries and a network of 50 distributors. With this global presence we ensure being close to our customers and provide quick product availability wherever ASM sensors are needed.

The 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
- **POSITILT®** Inclination Sensors
- **PRODIS®** Digital Process Displays

The design of a POSITAPE® sensor

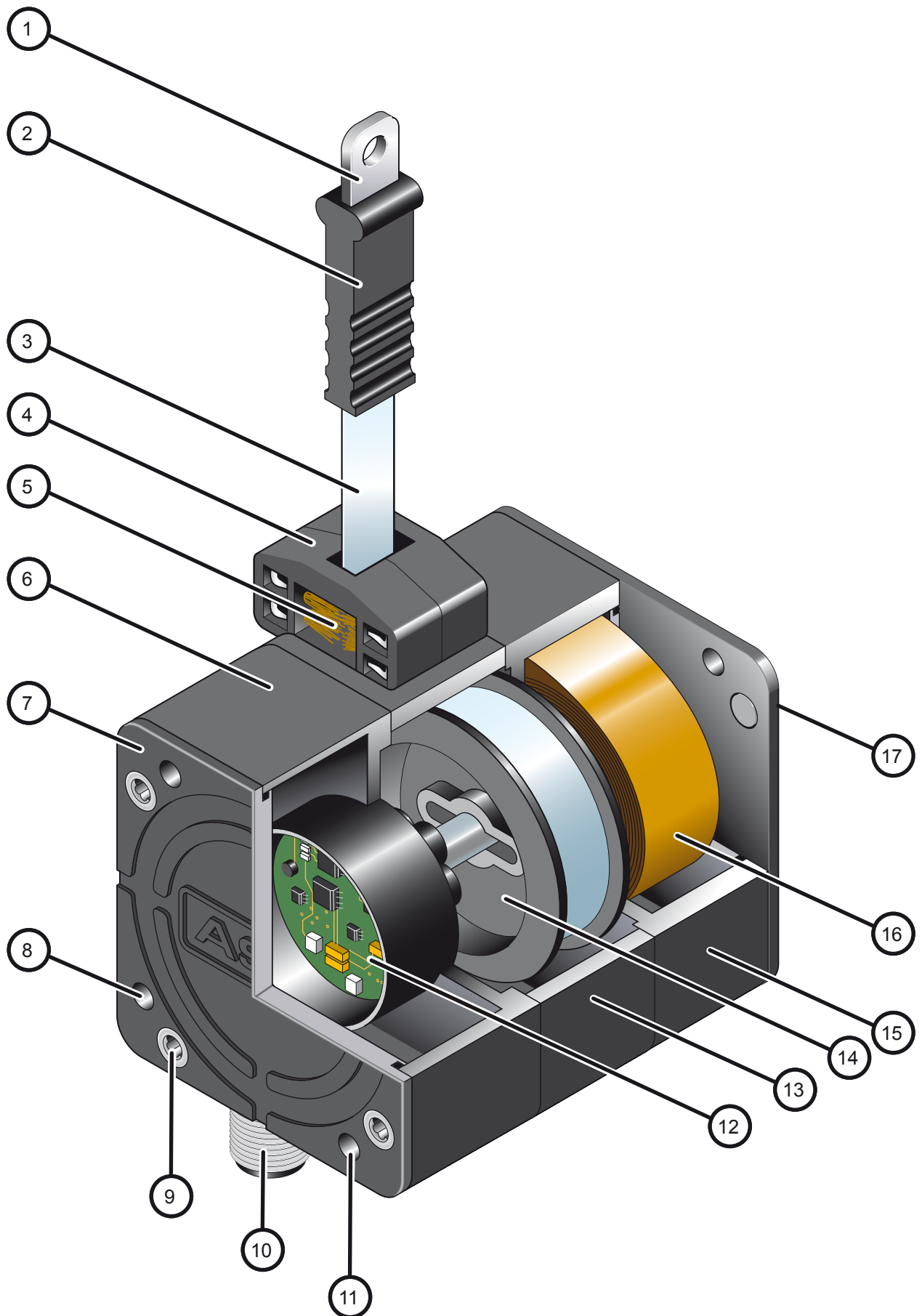
A POSITAPE® Sensor consists of a housing with dust wipers and a connector, and a moving measuring tape with a tape stopping element. The basic internal components are a drum, a flat spring, and a magnetic absolute multiturn encoder with the signal conditioner.

The measuring tape is wound onto the drum spirally in a single radial level, layer by layer without any gap. The tension element consists of a flat coil spring which is coupled coaxially to or integrated into the drum.

An angle sensing device – connected with the drum for co-rotation – counts the angle segments of the drum and sends them to the subsequent signal conditioners. The electronics determines the tape length from the retracted angle segments by considering the alternating length of a single winding according to the number of the windings on the drum.

The variable winding length is measured with the Teach-In-operation, when the measuring tape is being completely retracted from the drum in defined length segments.

- 1... Measuring tape clip
- 2... Elastic tape stopping element
- 3... Measuring tape
- 4... Tape inlet with dust wiper
- 5... Open dust wiper
- 6... Sealed encoder housing
- 7... Cover sealed with an O-ring
- 8... Drilling for mounting brackets
- 9... Clamping screws
- 10... Connector (90° rotation)
- 11... Screw passage for mounting brackets
- 12... Magnetic Absolute Multiturn Encoder
- 13... Drum housing with outlet drillings for water
- 14... Drum
- 15... Spring housing
- 16... Flat spring
- 17... Cover sealed with an O-ring



The limitations of the cable principle

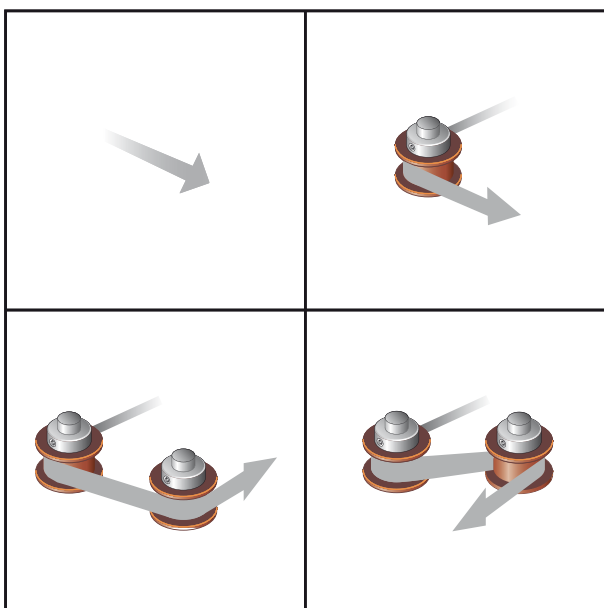
The use of the Cable Extension Position Sensors is limited by the cable lifetime (under extreme operating conditions), especially when the cable has to be guided through a single or multiple cable pulleys due to space constraints.

„Cable pulleys are cable killers“

This statement refers to the extreme reduction of the cable lifetime in case of pulleys. The logical conclusion is that the use of pulleys should be avoided whenever possible.

Due to the fact that the cable lifetime of the sensors based on the wire principle is limited with the use of pulleys, the Cable Extension Position Sensors are not suitable for some sorts of special applications.

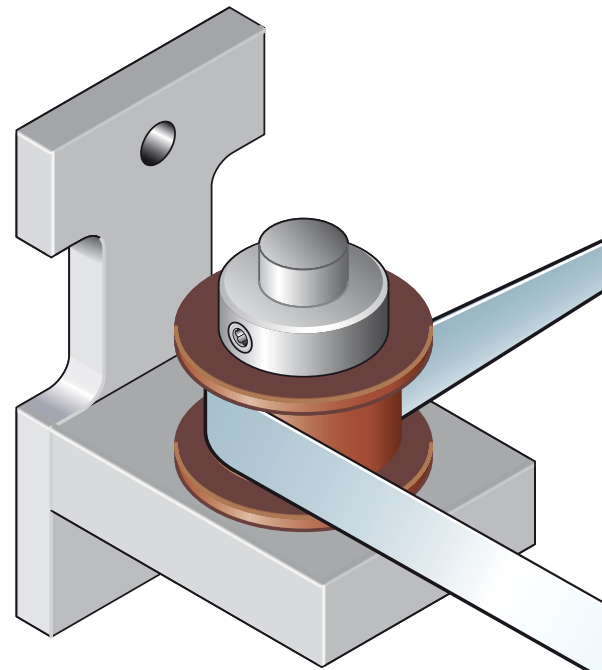
The reliability of the sensors in applications, where safety is a major consideration, is of paramount importance. However, it cannot always be guaranteed in case of pulley guided cables.



Measuring tape

Alternatively, instead of using a cable, the measurement range can be defined by means of the pull-out length of a steel tape which is wound on a precision drum coupled to an angular sensing device. Markings placed on the measuring tape, for instance uniformly arranged perforations, can be counted by this device and converted into position values.

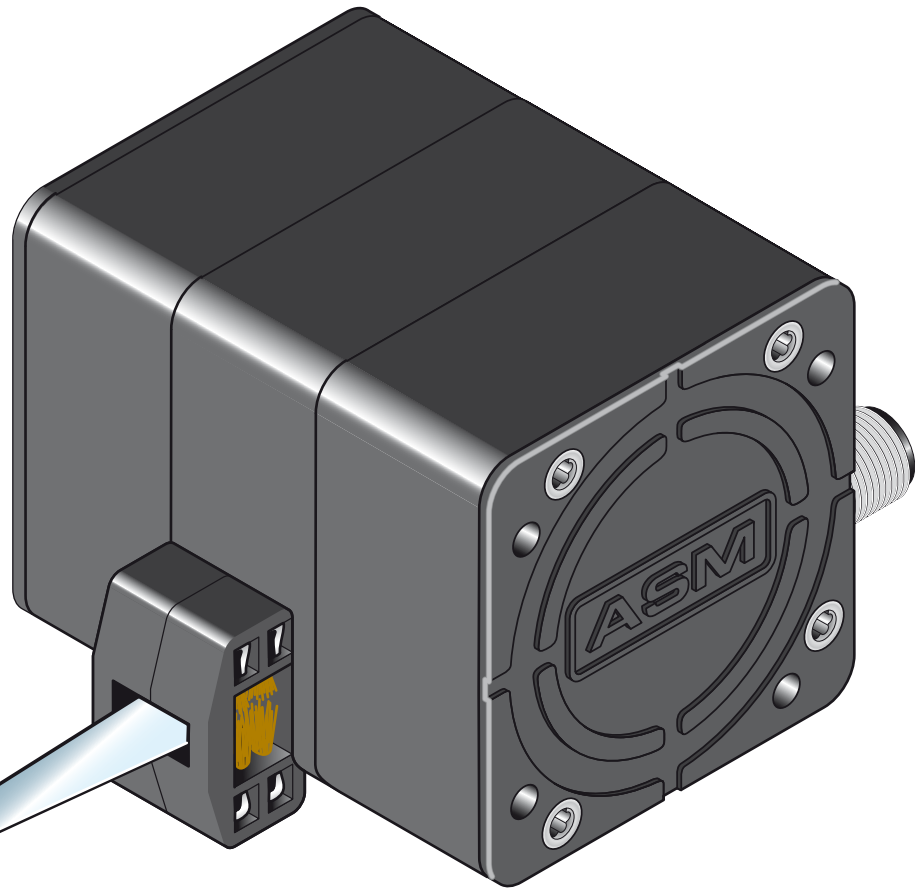
The disadvantage of this solution lies in the use of the special measuring tape furnished with markings, the structure of which must be maintained over a long time period and sustain numerous on/off windings.



However, a tape with the features described above cannot be realised at present with the required lifetime.

If some sections of the tape differ mechanically due to perforation, camber, tothing, printing etc. in/on the tape surface, they are subject to intense mechanical wear and have therefore a strongly reduced lifetime.

On the contrary, a very thin tape manufactured of an extremely tight stainless steel and without any mechanical marking, i.e. without any mechanical amendment, offers a very long lifetime.



In contrast to the tapes with integral marking, the tape length is defined by means of the analog or digital angular sensing device such as a potentiometer or encoder. This angular sensor/encoder is directly coupled to the drum and measures the angle of rotation with which the tape is being wound around the drum. The measuring tape remains unchanged, i.e. without any perforation or camber etc. and thus can neither be impaired nor destroyed by mechanical stress.

Unless the measuring tape has been damaged by external influence like e.g. bending or notches, its lifetime will be significantly longer as that of a cable, even when using multiple pulleys.

Why POSITAPE® Position Sensors?

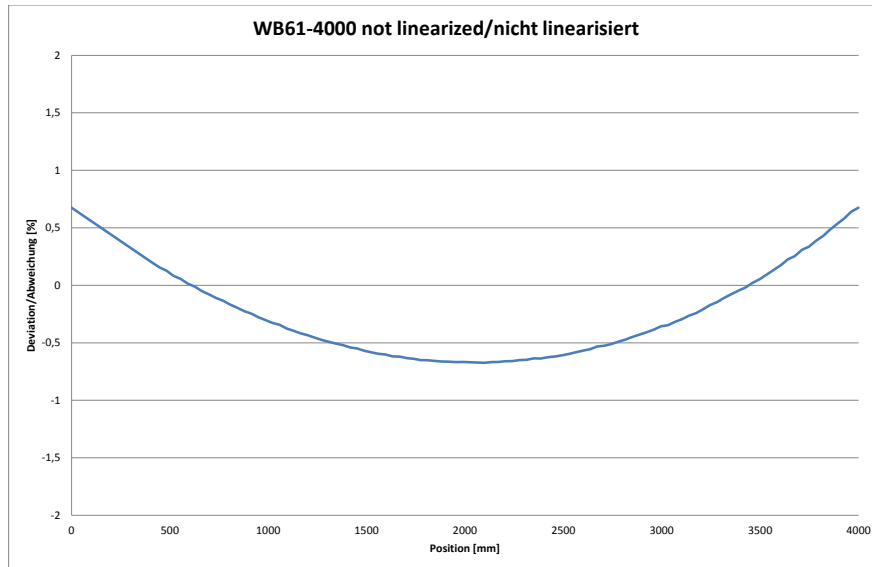
Apart from the extreme long lifetime of the measuring tape, sensors for special application, as in harsh environments and tight locations, must have a compact narrow axial design. For such applications the POSITAPE® Position Sensors offer visible advantages.

The axial width of a tape sensor housing (POSITAPE® Sensor) can be reduced due to the fact that the tape is wound spirally on the drum in a single radial level, like an Archimedean spring, layer by layer without any gap, and not axially side by side.

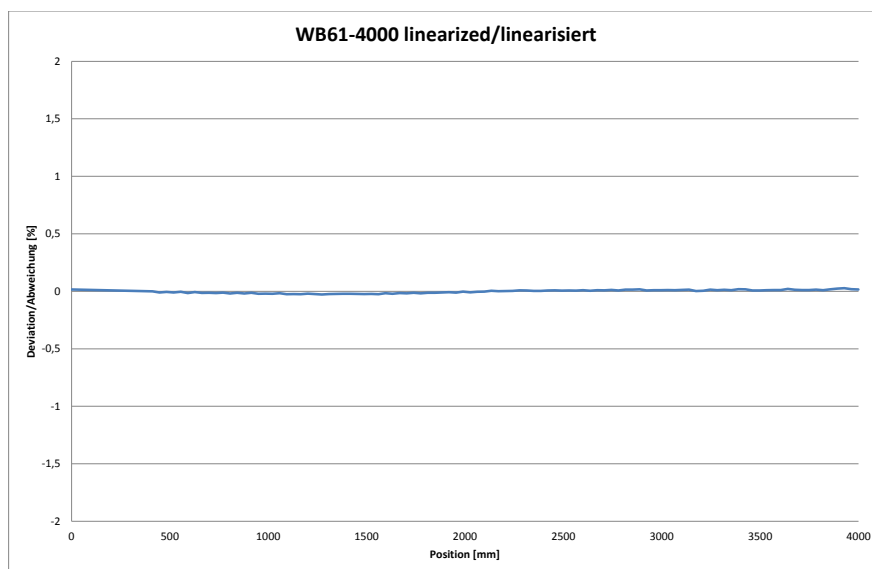
An apparently disadvantage for this design is the fact that the circumference of a 360° angle movement grows with each winding, i.e. the drum diameter increases. This effect can be easily eliminated by the use of electronics.

To exactly define the retraction length of the measuring tape, the sensor applies the subsequent electronics which assigns a (not always equal) tape length to a defined rotation angle of the drum, also taking into consideration the instantaneous number of windings. Thus the actual measurement range is defined by the electronic linearization.

Example of a WB61 sensor (not linearized)



Example of a WB61 sensor (linearized)






Very low wear of the measuring tape due to the lack of internal abrasion (as in case of cables). Due to the **virtually unlimited life** of the metal tape the use of (multiple) pulleys is possible. **Compact design** in comparison to cable actuated sensors – the tape is wound in only a single layer around a cable drum.

Easy cleaning - external brushes wipe off debris from the measuring tape. **Low risk of ice build up** and ice accumulation due to the extremely smooth surfaces of the tape. No plastic jacket necessary for tape protection (plastic jacket of measuring cables deteriorates due to water absorption). The measuring **tape cannot skip on the drum** (important when exceeding the acceleration values). **Low danger** of injury due to the **rounded tape edges**. High stability / weight ratio: advantageous for almost all applications and an imperative requirement in case of a minor deflection/deformation. **Resistant against extreme** temperatures, corrosive media and humidity. The wear of the steel tape can be easily monitored, which means the **reduced necessity of the maintenance** of the sensor.

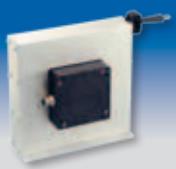

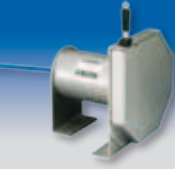
Clean: as opposed to cable actuated sensors, steel tapes make **no abrasion** and are thus **ideal** for applications in food industry, pharmaceutical industry and clean-room technology. **Precise performance**: the steel tape features very **close tolerances**. This precision is crucial for linearity and repeatability.

POSITAPE® - Tape Extension Position Sensors

Guide of selection

Selection features	Model			
		WB10ZG	WB61	WB85
Measurement range 0 to ... [mm]				
250	●			
375	●			
500	●			
750	●			
1,000	●			
1,250	●			
1,500	●	●		
2,000	●	●		
2,500		●		
3,000		●		
3,500		●		
4,000		●		
5,000			●	
6,000			●	
7,500				
8,000				
10,000				
12,500				
15,000				
17,500				
20,000				
Analog outputs, absolute				
Voltage 0.5 ... 10 V	●	●	●	
Voltage 0.5 ... 4.5 V	●	●	●	
Current 4 ... 20 mA	●	●	●	
Redundant version (optional)		●	●	
Digital outputs, absolute				
SSI	●	●	●	
CANopen	●	●	●	
CAN SAE J1939	●	●	●	
Linearity				
standard	±0.10 %	±0.10 %	±0.10 %	
optional (for meas. ranges ≥ 1000 mm)	±0.05 %	±0.05 %	±0.05 %	
Protection class				
standard	IP65	IP67	IP67	
optional	–	IP67/IP69K*	IP67/IP69K*	

* = with a suitable IP67/IP69K connector

  			Model	Selection features
WB21	WB12	WB100M		
				Measurement range 0 to ... [mm]
	●		250	
	●		375	
	●		500	
	●		750	
	●		1,000	
	●		1,250	
	●		1,500	
	●	●	2,000	
	●		2,500	
	●		3,000	
	●	●	3,500	
	●		4,000	
			5,000	
			6,000	
		●	7,500	
●			8,000	
●		●	10,000	
●			12,500	
●			15,000	
●			17,500	
●			20,000	
				Analog outputs, absolute
●	●	●	Voltage 0.5 ... 10 V	
●	●	●	Voltage 0.5 ... 4.5 V	
●	●	●	Current 4 ... 20 mA	
●	●	●	Redundant version (optional)	
				Digital outputs, absolute
●	●	●	SSI	
●	●	●	CANopen	
●	●	●	CAN SAE J1939	
				Linearity
±0.10 %	±0.10 %	±0.10 %	standard	
±0.05 %	±0.05 %	±0.05 %	(for meas. ranges ≥ 1000 mm) optional	
				Protection class
IP67	IP67	IP68/IP69K	standard	
IP67/IP69K*	IP67/IP69K*	–	optional	

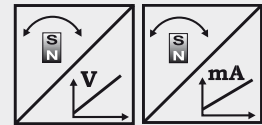
* = with a suitable IP67/IP69K connector

POSITAPE®
WB10ZG
Analog output



Position sensor with measuring tape

- Measurement range up to 2000 mm
- Protection class IP65
- Stainless steel measuring tape
- Analog output



Specifications	Outputs	U2	Voltage 0.5 ... 10 V
		U8	Voltage 0.5 ... 4.5 V
		I1	Current 4 ... 20 mA, 3 wire
	Resolution		<0,05 mm
	Linearity		±0.10 % f. s.; optional ±0.05 %
	Sensing device		Magnetic absolute encoder
	Material		Zinc diecast, aluminium, plastic and stainless steel; Tape: stainless steel, 10 mm wide, 0.08 mm thick
	Protection class		IP65 (with mating connector)
	Connection		Connector M12, 5 pin
	Shock		EN 60068-2-27:1993, 100 g/11 ms, 100 shocks
	Vibration		EN 60068-2-6:1995, 20 g 10 Hz-2 kHz, 10 cycles
	EMC, temperature		Refer to output specification

Order code WB10ZG



Model name

Measurement range (in mm)

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

Output

- U2 = 0.5 ... 10 V signal conditioner
- U8 = 0.5 ... 4.5 V signal conditioner
- I1 = 4 ... 20 mA signal conditioner

Signal characteristics

- A = increasing (eg. 4 ... 20 mA)
- D = decreasing (eg. 20 ... 4 mA)

Linearity

- L10 = ±0.10 %
- L05 = ±0.05 % (optional, only for measurement ranges ≥1000 mm)

Connection

M12A5 = Connector M12, 5 pin

Dust wiper

BAB1

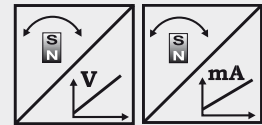
Order code connector cable see page 62

Order example: WB10ZG - 1250 - U2 - A - L10 - M12A5 - BAB1



Position sensor with measuring tape

- Measurement range up to 2000 mm
- Protection class IP65
- Stainless steel measuring tape
- Analog output, programmable



Specifications	Output	U2/PMU U8/PMU I1/PMU	Voltage 0.5 ... 10 V, programmable Voltage 0.5 ... 4.5 V, programmable Current 4 ... 20 mA, 3 wire, programmable
	Resolution		
Linearity			±0.10 % f. s.; optional ±0.05 %
Sensing device			Magnetic absolute encoder
Material			Zinc diecast, aluminium, plastic and stainless steel; Tape: stainless steel, 10 mm wide, 0.08 mm thick
Protection class			IP65 (with mating connector only)
Connection			Connector M12, 5 pin
Shock			EN 60068-2-27:1993, 100 g/11 ms, 100 shocks
Vibration			EN 60068-2-6:1995, 20 g 10 Hz-2 kHz, 10 cycles
EMC, temperature			Refer to output specification

Order code WB10ZG



Model name

Measurement range (in mm)

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

Output

- U2/PMU = 0.5 ... 10 V signal conditioner, programmable
- U8/PMU = 0.5 ... 4.5 V signal conditioner, programmable
- I1/PMU = 4 ... 20 mA signal conditioner, programmable

Signal characteristics

- A = increasing (eg. 4 ... 20 mA)
- D = decreasing (eg. 20 ... 4 mA)

Linearity

- L10 = ±0.10 %
- L05 = ±0.05 % (optional, only for measurement ranges ≥1000 mm)

Connection

M12A5 = Connector M12, 5 pin

Dust wiper

BAB1

Order code connector cable see page 63

Order example: WB10ZG - 2000 - U2/PMU - A - L10 - M12A5 - BAB1

POSITAPE®
WB10ZG
Digital output SSI



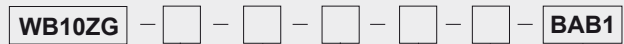
Position sensor with measuring tape

- Measurement range up to 2000 mm
- Protection class IP65
- Stainless steel measuring tape
- Digital output SSI



Specifications	Outputs	Synchronous serial interface (SSI)
	Resolution	up to 10 µm
	Linearity	±0.10 % f. s.; optional ±0.05 %
	Sensing device	Magnetic absolute encoder
	Material	Zinc diecast, aluminium and plastic Tape: stainless steel, 10 mm wide, 0.08 mm thick
	Protection class	IP65 (with mating connector only)
	Connection	Connector M12, 8 pin
	Shock	EN 60068-2-27:1993, 100 g/11 ms, 100 shocks
	Vibration	EN 60068-2-6:1995, 20 g 10 Hz-2 kHz, 10 cycles
	EMC, temperature	Refer to output specification

Order code WB10ZG



- Model name**
- Measurement range (in mm)**
1000 / 2000
- Resolution (in µm)**
10 / 50 / 100
- Outputs**
MSSI = SSI synchronous serial interface
- Linearity**
L10 = ±0.10%
L05 = ±0.05% (optional)
- Connection**
M12A8 = Connector M12, 8 pin
- Dust wiper**
BAB1

Order code connector cable see page 64

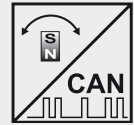
Order example: WB10ZG - 2000 - 100 - MSSI - L10 - M12A8 - BAB1

POSITAPE®
WB10ZG
Digital output CANopen



Position sensor with measuring tape

- Measurement range up to 2000 mm
- Protection class IP65
- Stainless steel measuring tape
- Digital output CANopen or CAN SAE J1939



Specifications	Outputs	CANopen or CAN SAE J1939
	Resolution	setting via CAN Bus
	Linearity	±0.10 % f. s.; optional ±0.05 %
	Sensing device	Magnetic absolute encoder
	Material	Zinc diecast, aluminium, plastic and stainless steel; Tape: stainless steel, 10 mm wide, 0.08 mm thick
	Protection class	IP65 (with mating connector only)
	Connection	Connector M12, 5 pin
	Shock	EN 60068-2-27:1993, 100 g/11 ms, 100 shocks
	Vibration	EN 60068-2-6:1995, 20 g 10 Hz-2 kHz, 10 cycles
	EMC, temperature	Refer to output specification

Order code WB10ZG

WB10ZG - [] - [] - [] - [] - **BAB1**

Model name

Measurement range (in mm)

1000 / 2000

Output

MCANOP = CANopen

MCANJ1939 = CAN SAE J1939

Linearity

L10 = 0.10%

L05 = 0.05% (optional)

Connection

M12/CAN = Connector M12, 5 pin

Dust wiper

BAB1

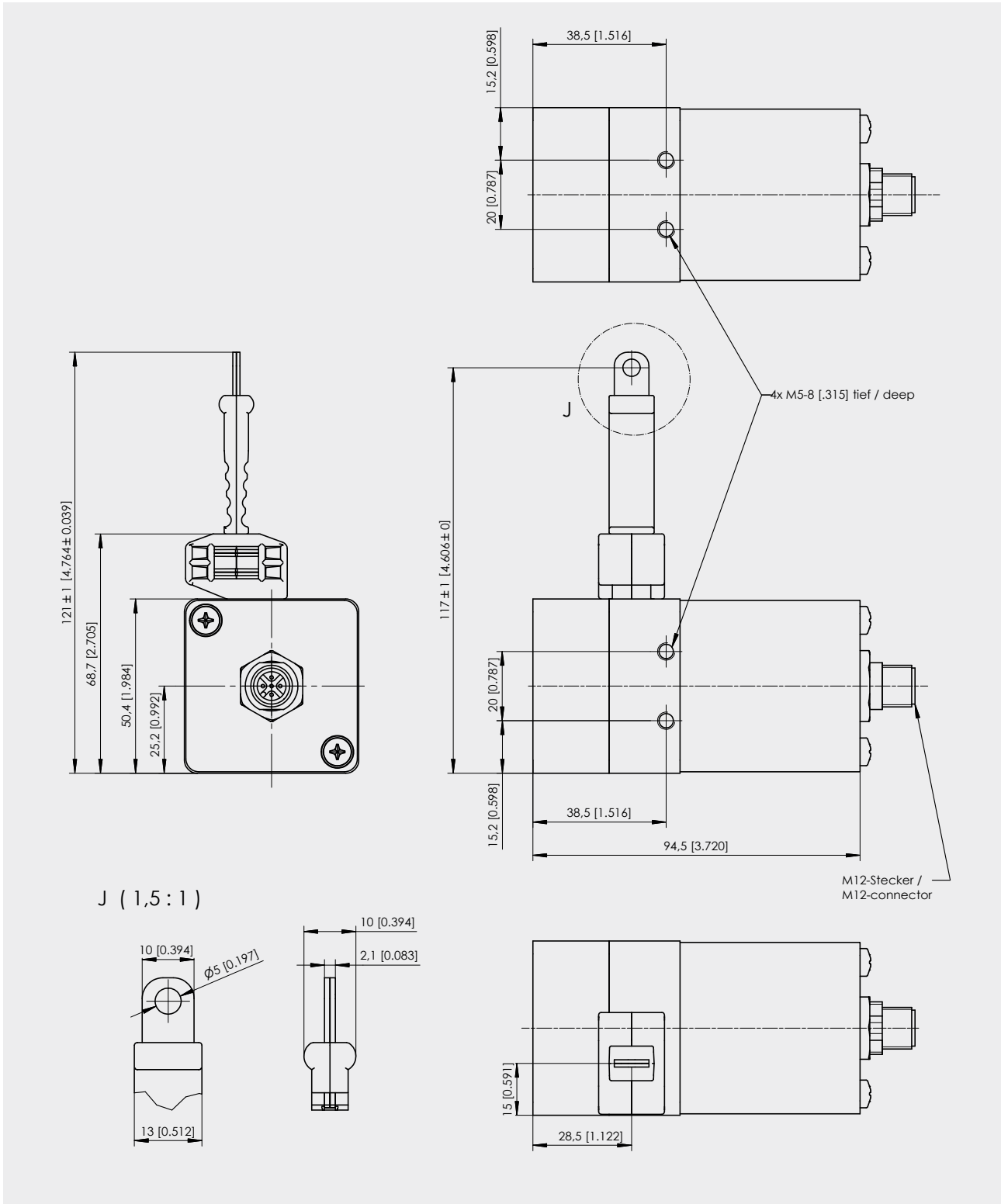
Order code connector cable see page 65

Order example: WB10ZG - 2000 - MCANOP - L10 - M12/CAN - BAB1

POSITAPE®
WB10ZG
Analog or digital output



Outline drawing WB10ZG
 up to 1000 mm



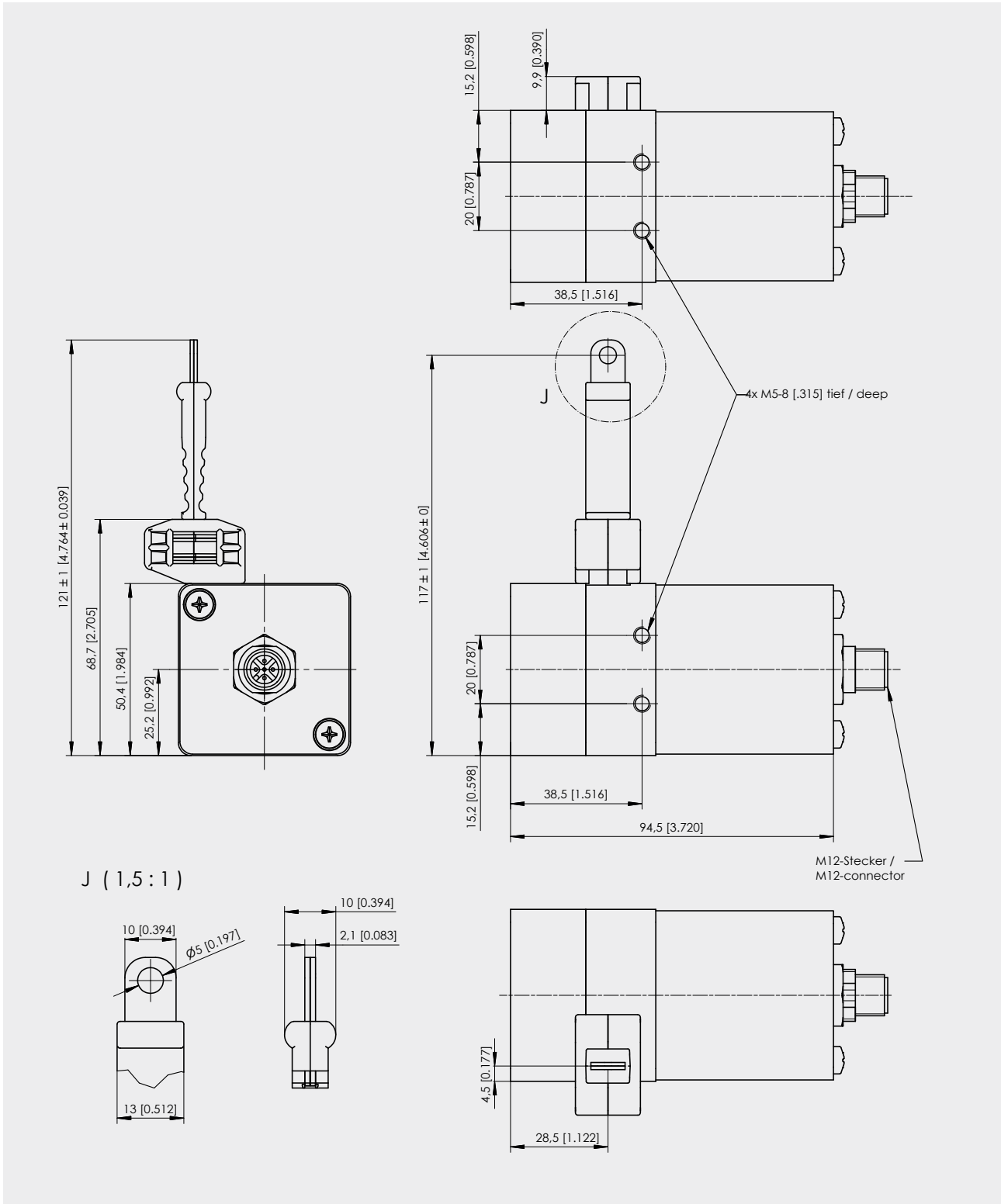
Dimensions in mm [inch]

Dimensions informative only.
 For guaranteed dimensions consult factory.

POSITAPE®
WB10ZG
Analog or digital output



Outline drawing WB10ZG
 1250 ... 2000 mm



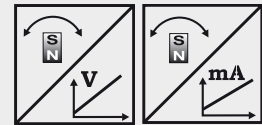
Dimensions in mm [inch]

Dimensions informative only.
 For guaranteed dimensions consult factory.



Position sensor with measuring tape

- Measurement range up to 4000 mm
- Protection class IP67/IP69K
- Steel measuring tape
- Analog output



Specifications	Outputs	U2	Voltage 0.5 ... 10 V
		U8	Voltage 0.5 ... 4.5 V
		I1	Current 4 ... 20 mA, 3 wire
	Resolution		<0.05 mm
	Linearity		±0.10 % f. s.; optional ±0.05 %
	Sensing device		Magnetic absolute encoder
	Material		Plastic and stainless steel; Tape: stainless steel, 10 mm wide, 0.08 mm thick
	Protection class		IP67/IP69K, with mating connector
	Connection		Connector M12, 5 pin
	Shock		EN 60068-2-27:1993, 100 g/11 ms, 100 shocks
	Vibration		EN 60068-2-6:1995, 20 g 10 Hz-2 kHz, 10 cycles
	EMC, temperature		Refer to output specification

Order code WB61



Model name

Measurement range (in mm)

1500 / 2000 / 2500 / 3000 / 3500 / 4000

Output

- U2 = 0.5 ... 10 V signal conditioner
- U8 = 0.5 ... 4.5 V signal conditioner
- I1 = 4 ... 20 mA signal conditioner

Signal characteristics

- A = increasing (eg. 4 ... 20 mA)
- D = decreasing (eg. 20 ... 4 mA)

Linearity

- L10 = ±0.10 % (standard)
- L05 = ±0.05 % (optional)

Connection

M12R5 = Connector M12, 5 pin

Dust wiper

BAB1

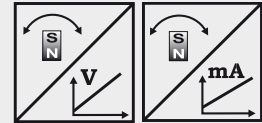
Order code connector cable see page 62

Order example: WB61 - 4000 - I1 - A - L10 - M12R5 - BAB1



Position sensor with measuring tape

- Measurement range up to 4000 mm
- Protection class IP67/IP69K
- Steel measuring tape
- Analog output, programmable



Specifications	Outputs	U2/PMU U8/PMU I1/PMU	Voltage 0.5 ... 10 V, programmable Voltage 0.5 ... 4.5 V, programmable Current 4 ... 20 mA, 3 wire, programmable
	Resolution		<0.05 mm
	Linearity		±0.10 % f. s.; optional ±0.05 %
	Sensing device		Magnetic absolute encoder
	Material		Plastic and stainless steel; Tape: stainless steel, 10 mm wide, 0.08 mm thick
	Protection class		IP67/IP69K (with mating connector)
	Connection		Connector M12, 5 pin
	Shock		EN 60068-2-27:1993, 100 g/11 ms, 100 shocks
	Vibration		EN 60068-2-6:1995, 20 g 10 Hz-2 kHz, 10 cycles
	EMC, temperature		Refer to output specification

Order code WB61



Model name

Measurement range (in mm)

1500 / 2000 / 2500 / 3000 / 3500 / 4000

Output

- U2/PMU = 0.5 ... 10 V signal conditioner, programmable
- U8/PMU = 0.5 ... 4.5 V signal conditioner, programmable
- I1/PMU = 4 ... 20 mA signal conditioner, programmable

Signal characteristics

- A = increasing (eg. 4 ... 20 mA)
- D = decreasing (eg. 20 ... 4 mA)

Linearity

- L10 = ±0.10 % (standard)
- L05 = ±0.05 % (optional)

Connection

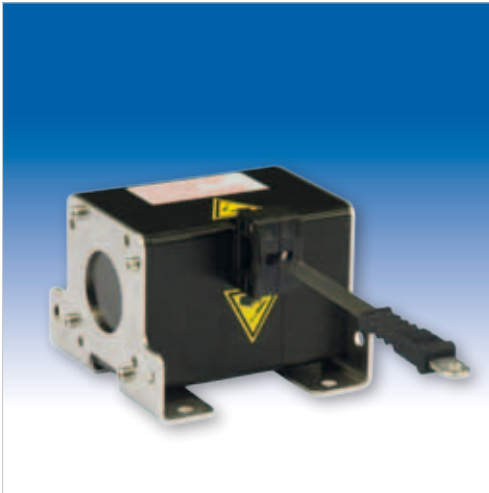
M12R5 = Connector M12, 5 pin

Dust wiper

BAB1

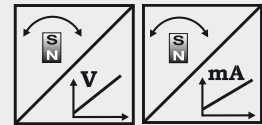
Order code connector cable see page 63

Order example: WB61 - 4000 - U2/PMU - A - L10 - M12R5 - BAB1



Position sensor with measuring tape

- Measurement range up to 4000 mm
- Protection class IP67/IP69K
- Stainless steel measuring tape
- Analog output, redundant



Specifications	Outputs	U2R	Voltage 0.5 ... 10 V, redundant
		U8R	Voltage 0.5 ... 4.5 V, redundant
		I1R	Current 4 ... 20 mA, 3 wire, redundant
	Resolution		<0.05 mm
	Linearity		±0.10 % f. s.; optional ±0.05 %
	Sensing device		Magnetic absolute encoder
	Material		Plastic and stainless steel; Tape: stainless steel, 10 mm wide, 0.08 mm thick
	Protection class		IP67/IP69K, with mating connector
	Connection		Connector M12, 8 pin
	Shock		EN 60068-2-27:1993, 100 g/11 ms, 100 shocks
	Vibration		EN 60068-2-6:1995, 20 g 10 Hz-2 kHz, 10 cycles
	EMC, temperature		Refer to output specification

Order code WB61



Model name

Measurement range (in mm)

1500 / 2000 / 2500 / 3000 / 3500 / 4000

Output

- U2R = 0.5 ... 10 V signal conditioner, redundant
- U8R = 0.5 ... 4.5 V signal conditioner, redundant
- I1R = 4 ... 20 mA signal conditioner, redundant

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

Linearity

- L10 = ±0.10 % (standard)
- L05 = ±0.05 % (optional)

Connection

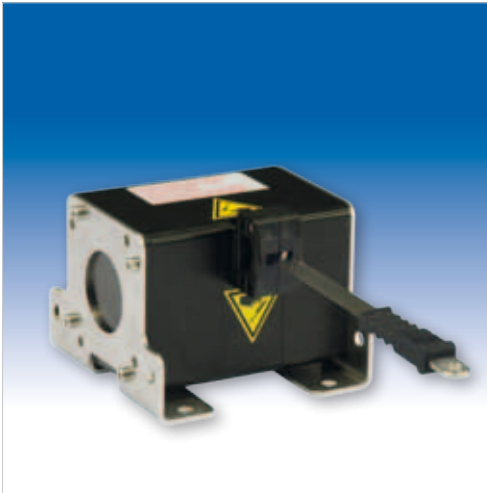
M12R8 = Connector M12, 8 pin

Dust wiper

BAB1

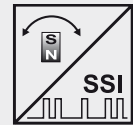
Order code connector cable see page 64

Order example: WB61 - 4000 - I1R - A/D - L10 - M12R8 - BAB1



Position sensor with measuring tape

- Measurement range up to 4000 mm
- Protection class IP67/IP69K
- Stainless steel measuring tape
- Digital output SSI



Specifications	Output	Synchronous serial interface (SSI)
	Resolution	0.05 mm
	Linearity	±0.10 % f.s; optional ±0.05 %
	Sensing device	Magnetic absolute encoder
	Material	Plastic and stainless steel; Tape: stainless steel, 10 mm wide, 0.08 mm thick
	Protection class	IP67/IP69K, with mating connector
	Connection	Connector M12, 8 pin
	Shock	EN 60068-2-27:1993, 100 g/11 ms, 100 shocks
	Vibration	EN 60068-2-6:1995, 20 g 10 Hz-2 kHz, 10 cycles
	EMC, temperature	Refer to output specification

Order code WB61



- Model name**
- Measurement range (in mm)**
4000
- Resolution (in µm)**
50 (other resolutions on demand)
- Output**
MSSI = SSI synchronous serial interface
- Linearity**
L10 = ±0.10% (standard)
L05 = ±0.05% (optional)
- Connection**
M12R8 = Connector M12, 8 pin
- Dust wiper**
BAB1

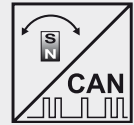
Order code connector cable see page 64

Order example: WB61 - 4000 - 50 - MSSI - L10 - M12R8 - BAB1



Position sensor with measuring tape

- Measurement range up to 4000 mm
- Protection class IP67/IP69K
- Stainless steel measuring tape
- Digital output CANopen or CAN SAE J1939
- Optional redundant CAN Bus (on demand)



Specifications	Output	CANopen or CAN SAE J1939
	Resolution	setting via CAN Bus
	Linearity	±0.10 % f.s.; optional ±0.05 %
	Sensing device	Magnetic absolute encoder
	Material	Plastic and stainless steel; Tape: stainless steel, 10 mm wide, 0.08 mm thick
	Protection class	IP67/IP69K, with mating connector
	Connection	Connector M12, 5 pin
	Shock	EN 60068-2-27:1993, 100 g/11 ms, 100 shocks
	Vibration	EN 60068-2-6:1995, 20 g 10 Hz-2 kHz, 10 cycles
	EMC, temperature	Refer to output specification

Bestellcode WB61

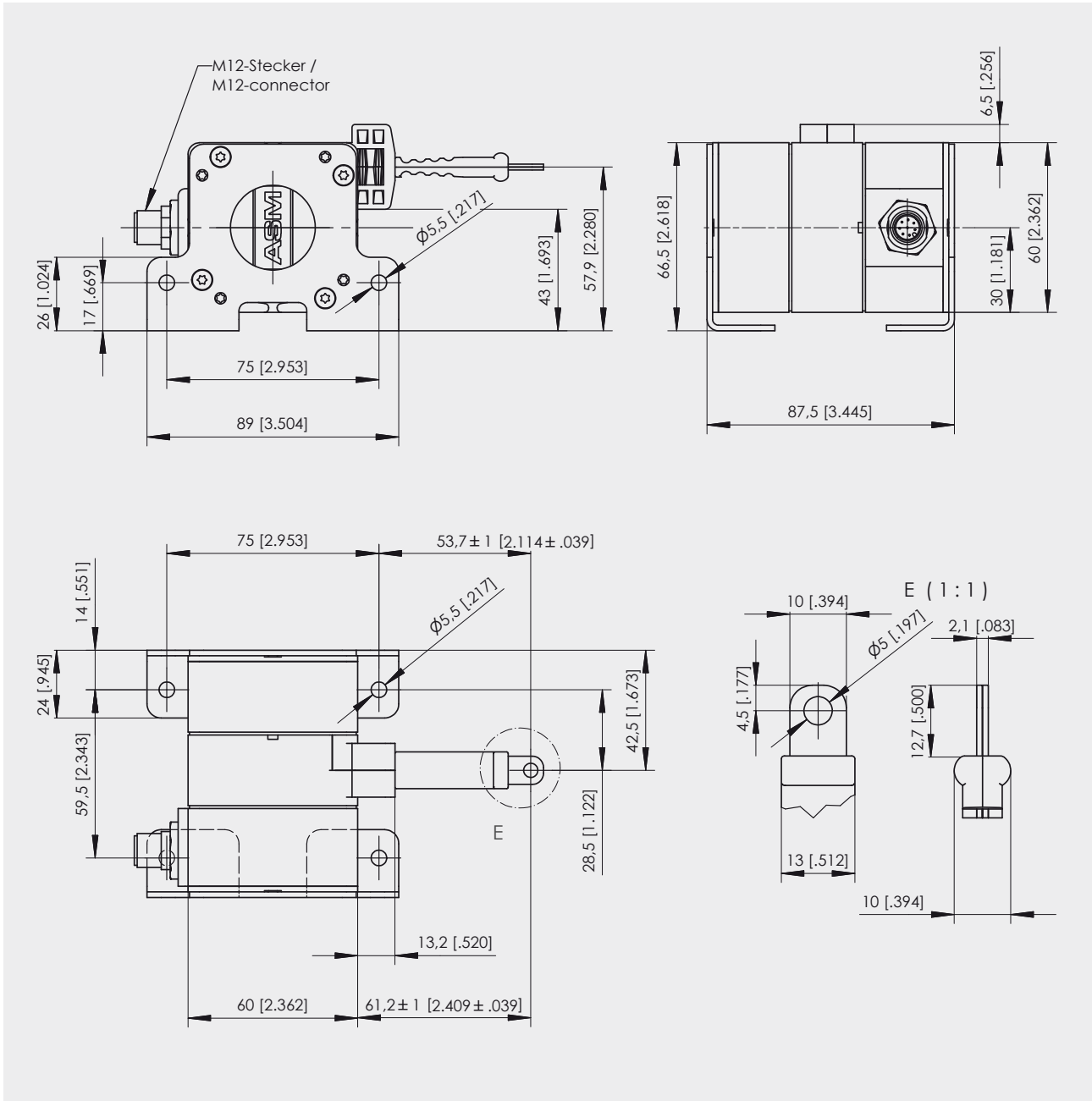


- Model name**
- Measurement range (in mm)**
4000
- Output**
MCANOP = CANopen
MCANJ1939 = CAN SAE J1939
- Linearity**
L10 = 0.10% (standard)
L05 = 0.05% (optional)
- Connection**
M12/CAN = Connector M12, 5 pin
- Dust wiper**
BAB1

Order code connector cable see page 65

Order example: WB61 - 4000 - MCANOP - L10 - M12/CAN - BAB1

Dimensions WB61



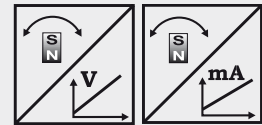
Dimensions in mm [inch]

Dimensions informative only.
For guaranteed dimensions consult factory.



Position sensor with measuring tape

- Measurement range up to 6000 mm
- Protection class IP67/IP69K
- Stainless steel measuring tape
- Analog output



Specifications	Outputs	U2	Voltage 0.5 ... 10 V
		U8	Voltage 0.5 ... 4.5 V
		I1	Current 4 ... 20 mA, 3 wire
	Resolution		<0.05 mm
	Linearity		±0.10 % f. s.; optional ±0.05 %
	Sensing device		Magnetic absolute encoder
	Material		Plastic and stainless steel; Tape: stainless steel, 10 mm wide, 0.08 mm thick
	Protection class		IP67/IP69K (with mating connector)
	Connection		Connector M12, 5 pin
	Shock		EN 60068-2-27:1993, 100 g/11 ms, 100 shocks
	Vibration		EN 60068-2-6:1995, 20 g 10 Hz-2 kHz, 10 cycles
	EMC, temperature		Refer to output specification

Order code WB85



Model name

Measurement range (in mm)

5000 / 6000

Output

- U2 = 0.5 ... 10 V signal conditioner
- U8 = 0.5 ... 4.5 V signal conditioner
- I1 = 4 ... 20 mA signal conditioner

Signal characteristics

- A = increasing (eg. 4 ... 20 mA)
- D = decreasing (eg. 20 ... 4 mA)

Linearity

- L10 = ±0.10 % (standard)
- L05 = ±0.05 % (optional)

Connection

M12R5 = Connector M12, 5 pin

Dust wiper

BAB1

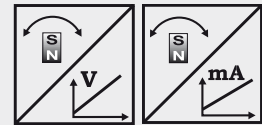
Order code connector cable see page 62

Order example: WB85 - 6000 - I1 - A - L10 - M12R5 - BAB1



Position sensor with measuring tape

- Measurement range up to 6000 mm
- Protection class IP67/IP69K
- Stainless steel measuring tape
- Analog output, programmable



Specifications	Outputs	U2/PMU U8/PMU I1/PMU	Voltage 0.5 ... 10 V, programmable Voltage 0.5 ... 4.5 V, programmable Current 4 ... 20 mA, 3 wire, programmable
	Resolution		<0.05 mm
	Linearity		±0.10 % f. s.; optional ±0.05 %
	Sensing device		Magnetic absolute encoder
	Material		Plastic and stainless steel; Tape: stainless steel, 10 mm wide, 0.08 mm thick
	Protection class		IP67/IP69K (with mating connector)
	Connection		Connector M12, 5 pin
	Shock		EN 60068-2-27:1993, 100 g/11 ms, 100 shocks
	Vibration		EN 60068-2-6:1995, 20 g 10 Hz-2 kHz, 10 cycles
	EMC, temperature		Refer to output specification

Order code WB85



Model name

Measurement range (in mm)

5000 / 6000

Output

- U2/PMU = 0.5 ... 10 V signal conditioner, programmable
- U8/PMU = 0.5 ... 4.5 V signal conditioner, programmable
- I1/PMU = 4 ... 20 mA signal conditioner, programmable

Signal characteristics

- A = increasing (eg. 4 ... 20 mA)
- D = decreasing (eg. 20 ... 4 mA)

Linearity

- L10 = ±0.10 % (standard)
- L05 = ±0.05 % (optional)

Connection

M12R5 = Connector M12, 5 pin

Dust wiper

BAB1

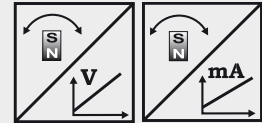
Order code connector cable see page 63

Order example: WB85 - 6000 - U2/PMU - A - L10 - M12R5 - BAB1



Position sensor with measuring tape

- Measurement range up to 6000 mm
- Protection class IP67/IP69K
- Stainless steel measuring tape
- Analog output, redundant



Specifications	Outputs	U2R	Voltage 0.5 ... 10 V, redundant
		U8R	Voltage 0.5 ... 4.5 V, redundant
		I1R	Current 4 ... 20 mA, 3 wire, redundant
	Resolution		<0.05 mm
	Linearity		±0.10 % f. s.; optional ±0.05 %
	Sensing device		Magnetic absolute encoder
	Material		Plastic and stainless steel; Tape: stainless steel, 10 mm wide, 0.08 mm thick
	Protection class		IP67/IP69K (with mating connector)
	Connection		Connector M12, 8 pin
	Shock		EN 60068-2-27:1993, 100 g/11 ms, 100 shocks
	Vibration		EN 60068-2-6:1995, 20 g 10 Hz-2 kHz, 10 cycles
	EMC, temperature		Refer to output specification

Order code WB85



Model name

Measurement range (in mm)

5000 / 6000

Output

- U2R = 0.5 ... 10 V signal conditioner, redundant
- U8R = 0.5 ... 4.5 V signal conditioner, redundant
- I1R = 4 ... 20 mA signal conditioner, redundant

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

Linearity

- L10 = ±0.10 % (standard)
- L05 = ±0.05 % (optional)

Connection

M12R8 = Connector M12, 8 pin

Dust wiper

BAB1

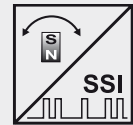
Order code connector cable see page 64

Order example: WB85 - 6000 - I1R - A/D - L10 - M12R8 - BAB1



Position sensor with measuring tape

- Measurement range up to 6000 mm
- Protection class IP67/IP69K
- Stainless steel measuring tape
- Digital output SSI



Specifications	Output	Synchronous serial interface (SSI)
	Resolution	0.05 mm
	Linearity	±0.10 % f.s; optional ±0.05 %
	Sensing device	Magnetic absolute encoder
	Material	Plastic and stainless steel; Tape: stainless steel, 10 mm wide, 0.08 mm thick
	Protection class	IP67/IP69K (with mating connector)
	Connection	Connector M12, 8 pin
	Shock	EN 60068-2-27:1993, 100 g/11 ms, 100 shocks
	Vibration	EN 60068-2-6:1995, 20 g 10 Hz-2 kHz, 10 cycles
	EMC, temperature	Refer to output specification

Order code WB85



Model name

Measurement range (in mm)

6000

Resolution (in µm)

50 (other resolutions on demand)

Output

MSSI = SSI synchronous serial interface

Linearity

L10 = ±0.10% (standard)

L05 = ±0.05% (optional)

Connection

M12R8 = Connector M12, 8 pin

Dust wiper

BAB1

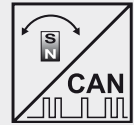
Order code connector cable see page 64

Order example: WB85 - 6000 - 50 - MSSI - L10 - M12R8 - BAB1



Position sensor with measuring tape

- Measurement range up to 6000 mm
- Protection class IP67/IP69K
- Stainless steel measuring tape
- Digital output CANopen or CAN SAE J1939
- Optional redundant CAN Bus (on demand)



Specifications	Output	CANopen or CAN SAE J1939
	Resolution	setting via CAN Bus
	Linearity	±0.10 % f.s.; optional ±0.05 %
	Sensing device	Magnetic absolute encoder
	Material	Plastic and stainless steel; Tape: stainless steel, 10 mm wide, 0.08 mm thick
	Protection class	IP67/IP69K (with mating connector)
	Connection	Connector M12, 5 pin
	Shock	EN 60068-2-27:1993, 100 g/11 ms, 100 shocks
	Vibration	EN 60068-2-6:1995, 20 g 10 Hz-2 kHz, 10 cycles
	EMC, temperature	Refer to output specification

Bestellcode WB85



Model name

Measurement range (in mm)

6000

Output

MCANOP = CANopen

MCANJ1939 = CAN SAE J1939

Linearity

L10 = 0.10% (standard)

L05 = 0.05% (optional)

Connection

M12/CAN = Connector M12, 5 pin

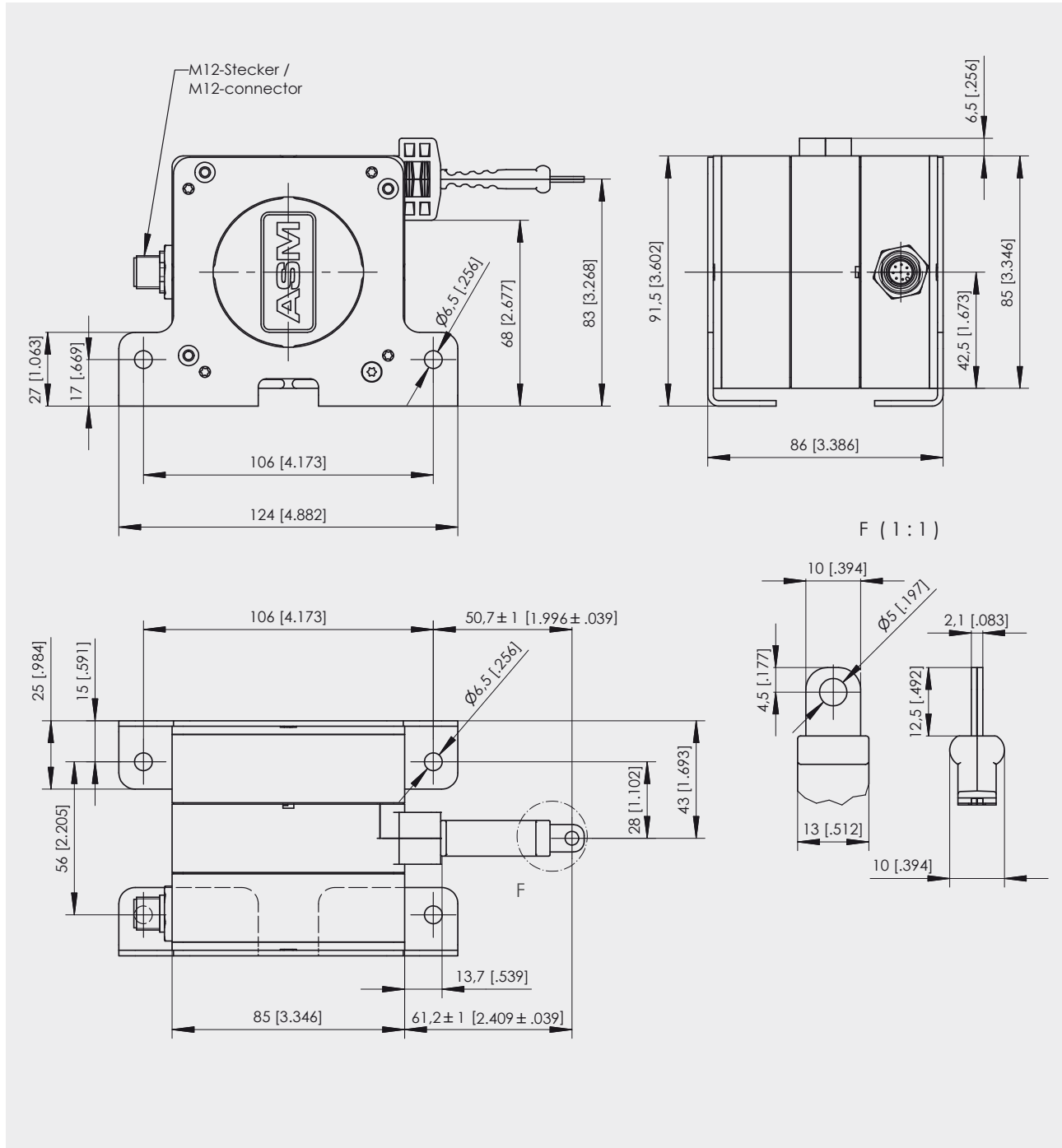
Dust wiper

BAB1

Order code connector cable see page 65

Order example: WB85 - 6000 - MCANOP - L10 - M12/CAN - BAB1

Dimensions WB85



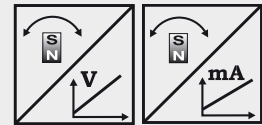
Dimensions in mm [inch]

Dimensions informative only.
For guaranteed dimensions consult factory.



Position sensor with measuring tape

- Measurement range up to 20,000 mm
- Protection class IP67/IP69K
- Stainless steel measuring tape
- Analog output



Specifications	Outputs	U2	Voltage 0.5 ... 10 V
		U8	Voltage 0.5 ... 4.5 V
	I1	Current 4 ... 20 mA, 3 wire	
	Resolution		<0,05 mm
	Linearity		±0.10 % f. s.; optional ±0.05 %
	Sensing device		Magnetic absolute encoder
	Material		Aluminium, plastic and stainless steel; Tape: stainless steel, 10 mm wide, 0.08 mm thick
	Protection class		IP67/IP69K (with mating connector)
	Connection		Connector M12, 5 pin
	Shock		EN 60068-2-27:1993, 100 g/11 ms, 100 shocks
	Vibration		EN 60068-2-6:1995, 20 g 10 Hz-2 kHz, 10 cycles
	EMC, temperature		Refer to output specification

Order code WB21



Model name

Measurement range (in mm)

8000 / 10000 / 12500 / 15000 / 17500 / 20000

Output

- U2 = 0.5 ... 10 V signal conditioner
- U8 = 0.5 ... 4.5 V signal conditioner
- I1 = 4 ... 20 mA signal conditioner

Signal characteristics

- A = increasing (eg. 4 ... 20 mA)
- D = decreasing (eg. 20 ... 4 mA)

Linearity

- L10 = ±0.10 % (standard)
- L05 = ±0.05 % (optional)

Connection

M12R5 = Connector M12, 5 pin

Dust wiper

BAB1

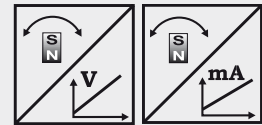
Order code connector cable see page 62

Order example: WB21 - 8000 - I1 - A - L10 - M12R5 - BAB1



Position sensor with measuring tape

- Measurement range up to 20,000 mm
- Protection class IP67/IP69K
- Stainless steel measuring tape
- Analog output, programmable



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		<0,05 mm
	Linearity		±0.10 % f. s.; optional ±0.05 %
	Sensing device		Magnetic absolute encoder
	Material		Aluminium, plastic and stainless steel; Tape: stainless steel, 10 mm wide, 0.08 mm thick
	Protection class		IP67/IP69K (with mating connector)
	Connection		Connector M12, 5 pin
	Shock		EN 60068-2-27:1993, 100 g/11 ms, 100 shocks
	Vibration		EN 60068-2-6:1995, 20 g 10 Hz-2 kHz, 10 cycles
	EMC, temperature		Refer to output specification

Order code WB21



Model name

Measurement range (in mm)

8000 / 10000 / 12500 / 15000 / 17500 / 20000

Output

U2/PMU = 0.5 ... 10 V signal conditioner, programmable

U8/PMU = 0.5 ... 4.5 V signal conditioner, programmable

I1/PMU = 4 ... 20 mA signal conditioner, programmable

Signal characteristics

A = increasing (eg. 4 ... 20 mA)

D = decreasing (eg. 20 ... 4 mA)

Linearity

L10 = ±0.10 % (standard)

L05 = ±0.05 % (optional)

Connection

M12R5 = Connector M12, 5 pin

Dust wiper

BAB1

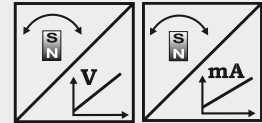
Order code connector cable see page 63

Order example: WB21 - 8000 - U2/PMU - A - L10 - M12R5 - BAB1



Position sensor with measuring tape

- Measurement range up to 20,000 mm
- Protection class IP67/IP69K
- Stainless steel measuring tape
- Analog output, redundant



Specifications	Output	U2R	Voltage 0.5 ... 10 V, redundant
		U8R	
	I1R		Current 4 ... 20 mA, 3 wire, redundant
	Resolution		<0,05 mm
	Linearity		±0.10 % f. s.; optional ±0.05 %
	Sensing device		Magnetic absolute encoder
	Material		Aluminium, plastic and stainless steel; Tape: stainless steel, 10 mm wide, 0.08 mm thick
	Protection class		IP67/IP69K (with mating connector)
	Connection		Connector M12, 8 pin
	Shock		EN 60068-2-27:1993, 100 g/11 ms, 100 shocks
	Vibration		EN 60068-2-6:1995, 20 g 10 Hz-2 kHz, 10 cycles
	EMC, temperature		Refer to output specification

Order code WB21



Model name

Measurement range (in mm)

8000 / 10000 / 12500 / 15000 / 17500 / 20000

Output

- U2R = 0.5 ... 10 V signal conditioner, redundant
- U8R = 0.5 ... 4.5 V signal conditioner, redundant
- I1R = 4 ... 20 mA signal conditioner, redundant

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

Linearity

- L10 = ±0.10 % (standard)
- L05 = ±0.05 % (optional)

Connection

M12R8 = Connector M12, 8 pin

Dust wiper

BAB1

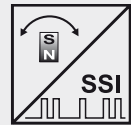
Order code connector cable see page 64

Order example: WB21 - 8000 - I1R - A/D - L10 - M12R8 - BAB1



Position sensor with measuring tape

- Measurement range up to 20,000 mm
- Protection class IP67/IP69K
- Stainless steel measuring tape
- Digital output SSI



Specifications	Output	Synchronous serial interface (SSI)
	Resolution	0.05 mm
	Linearity	±0.10 % f.s; optional ±0.05 %
	Sensing device	Magnetic absolute encoder
	Material	Aluminium, plastic and stainless steel; Tape: stainless steel, 10 mm wide, 0.08 mm thick
	Protection class	IP67/IP69K (with mating connector)
	Connection	Connector M12, 8 pin
	Shock	EN 60068-2-27:1993, 100 g/11 ms, 100 shocks
	Vibration	EN 60068-2-6:1995, 20 g 10 Hz-2 kHz, 10 cycles
	EMC, temperature	Refer to output specification

Order code WB21



Model name

Measurement range (in mm)

8000 / 10000 / 12500 / 15000 / 20000

Resolution (in µm)

50 (other resolutions on demand)

Output

MSSI = SSI synchronous serial interface

Linearity

L10 = ±0.10% (standard)

L05 = ±0.05% (optional)

Connection

M12R8 = Connector M12, 8 pin

Dust wiper

BAB1

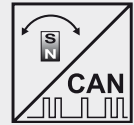
Order code connector cable see page 64

Order example: WB21 - 8000 - 50 - MSSI - L10 - M12R8 - BAB1



Position sensor with measuring tape

- Measurement range up to 20,000 mm
- Protection class IP67/IP69K
- Stainless steel measuring tape
- Digital output CANopen or CAN SAE J1939
- Optional redundant CAN Bus (on demand)



Specifications	Output	CANopen or CAN SAE J1939
	Resolution	setting via CAN Bus
	Linearity	±0.10 % f.s.; optional ±0.05 %
	Sensing device	Magnetic absolute encoder
	Material	Aluminium, plastic and stainless steel; Tape: stainless steel, 10 mm wide, 0.08 mm thick
	Protection class	IP67/IP69K (with mating connector)
	Connection	Connector M12, 5 pin
	Shock	EN 60068-2-27:1993, 100 g/11 ms, 100 shocks
	Vibration	EN 60068-2-6:1995, 20 g 10 Hz-2 kHz, 10 cycles
	EMC, temperature	Refer to output specification

Bestellcode WB21



Model name

Measurement range (in mm)

8000 / 10000 / 12500 / 15000 / 20000

Output

MCANOP = CANopen

MCANJ1939 = CAN SAE J1939

Linearity

L10 = 0.10% (standard)

L05 = 0.05% (optional)

Connection

M12/CAN = Connector M12, 5 pin

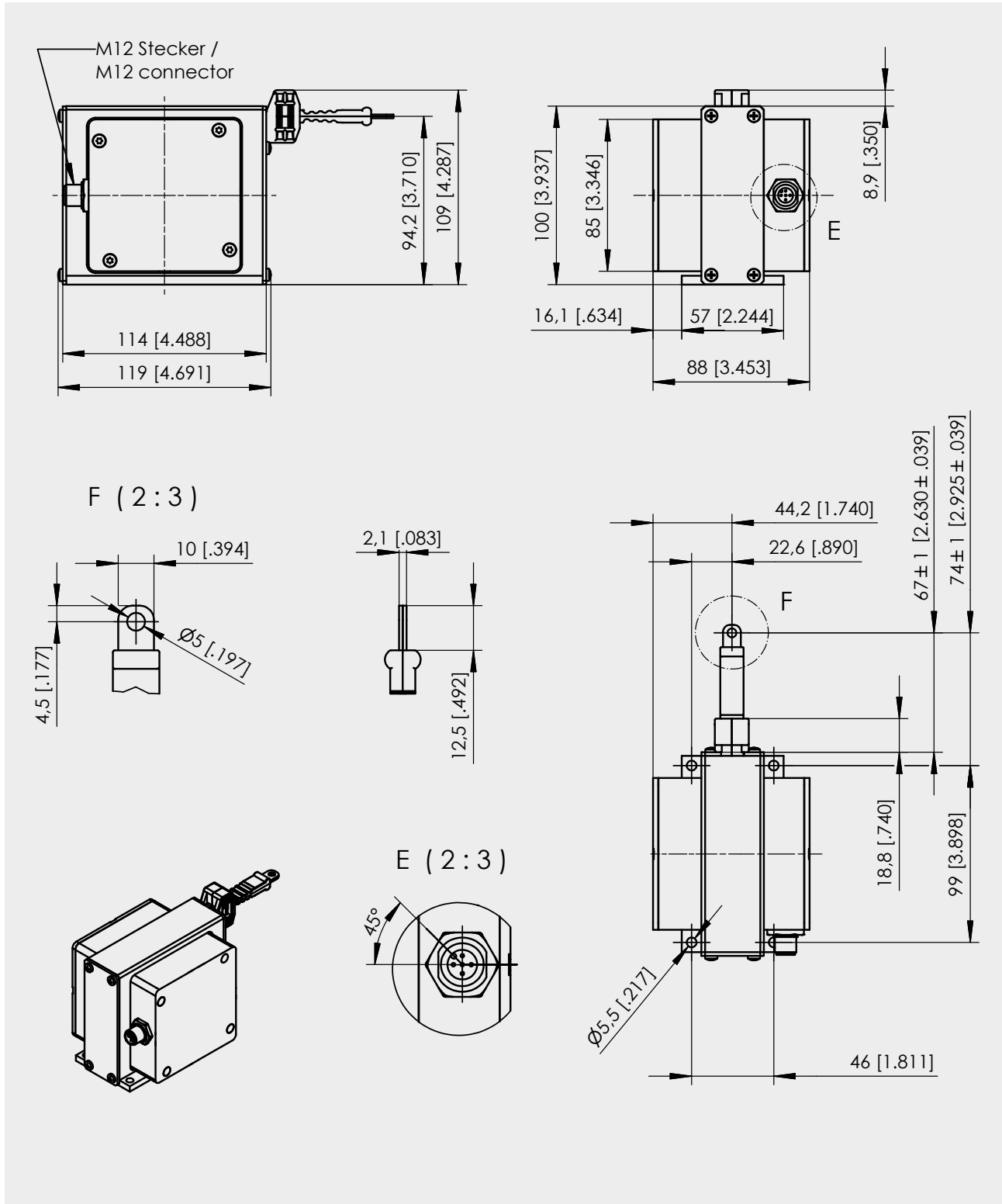
Dust wiper

BAB1

Order code connector cable see page 65

Order example: WB21 - 8000 - MCANOP - L10 - M12/CAN - BAB1

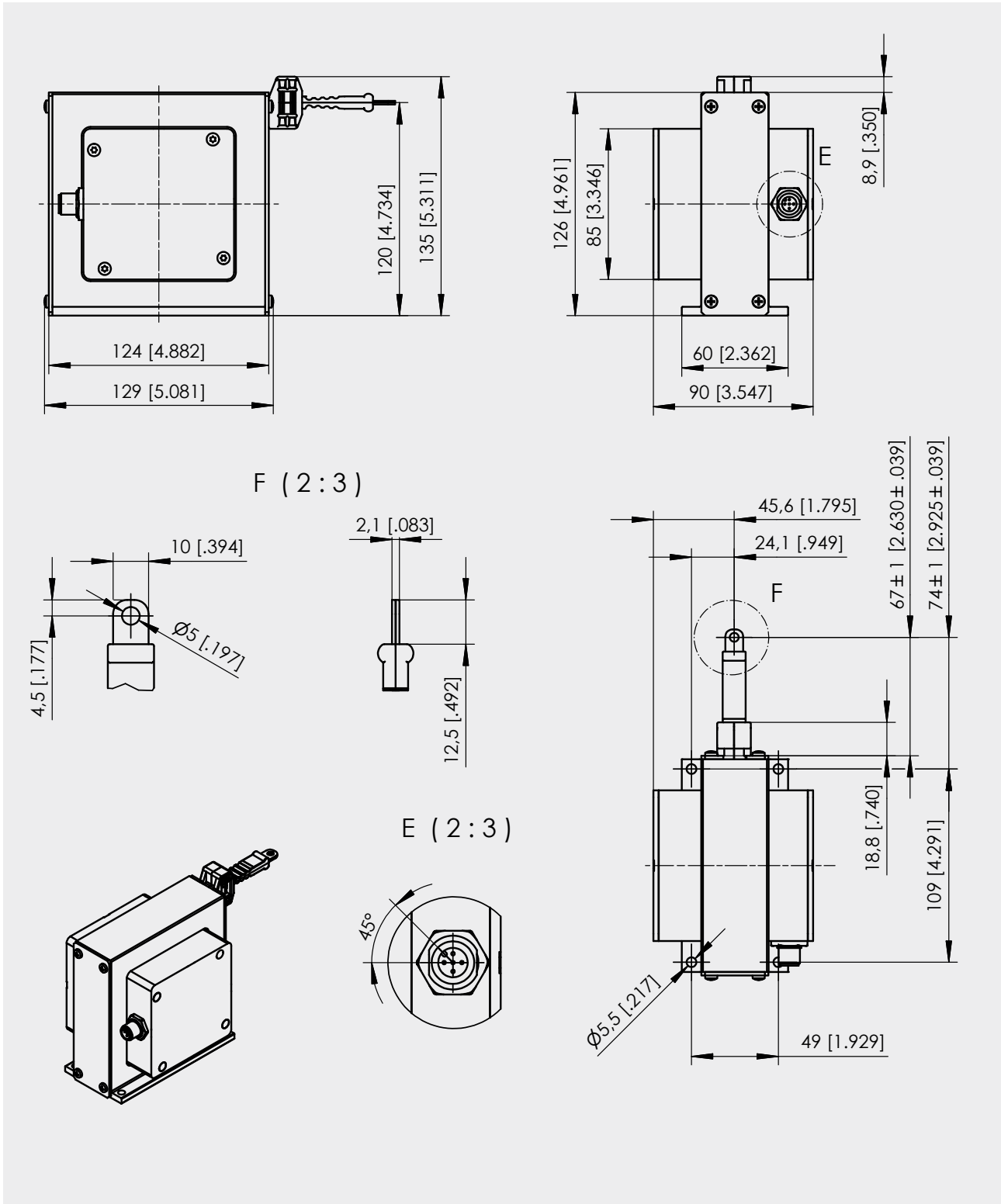
Dimensions WB21-8000



Dimensions in mm [inch]

Dimensions informative only.
For guaranteed dimensions consult factory.

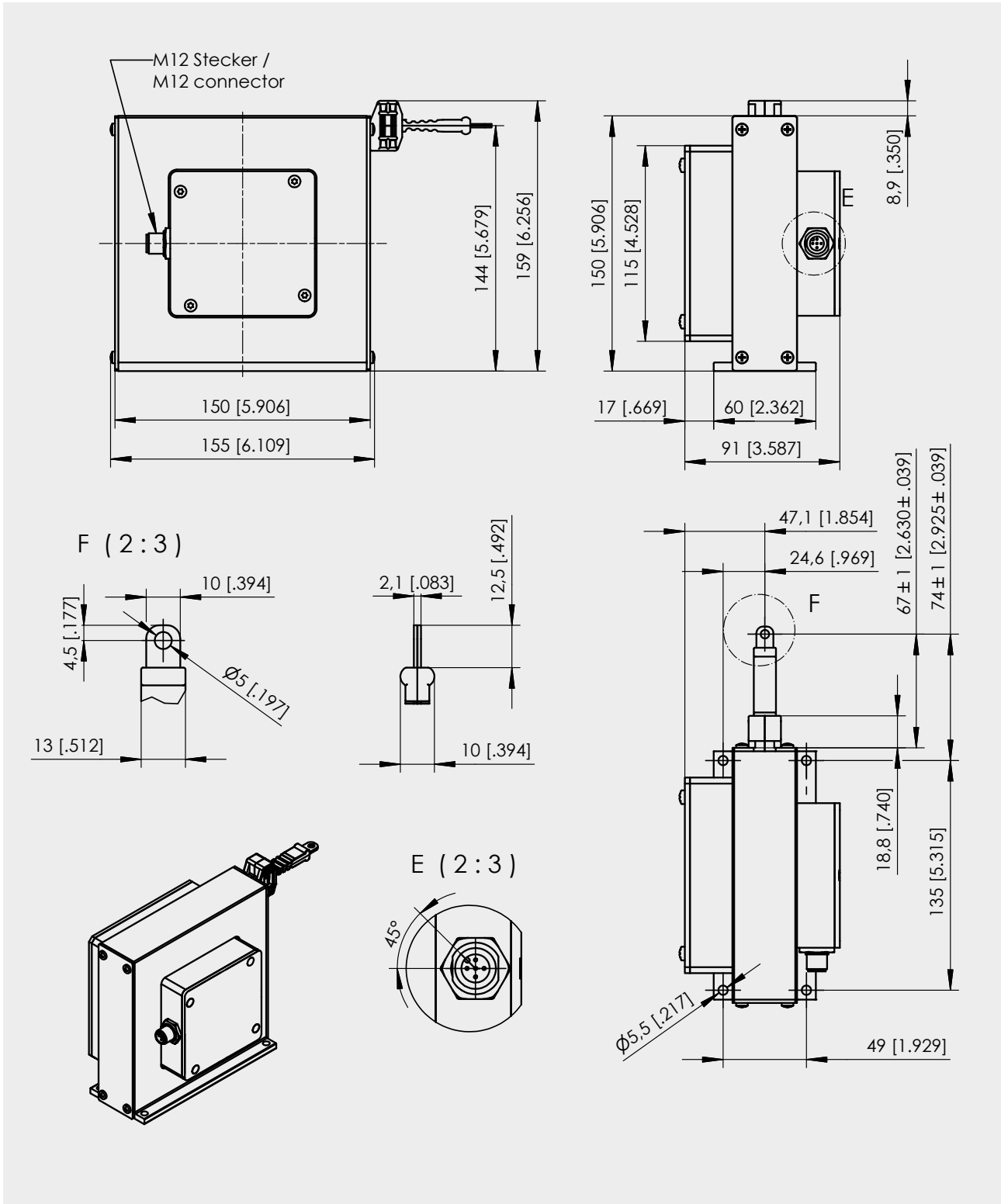
Dimensions WB21-10000



Dimensions in mm [inch]

Dimensions informative only.
For guaranteed dimensions consult factory.

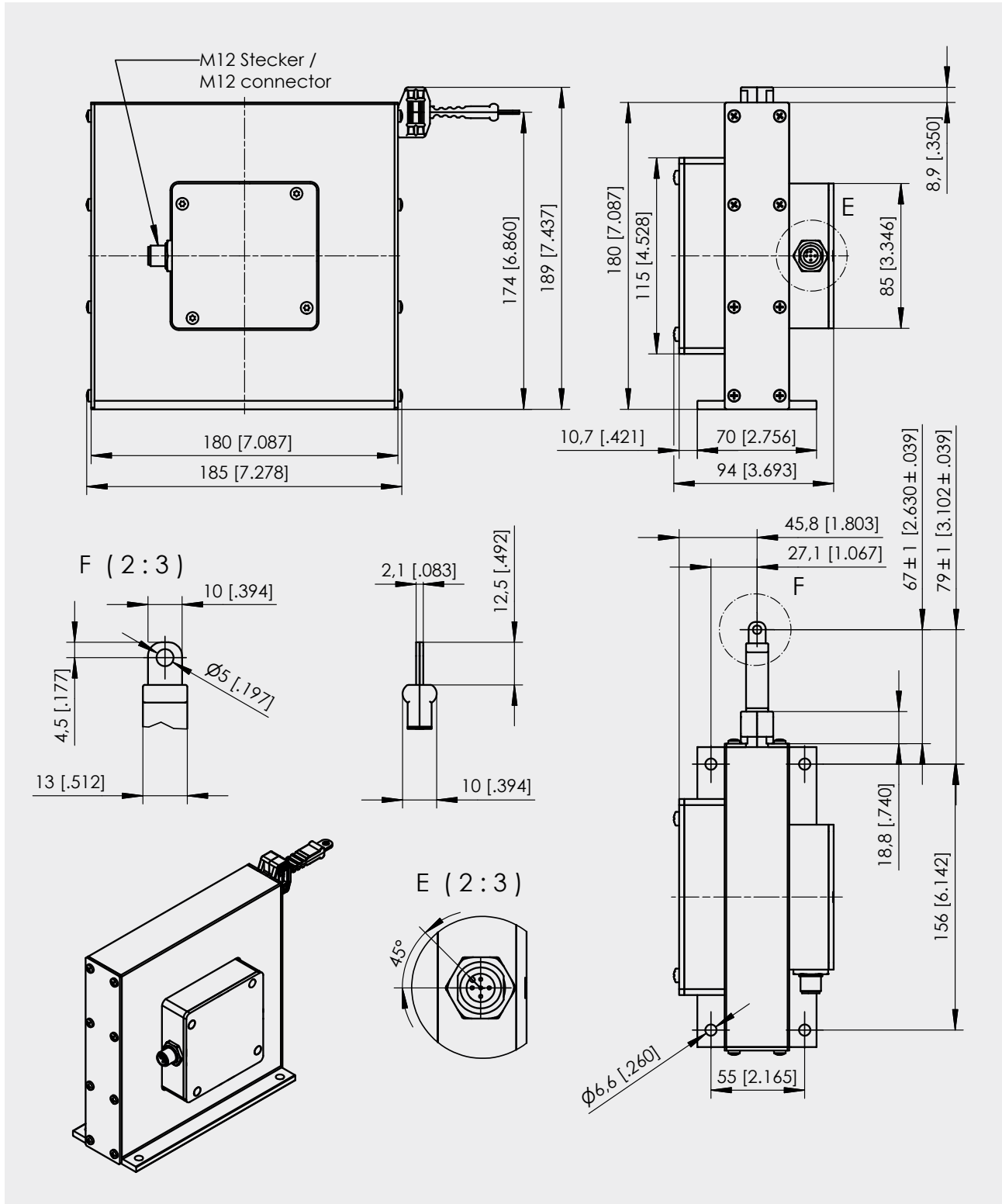
Dimensions WB21-12500



Dimensions in mm [inch]

Dimensions informative only.
For guaranteed dimensions consult factory.

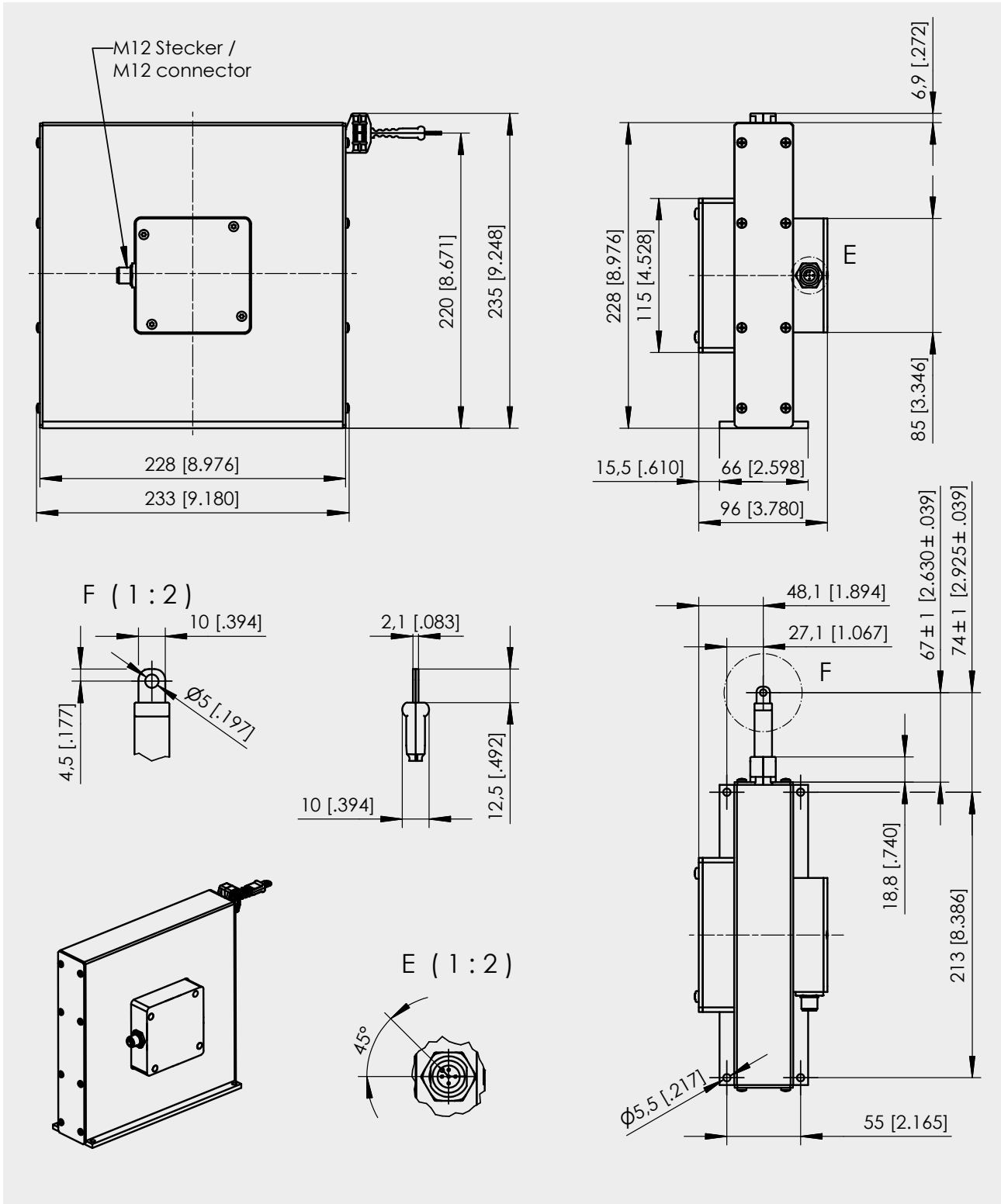
Dimensions WB21-15000



Dimensions in mm [inch]

Dimensions informative only.
For guaranteed dimensions consult factory.

Dimensions WB21-17500, WB21-20000



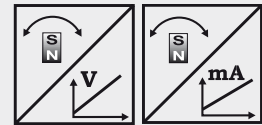
Dimensions in mm [inch]

Dimensions informative only.
For guaranteed dimensions consult factory.



Position sensor with measuring tape

- Measurement range up to 4000 mm
- Protection class IP67/IP69K
- Stainless steel measuring tape
- Analog output



Specifications	Outputs	U2	Voltage 0.5 ... 10 V
		U8	Voltage 0.5 ... 4.5 V
		I1	Current 4 ... 20 mA, 3 wire
	Resolution		<0,05 mm
	Linearity		±0.10 % f. s.; optional ±0.05 %
	Sensing device		Magnetic absolute encoder
	Material		Aluminium, stainless steel and plastic; Tape: stainless steel, 10 mm wide, 0.08 mm thick
	Protection class		IP67/IP69K (with mating connector)
	Connection		Connector M12, 5 pin
	Shock		EN 60068-2-27:1993, 100 g/11 ms, 100 shocks
	Vibration		EN 60068-2-6:1995, 20 g 10 Hz-2 kHz, 10 cycles
	EMC, temperature		Refer to output specification

Order code WB12



Model name

Measurement range (in mm)

250/375/500/750/1000/1250/1500/2000/2500/3000/3500/4000

Output

- U2 = 0.5 ... 10 V signal conditioner
- U8 = 0.5 ... 4.5 V signal conditioner
- I1 = 4 ... 20 mA signal conditioner

Signal characteristics

- A = increasing (eg. 4 ... 20 mA)
- D = decreasing (eg. 20 ... 4 mA)

Linearity

- L10 = ±0.10 % (standard)
- L05 = ±0.05 % (optional, only for measurement ranges ≥1000 mm)

Connection

M12A5 = Connector M12, 5 pin

Dust wiper

BAB1

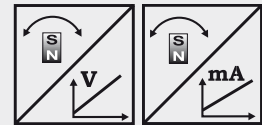
Order code connector cable see page 62

Order example: WB12 - 1250 - U2 - A - L10 - M12A5 - BAB1



Position sensor with measuring tape

- Measurement range up to 4000 mm
- Protection class IP67/IP69K
- Stainless steel measuring tape
- Analog output, programmable



Specifications	Output	U2/PMU U8/PMU I1/PMU	Voltage 0.5 ... 10 V, programmable Voltage 0.5 ... 4.5 V, programmable Current 4 ... 20 mA, 3 wire, programmable
	Resolution		<0,05 mm
	Linearity		±0.10 % f. s.; optional ±0.05 %
	Sensing device		Magnetic absolute encoder
	Material		Aluminium, stainless steel and plastic Tape: stainless steel, 10 mm wide, 0.08 mm thick
	Protection class		IP67/IP69K (with mating connector)
	Connection		Connector M12, 5 pin
	Shock		EN 60068-2-27:1993, 100 g/11 ms, 100 shocks
	Vibration		EN 60068-2-6:1995, 20 g 10 Hz-2 kHz, 10 cycles
	EMC, temperature		Refer to output specification

Order code WB12



Model name

Measurement range (in mm)

250/375/500/750/1000/1250/1500/2000/2500/3000/3500/4000

Output

- U2/PMU = 0.5 ... 10 V signal conditioner, programmable
- U8/PMU = 0.5 ... 4.5 V signal conditioner, programmable
- I1/PMU = 4 ... 20 mA signal conditioner, programmable

Signal characteristics

- A = increasing (eg. 4 ... 20 mA)
- D = decreasing (eg. 20 ... 4 mA)

Linearity

- L10 = ±0.10 % (standard)
- L05 = ±0.05 % (optional, only for measurement ranges ≥1000 mm)

Connection

- M12A5 = Connector M12, 5 pin

Dust wiper

BAB1

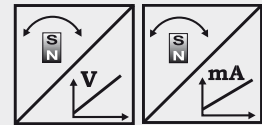
Order code connector cable see page 63

Order example: WB12 - 2000 - U2/PMU - A - L10 - M12A5 - BAB1



Position sensor with measuring tape

- Measurement range up to 4000 mm
- Protection class IP67/IP69K
- Stainless steel measuring tape
- Analog output, redundant



Specifications	Outputs	U2	Voltage 0.5 ... 10 V, redundant
		U8	Voltage 0.5 ... 4.5 V, redundant
		I1	Current 4 ... 20 mA, 3 wire, redundant
	Resolution		<0.05 mm
	Linearity		±0.10 % f. s.; optional ±0.05 %
	Sensing device		Magnetic absolute encoder
	Material		Aluminium, stainless steel and plastic; Tape: stainless steel, 10 mm wide, 0.08 mm thick
	Protection class		IP67/IP69K (with mating connector)
	Connection		Connector M12, 8 pin
	Shock		EN 60068-2-27:1993, 100 g/11 ms, 100 shocks
	Vibration		EN 60068-2-6:1995, 20 g 10 Hz-2 kHz, 10 cycles
	EMC, temperature		Refer to output specification

Order code WB12



Model name

Measurement range (in mm)

250/375/500/750/1000/1250/1500/2000/2500/3000/3500/4000

Output

- U2R = 0.5 ... 10 V signal conditioner, redundant
- U8R = 0.5 ... 4.5 V signal conditioner, redundant
- I1R = 4 ... 20 mA signal conditioner, redundant

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

Linearity

- L10 = ±0.10 % (standard)
- L05 = ±0.05 % (optional, only for measurement ranges ≥1000 mm)

Connection

M12R8 = Connector M12, 8 pin

Dust wiper

BAB1

Order code connector cable see page 64

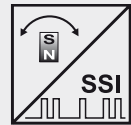
Order example: WB12 - 3000 - I1R - A/D - L10 - M12R8 - BAB1

POSITAPE®
WB12
Digital output SSI



Position sensor with measuring tape

- Measurement range up to 4000 mm
- Protection class IP67/IP69K
- Stainless steel measuring tape
- Digital output SSI



Specifications	Outputs	Synchronous serial interface (SSI)
	Resolution	up to 10 µm
	Linearity	up to ±0.05 % f.s.
	Sensing device	Magnetic absolute encoder
	Material	Aluminium, Stainless steel and plastic Tape: stainless steel, 10 mm wide, 0.08 mm thick
	Protection class	IP67/IP69K (with mating connector)
	Connection	Connector M12, 8 pin
	Shock	EN 60068-2-27:1993, 100 g/11 ms, 100 shocks
	Vibration	EN 60068-2-6:1995, 20 g 10 Hz-2 kHz, 10 cycles
	EMC, temperature	Refer to output specification

Order code WB12

WB12 - [] - [] - [] - [] - [] - [] - BAB1

Model name

Measurement range (in mm)

2000 / 4000

Resolution (in µm)

10 / 50 / 100

Outputs

MSSI = SSI synchronous serial interface

Linearity

L10 = ±0.10% (standard)

L05 = ±0.05% (optional)

Connection

M12A8 = Connector M12, 8 pin

Dust wiper

BAB1

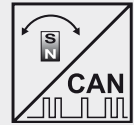
Order code connector cable see page 64

Order example: WB12 - 2000 - 100 - MSSI - L10 - M12A8 - BAB1



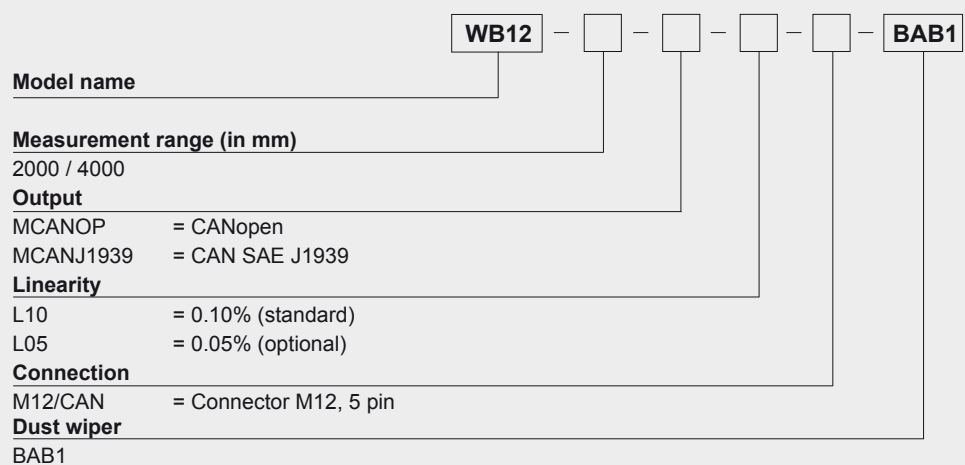
Position sensor with measuring tape

- Measurement range up to 4000 mm
- Protection class IP67/IP69K
- Stainless steel measuring tape
- Digital output CANopen or CAN SAE J1939



Specifications	Outputs	CANopen or CAN SAE J1939
	Resolution	setting via CAN Bus
	Linearity	up to ±0,05 % f.s.
	Sensing device	Magnetic absolute encoder
	Material	Aluminium, stainless steel and plastic; Tape: stainless steel, 10 mm wide, 0.08 mm thick
	Protection class	IP67/IP69K (with mating connector)
	Connection	Connector M12, 5 pin
	Shock	EN 60068-2-27:1993, 100 g/11 ms, 100 shocks
	Vibration	EN 60068-2-6:1995, 20 g 10 Hz-2 kHz, 10 cycles
	EMC, temperature	Refer to output specification

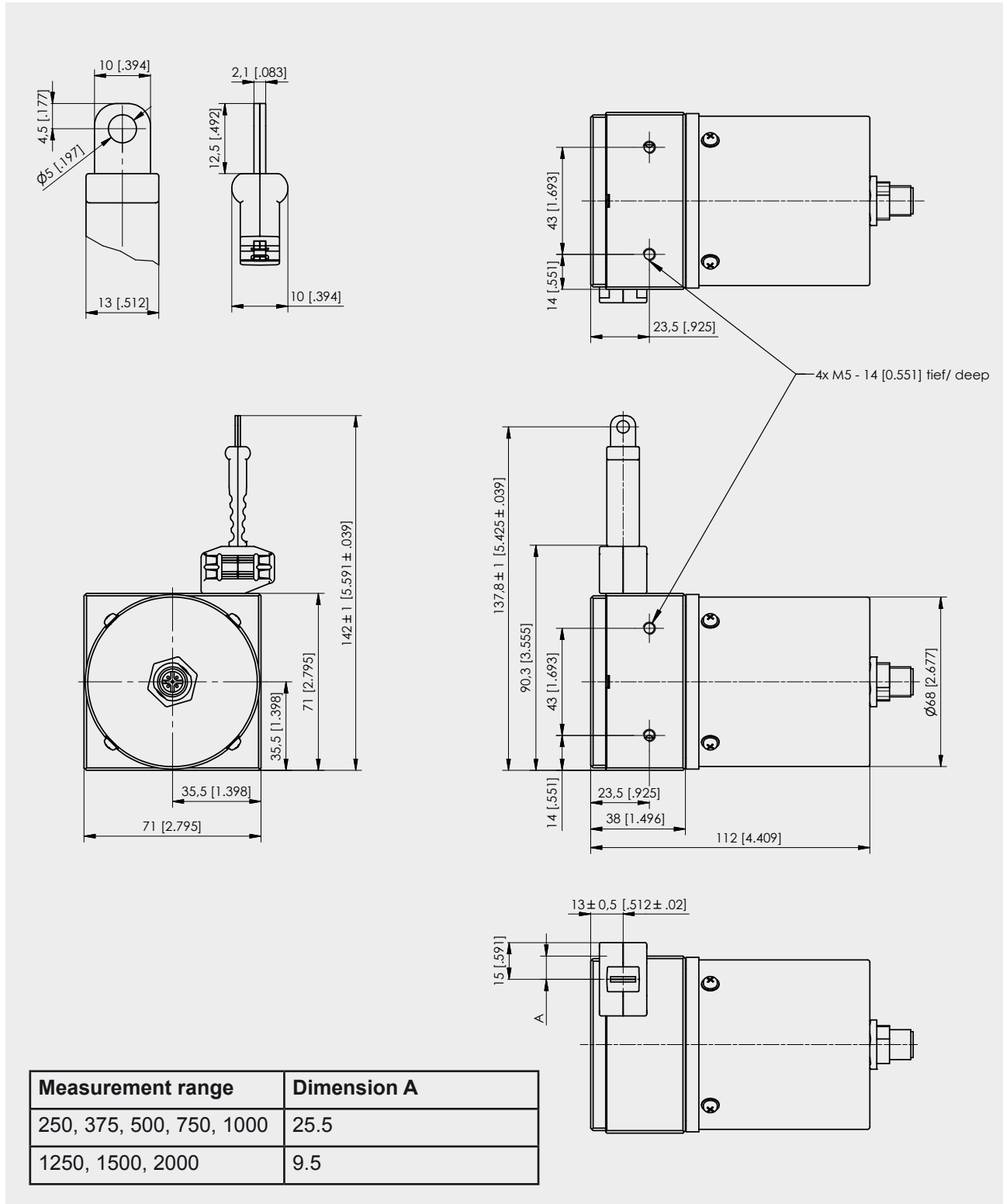
Order code WB12



Order code connector cable see page 65

Order example: WB12 - 2000 - MCANOP - L10 - M12/CAN - BAB1

Outline drawing WB12
up to 2000 mm

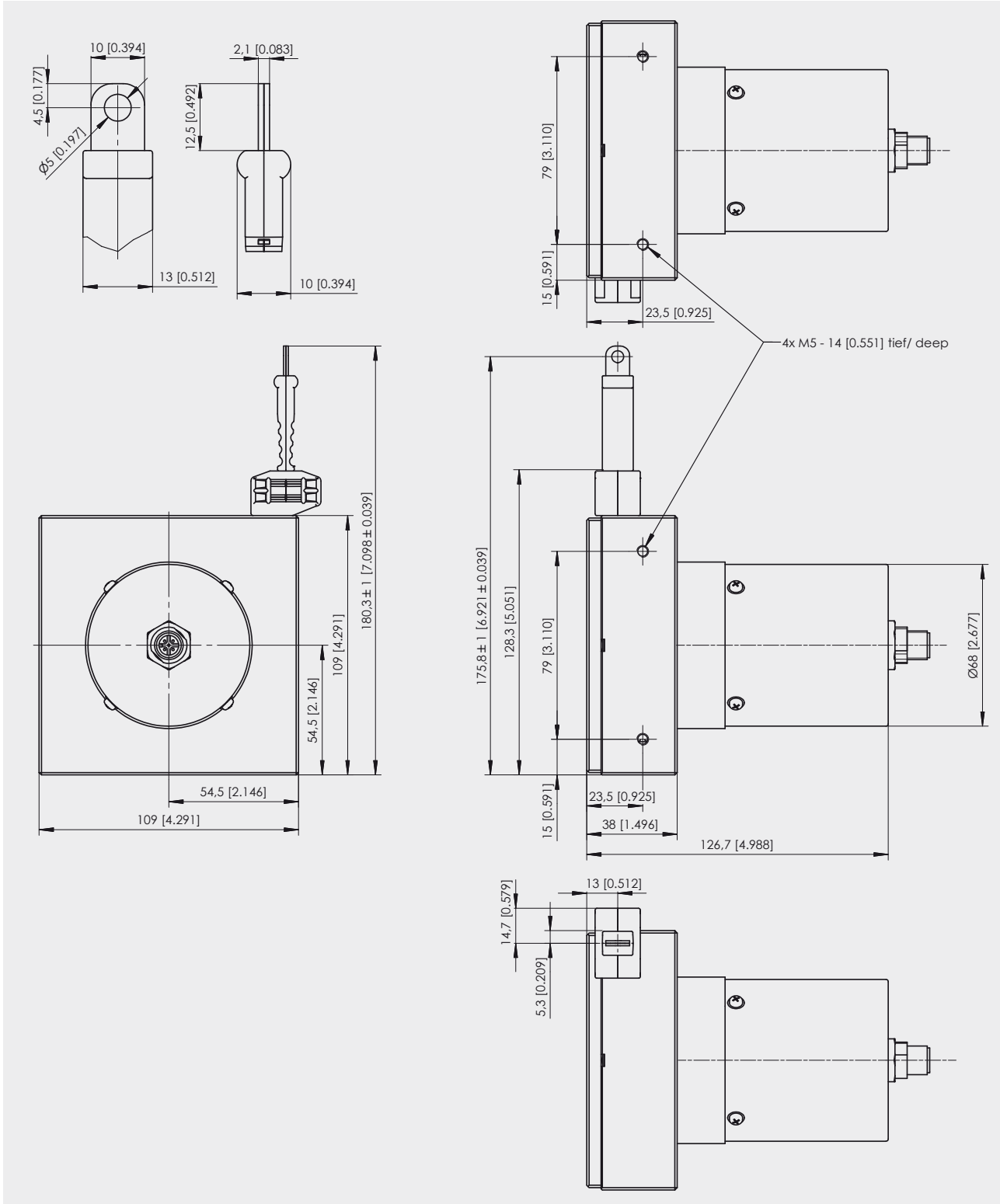


Dimensions in mm [inch]

Dimensions informative only.
For guaranteed dimensions consult factory.

Outline drawing WB12

2500 ... 4000 mm



Dimensions in mm [inch]

Dimensions informative only.

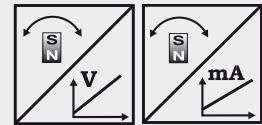
For guaranteed dimensions consult factory.

POSITAPE®
WB100M
Analog output



Position sensor with measuring tape

- Measurement range up to 10000 mm
- Protection class IP68/IP69K
- Stainless steel measuring tape
- Analog output



Specifications	Outputs	U2	Voltage 0.5 ... 10 V
		U8	Voltage 0.5 ... 4.5 V
		I1	Current 4 ... 20 mA, 3 wire
	Resolution		<0.05 mm
	Linearity		±0.10 % f. s. (standard); ±0.05 % (optional)
	Sensing device		Magnetic absolute encoder
	Material		Stainless steel and plastic; Tape: stainless steel, 10 mm wide, 0.08 mm thick
	Protection class		IP68/IP69K
	Connection		cable output, standard length 2 m
	Shock		EN 60068-2-27:1993, 100 g/11 ms, 100 shocks
	Vibration		EN 60068-2-6:1995, 20 g 10 Hz-2 kHz, 10 cycles
	EMC, temperature		Refer to output specification

Order code WB100M



Model name

Measurement range (in mm)

2000 / 3500 / 7500 / 10000

Output

- U2 = 0.5 ... 10 V signal conditioner
- U8 = 0.5 ... 4.5 V signal conditioner
- I1 = 4 ... 20 mA signal conditioner

Signal characteristics

- A = increasing (eg. 4 ... 20 mA)
- D = decreasing (eg. 20 ... 4 mA)

Linearity

- L10 = ±0.10 % (standard)
- L05 = ±0.05 % (optional)

Connection

KAB2M = cable output, standard length 2 m

Dust wiper

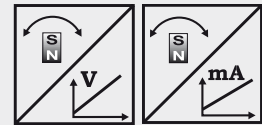
BAB1

Order example: WB100M - 2000 - I1 - A - L10 - KAB2M - BAB1



Position sensor with measuring tape

- Measurement range up to 10000 mm
- Protection class IP68/IP69K
- Stainless steel measuring tape
- Analog output, programmable



Specifications	Outputs	U2/PMU U8/PMU I1/PMU	Voltage 0.5 ... 10 V, programmable Voltage 0.5 ... 4.5 V, programmable Current 4 ... 20 mA, 3 wire, programmable
	Resolution		<0.05 mm
	Linearity		±0.10 % f. s. (standard); ±0.05 % (optional)
	Sensing device		Magnetic absolute encoder
	Material		Stainless steel and plastic; Tape: stainless steel, 10 mm wide, 0.08 mm thick
	Protection class		IP68/IP69K
	Connection		Cable output, standard length 2 m
	Shock		EN 60068-2-27:1993, 100 g/11 ms, 100 shocks
	Vibration		EN 60068-2-6:1995, 20 g 10 Hz-2 kHz, 10 cycles
	EMC, temperature		Refer to output specification

Order code WB100M



Model name

Measurement range (in mm)

2000 / 3500 / 7500 / 10000

Output

U2/PMU = 0.5 ... 10 V signal conditioner, programmable

U8/PMU = 0.5 ... 4.5 V signal conditioner, programmable

I1/PMU = 4 ... 20 mA signal conditioner, programmable

Signal characteristics

A = increasing (eg. 4 ... 20 mA)

D = decreasing (eg. 20 ... 4 mA)

Linearity

L10 = ±0.10 % (standard)

L05 = ±0.05 % (optional)

Connection

KAB2M = cable output, standard length 2 m

Dust wiper

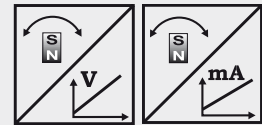
BAB1

Order example: WB100M - 2000 - U2/PMU - A - L10 - KAB2M - BAB1



Position sensor with measuring tape

- Measurement range up to 10000 mm
- Protection class IP68/IP69K
- Stainless steel measuring tape
- Analog output, redundant



Specifications	Outputs	U2R	Voltage 0.5 ... 10 V, redundant
		U8R	Voltage 0.5 ... 4.5 V, redundant
		I1R	Current 4 ... 20 mA, 3 wire, redundant
	Resolution		<0.05 mm
	Linearity		±0.10 % f. s. (standard); ±0.05 % (optional)
	Sensing device		Magnetic absolute encoder
	Material		Stainless steel and plastic; Tape: stainless steel, 10 mm wide, 0.08 mm thick
	Protection class		IP68/IP69K
	Connection		Cable output, standard length 2 m
	Shock		EN 60068-2-27:1993, 100 g/11 ms, 100 shocks
Vibration		EN 60068-2-6:1995, 20 g 10 Hz-2 kHz, 10 cycles	
EMC, temperature		Refer to output specification	

Order code WB100M



Model name

Measurement range (in mm)

2000 / 3500 / 7500 / 10000

Output

U2R = 0.5 ... 10 V signal conditioner, redundant

U8R = 0.5 ... 4.5 V signal conditioner, redundant

I1R = 4 ... 20 mA signal conditioner, redundant

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

Linearity

L10 = ±0.10 % (standard)

L05 = ±0.05 % (optional)

Connection

KAB2M = cable output, standard length 2 m

Dust wiper

BAB1

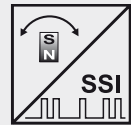
Order example: WB100M - 2000 - I1R - A/D - L10 - KAB2M - BAB1

POSITAPE®
WB100M
Digital output SSI



Position sensor with measuring tape

- Measurement range up to 10000 mm
- Protection class IP68/IP69K
- Stainless steel measuring tape
- Digital output SSI



Specifications	Output	Synchronous serial interface (SSI)
	Resolution	0.05 mm
	Linearity	±0.10 % f. s. (standard); ±0.05 % (optional)
	Sensing device	Magnetic absolute encoder
	Material	Stainless steel and plastic; Tape: stainless steel, 10 mm wide, 0.08 mm thick
	Protection class	IP68/IP69K
	Connection	Cable output, standard length 2 m
	Shock	EN 60068-2-27:1993, 100 g/11 ms, 100 shocks
	Vibration	EN 60068-2-6:1995, 20 g 10 Hz-2 kHz, 10 cycles
	EMC, temperature	Refer to output specification

Order code WB100M



Model name

Measurement range (in mm)

2000 / 3500 / 7500 / 10000

Resolution (in µm)

50 (other resolutions on demand)

Output

MSSI = SSI synchronous serial interface

Linearity

L10 = ±0.10% (standard)

L05 = ±0.05% (optional)

Connection

KAB2M = cable output, standard length 2 m

Dust wiper

BAB1

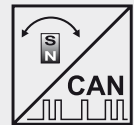
Order example: WB100M - 2000 - 50 - MSSI - L10 - KAB2M - BAB1

POSITAPE®
WB100M
Digital output CANopen



Position sensor with measuring tape

- Measurement range up to 10000 mm
- Protection class IP68/IP69K
- Stainless steel measuring tape
- Digital output CANopen or CAN SAE J1939
- Optional redundant CAN Bus (on demand)



Specifications	Output	CANopen or CAN SAE J1939
	Resolution	setting via CAN Bus
	Linearity	±0.10 % f. s. (standard); ±0.05 % (optional)
	Sensing device	Magnetic absolute encoder
	Material	Stainless steel and plastic; Tape: stainless steel, 10 mm wide, 0.08 mm thick
	Protection class	IP68/IP69K
	Connection	Cable output, standard length 2 m
	Shock	EN 60068-2-27:1993, 100 g/11 ms, 100 shocks
	Vibration	EN 60068-2-6:1995, 20 g 10 Hz-2 kHz, 10 cycles
	EMC, temperature	Refer to output specification

Bestellcode WB100M

WB100M - [] - [] - [] - [] - BAB1

Model name

Measurement range (in mm)

2000 / 3500 / 7500 / 10000

Output

MCANOP = CANopen

MCANJ1939 = CAN SAE J1939

Linearity

L10 = 0.10% (standard)

L05 = 0.05% (optional)

Connection

KAB2M = cable output, standard length 2 m

Dust wiper

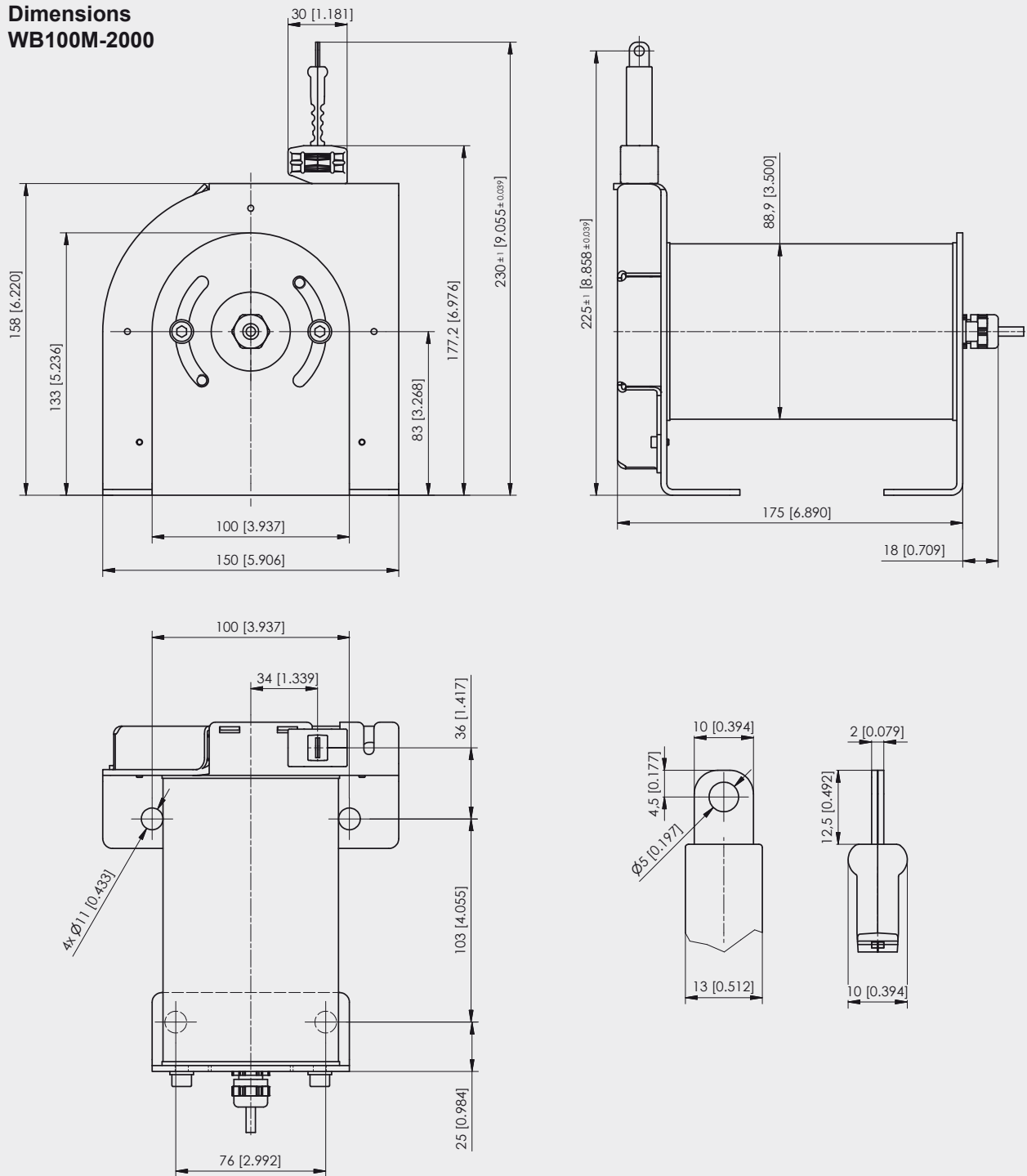
BAB1

Order example: WB100M - 2000 - MCANOP - L10 - KAB2M - BAB1

POSITAPE®
WB100M
Analog or digital output



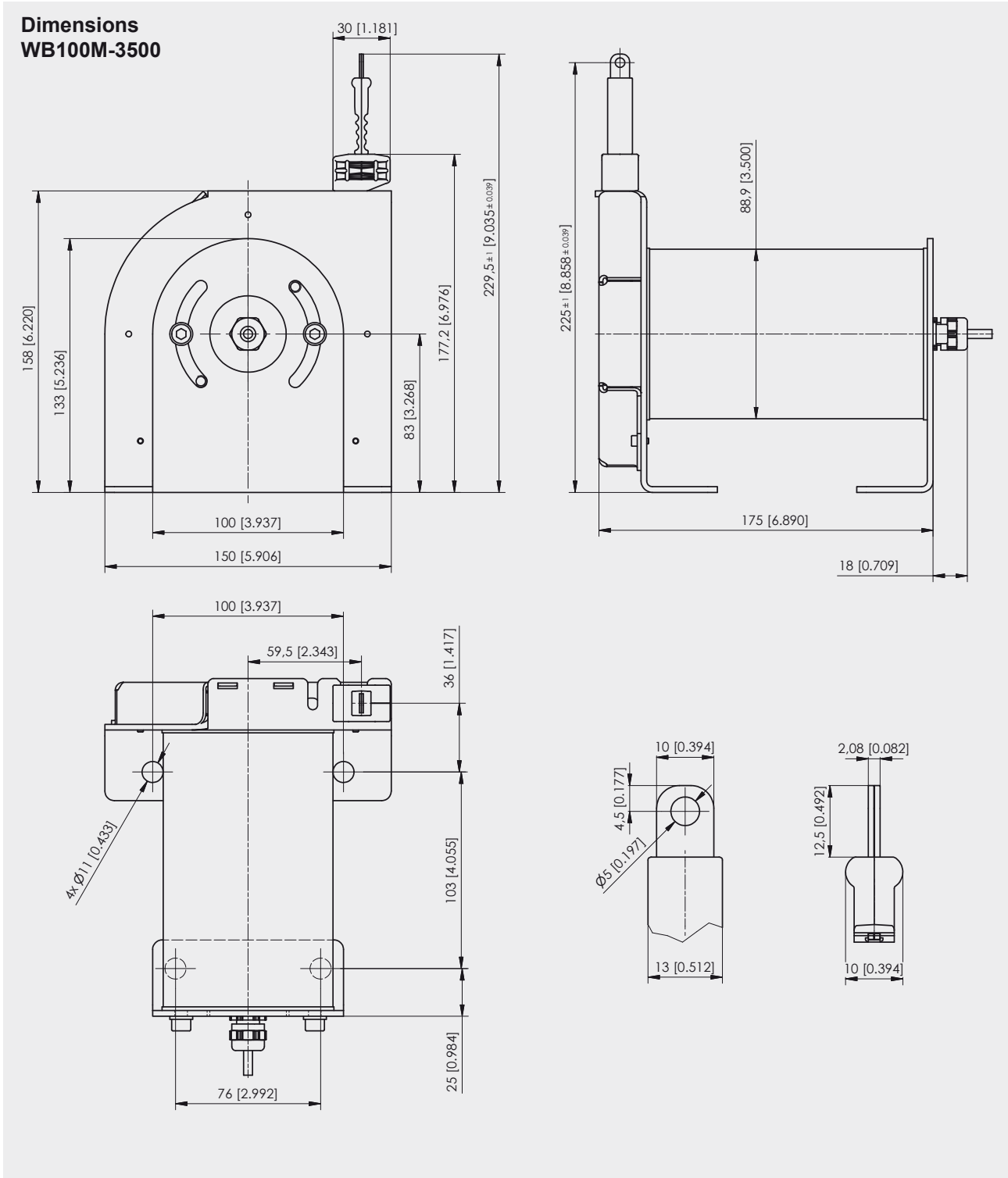
Dimensions
WB100M-2000



Dimensions in mm [inch]

Dimensions informative only.
 For guaranteed dimensions consult factory.

POSITAPE®
WB100M
Analog or digital output



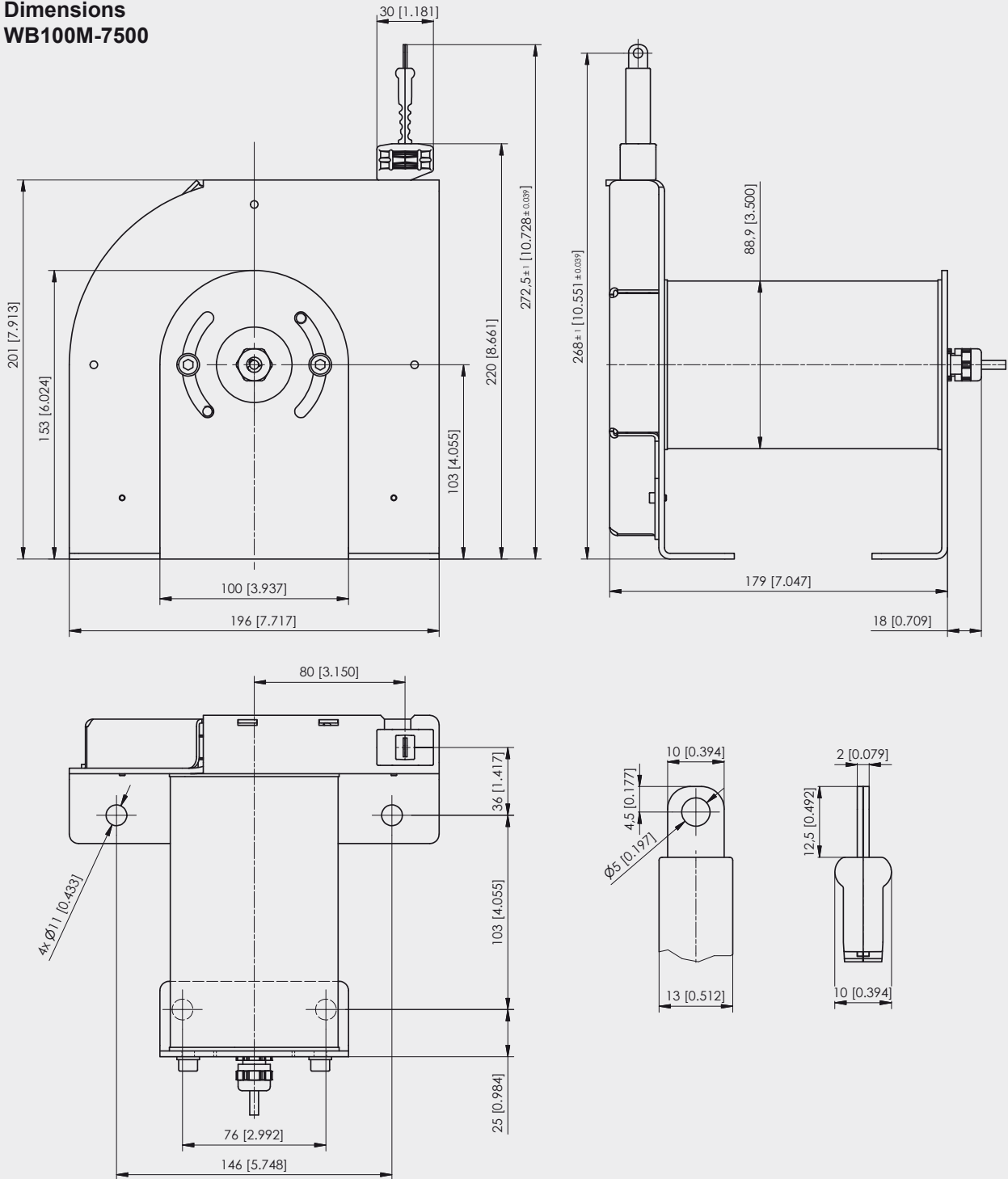
Dimensions in mm [inch]

Dimensions informative only.
 For guaranteed dimensions consult factory.

POSITAPE®
WB100M
Analog or digital output



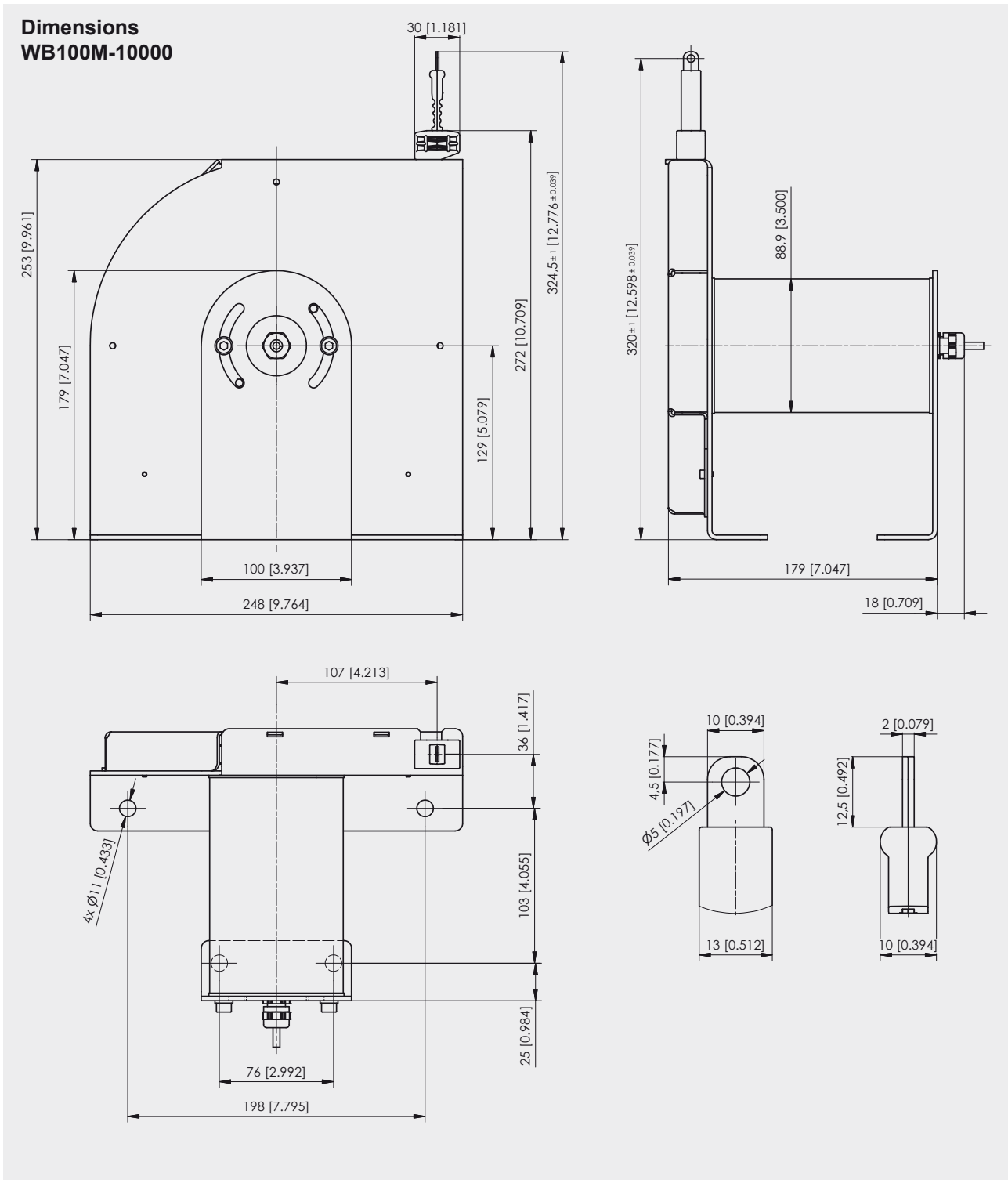
Dimensions
WB100M-7500



Dimensions in mm [inch]

Dimensions informative only.
 For guaranteed dimensions consult factory.

POSITAPE®
WB100M
 Analog or digital output



Dimensions in mm [inch]

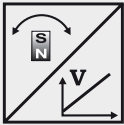
Dimensions informative only.
 For guaranteed dimensions consult factory.

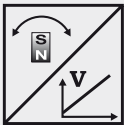
POSITAPE®

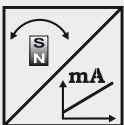
U2, U8 and I1

Analog output

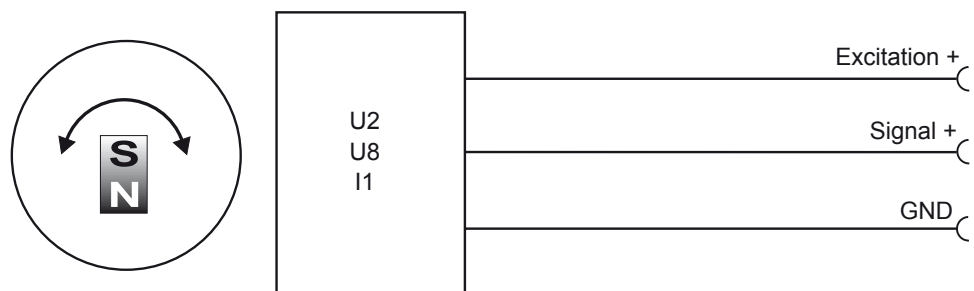


U2 Voltage output 0.5 ... 10 V 	Excitation voltage	10 ... 36 V DC
	Excitation current	typ. 20 mA at 24 V DC typ. 20 mA at 24 V DC max. 60 mA
	Output voltage	0.5 ... 10 V DC
	Output current	2 mA max.
	Measuring rate	1 kHz standard
	Stability (temperature)	$\pm 50 \times 10^{-6}/^{\circ}\text{C}$ f.s. (typ.)
	Protection	Reverse polarity, short circuit
	Operating temperature	-40 ... +85 °C
	EMC	EN61326-1:2006

U8 Voltage output 0.5 ... 4.5 V 	Excitation voltage	10 ... 36 V DC
	Excitation current	typ. 17 mA at 24 V DC typ. 32mA at 12 V DC max. 60 mA
	Output voltage	0.5 ... 4.5 V DC
	Output current	2 mA max.
	Measuring rate	1 kHz standard
	Stability (temperature)	$\pm 50 \times 10^{-6}/^{\circ}\text{C}$ f.s. (typ.)
	Protection	Reverse polarity, short circuit
	Operating temperature	-40 ... +85 °C
	EMC	EN61326-1:2006

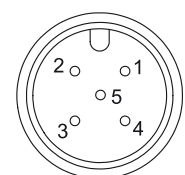
I1 Current output 4 ... 20 mA, 3 wire 	Excitation voltage	10 ... 36 V DC
	Excitation current	typ. 36 mA at 24 V DC typ. 70 mA at 12 V DC max. 100 mA
	Load R_L	500 Ω max.
	Output current	4 ... 20 mA
	Measuring rate	1 kHz standard
	Stability (temperature)	$\pm 50 \times 10^{-6}/^{\circ}\text{C}$ f.s. (typ.)
	Protection	Reverse polarity, short circuit
	Operating temperature	-40 ... +85 °C
	EMC	EN61326-1:2006

Output signals



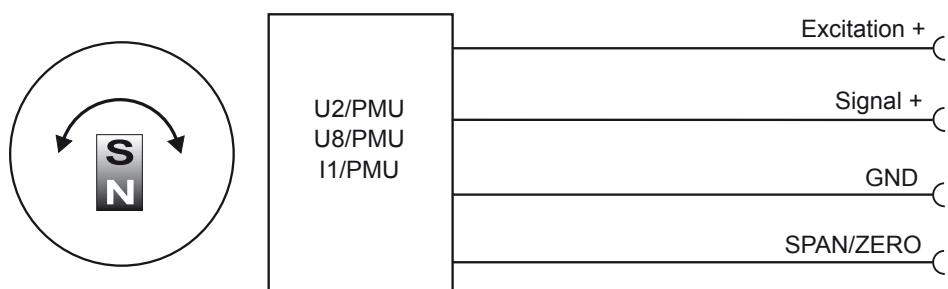
Signal wiring/ connection	Output signal	Connector pin	Cable wire color
	Excitation +	1	brown
	Signal	2	white
	GND	3	blue
	Do not connect!	4	black
	Do not connect!	5	(grey)

View to sensor
connector



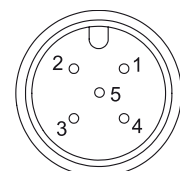
U2/PMU Voltage output 0.5 ... 10 V 	Excitation voltage	10 ... 36 V DC
	Excitation current	typ. 20 mA at 24 V DC, typ. 38 mA at 12 V DC max. 60 mA
	Output voltage	0.5 ... 10 V DC
	Output current	2 mA max.
	Measuring rate	1 kHz standard
	Stability (temperature)	$\pm 50 \times 10^{-6}/^{\circ}\text{C}$ f.s. (typ.)
	Protection	Reverse polarity, short circuit
	Operating temperature	-40 ... +85 °C
EMC	EN61326-1:2006	
U8/PMU Voltage output 0.5 ... 4.5 V 	Excitation voltage	10 ... 36 V DC
	Excitation current	typ. 17 mA at 24 V DC, typ. 32 mA at 12 V DC max. 60 mA
	Output voltage	0.5 ... 4.5 V DC
	Output current	2 mA max.
	Measuring rate	1 kHz standard
	Stability (temperature)	$\pm 50 \times 10^{-6}/^{\circ}\text{C}$ f.s. (typ.)
	Protection	Reverse polarity, short circuit
	Operating temperature	-40 ... +85 °C
EMC	EN61326-1:2006	
I1/PMU Current output 4 ... 20 mA, 3 wire 	Excitation voltage	10 ... 36 V DC
	Excitation current	typ. 36 mA at 24 V DC, typ. 70 mA at 12 V DC max. 100 mA
	Load R_L	500 Ω max.
	Output current	4 ... 20 mA
	Measuring rate	1 kHz standard
	Stability (temperature)	$\pm 50 \times 10^{-6}/^{\circ}\text{C}$ f.s. (typ.)
	Protection	Reverse polarity, short circuit
	Operating temperature	-40 ... +85 °C
EMC	EN61326-1:2006	

Output signals



Signal wiring/ connection	Signal	Connector pin	Cable wire color
	Excitation +	1	brown
	Signal	2	white
	GND	3	blue
	Do not connect!	4	black
	SPAN/ZERO	5	grey

View to sensor connector



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 taught positions will be stored non-volatile.

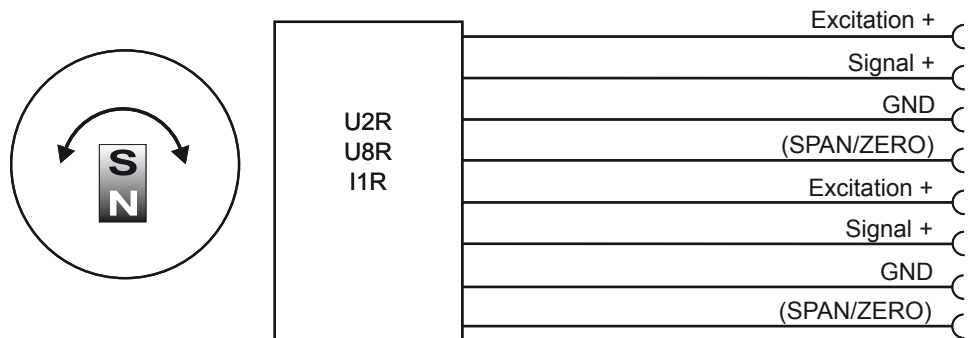
To reset the sensor to factory default signal ZERO/END must be connected to ground while powering up the sensor for 2 ... 3 seconds.

U2R Voltage output 0.5 ... 10 V 	Excitation voltage	10 ... 36 V DC
	Excitation current	typ. 22 mA at 24 V DC typ. 43mA at 12 V DC max. 60 mA per channel
	Output voltage	0.5 ... 10 V DC
	Output current	2 mA max.
	Measuring rate	1 kHz standard
	Stability (temperature)	$\pm 50 \times 10^{-6}/^{\circ}\text{C}$ f.s. (typ.)
	Protection	Reverse polarity, short circuit
	Operating temperature	-40 ... +85 °C
	EMC	EN61326-1:2006

U8R Voltage output 0.5 ... 4.5 V 	Excitation voltage	10 ... 36 V DC
	Excitation current	typ. 20mA at 24 V DC typ. 38mA at 12 V DC max. 60 mA per channel
	Output voltage	0.5 ... 4.5 V DC
	Output current	2 mA max.
	Measuring rate	1 kHz standard
	Stability (temperature)	$\pm 50 \times 10^{-6}/^{\circ}\text{C}$ f.s. (typ.)
	Protection	Reverse polarity, short circuit
	Operating temperature	-40 ... +85 °C
	EMC	EN61326-1:2006

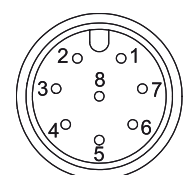
I1R Current output 4 ... 20 mA, 3 wire 	Excitation voltage	10 ... 36 V DC
	Excitation current	typ. 39 mA at 24 V DC typ. 76 mA at 12 V DC max. 100 mA per channel
	Load R_L	500 Ω max.
	Output current	4 ... 20 mA
	Measuring rate	1 kHz standard
	Stability (temperature)	$\pm 50 \times 10^{-6}/^{\circ}\text{C}$ f.s. (typ.)
	Protection	Reverse polarity, short circuit
	Operating temperature	-40 ... +85 °C
	EMC	EN61326-1:2006

Output signals



Signal wiring/ connection	Channel	Signal	Connector Pin	Cable wire color
	1	Excitation +	1	white
	1	Signal	2	brown
	1	GND	3	green
	1	SPAN/ZERO (Option PMU)	4	yellow
	2	Excitation +	5	grey
	2	Signal	6	pink
	2	GND	7	blue
	2	SPAN/ZERO (Option PMU)	8	red

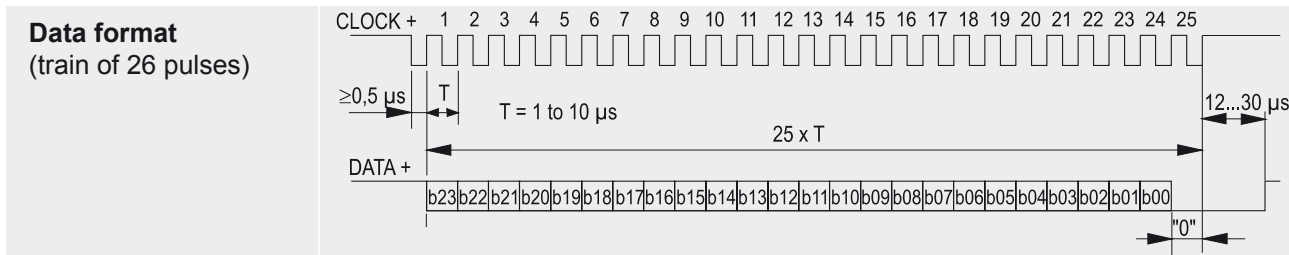
View to sensor connector



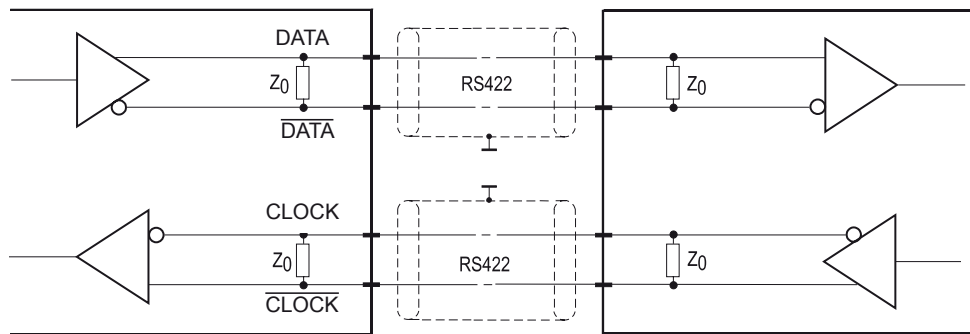
POSITAPE®
MSSI
Digital output SSI



MSSI Synchronous serial SSI 	Interface	EIA RS-422
	Excitation voltage	8 ... 36 V DC
	Excitation current	typ. 19 mA at 24 V DC typ. 35 mA at 12 V DC max. 80 mA
	Clock frequency	100 kHz ... 500 kHz
	Code	Gray-Code, continuous progression
	Delay between pulse trains	20 µs min.
	Stability (temperature)	$\pm 50 \times 10^{-6} / ^\circ\text{C}$ f.s. (typ.)
	Operating temperature	-40 ... +85 °C
	Protection	Short circuit
	EMC	EN61326-1:2006



Recommended processing circuit

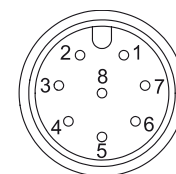



Transmission rate	Cable length	Baud rate
	50 m	100-400 kHz
100 m	100-300 kHz	

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

Signal wiring/ connection	Signal	Connector Pin	Cable wire color
	Excitation +	1	white
	Excitation GND	2	brown
	CLOCK	3	green
	CLOCK	4	yellow
	DATA	5	grey
	DATA	6	pink
	-	7	blu
	-	8	red

View to sensor connector

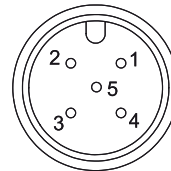


MCANOP CANopen 	Communication profile	CANopen CiA 301 V 4.02, Slave
	Encoder profile	Encoder CiA 406 V 3.2
	Error Control	Node Guarding, Heartbeat, Emergency Message
	Node ID	Adjustable via LSS; default: 127
	PDO	3 TxPDO, 0 RxPDO, no linking, static mapping
	PDO Modes	Event-/Time triggered, Remote-request, Sync cyclic/acyclic
	SDO	1 server, 0 client
	CAM	2 cams
	Certified	Yes
	Transmission rates	50 kbit to 1 Mbit, adjustable via LSS; default: 125 kbit
	Bus connection	M12 connector, 5 pins
	Integrated bus terminating resistor	120Ω adjustable by the customer
	Bus, galvanic isolated	No

Specifications	Excitation voltage	8 ... 36 V DC
	Excitation current	typ. 20 mA at 24 V DC typ. 40 mA at 12 V DC max. 80 mA
	Measuring rate	1 kHz (asynchronous)
	Stability (temperature)	$\pm 50 \times 10^{-6}$ / °C f.s.
	Repeatability	1 LSB
	Operating temperature	-40 ... +85 °C
	Protection	Reverse polarity, short circuit
	Dielectric strength	1 kV (V AC, 50 Hz, 1 min.)
	EMC	EN 61326-1:2006

Signal wiring/ connection	Signal name	Connector pin no.
	Shield	1
	Excitation +	2
	GND	3
	CAN-H	4
	CAN-L	5

View to sensor connector



POSITAPE®
MMCANJ1939
Output CAN SAE J1939



MCANJ1939 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

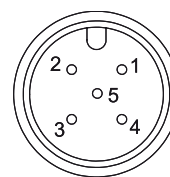
NAME Fields	Arbitrary address capable	1	Yes
	Industry group	0	Global
	Vehicle system	7Fh (127d)	Non specific
	Vehicle system instance	0	
	Function	FFh (255d)	Non specific
	Function instance	0	
	ECU instance	0	
	Manufacturer	145h (325d)	Manufacturer ID
	Identity number	0nnn	Serial number 21 bit

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	typ. 20 mA at 24 V, DC typ. 40 mA at 12 V DC max. 80 mA
	Measuring rate	1 kHz (asynchronous)
	Stability (temperature)	±50 x 10 ⁻⁶ / °C f.s.
	Repeatability	1 LSB
	Operating temperature	-40 ... +85 °C
	Protection	Reverse polarity, short circuit
	Dielectric strength	1 kV (V AC, 50 Hz, 1 min.)
	EMC	EN 61326-1:2006

Signal wiring / connection	Signal name	Connector pin no.
	Shield	1
	Excitation +	2
	GND	3
	CAN-H	4
	CAN-L	5

View to sensor connector



Connector cable
M12, 4 pin
Suitable for 5-pin
sensor connectors

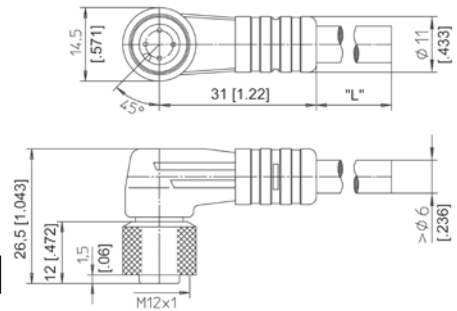
The 4-lead shielded cable is supplied with a mating 4-pin 90° M12 connector at one end and 4 wires at the other end. Available lengths are 2 m, 5 m and 10 m. Wire: cross sectional area 0.34 mm².

Order code:

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

IP69K: **KAB - XM - M12/4F/W/69K - LITZE**

Length in m



Connector cable
M12, 4 pin
Suitable for 5-pin
sensor connectors

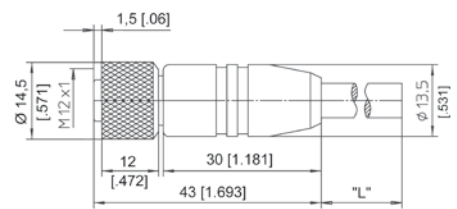
The 4-lead shielded cable is supplied with a mating 4-pin M12 connector at one end and 4 wires at the other end. Available lengths are 2 m, 5 m and 10 m. Wire: cross sectional area 0.34 mm².

Order code:

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

IP69K: **KAB - XM - M12/4F/G/69K - LITZE**

Length in m



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

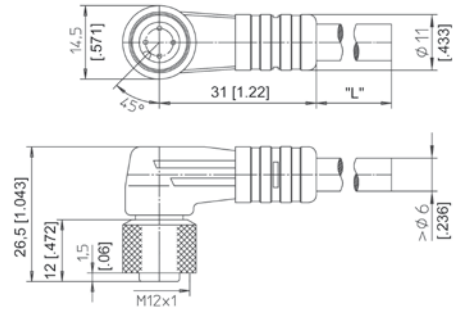
Connector cable
M12, 5 pin

The 5-lead shielded cable is supplied with a mating 5-pin 90° M12 connector at one end and 5 wires at the other end. Available lengths are 2 m, 5 m and 10 m. Wire: cross sectional area 0.34 mm².
Order code:

KAB - XM - M12/5F/W - LITZE

IP69K: **KAB - XM - M12/5F/W/69K - LITZE**

Length in m



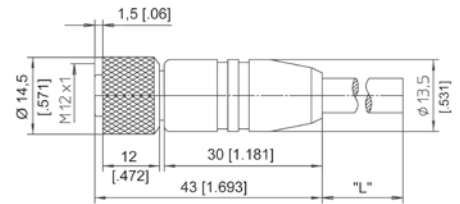
Connector cable
M12, 5 pin

The 5-lead shielded cable is supplied with a mating 5-pin M12 connector at one end and 5 wires at the other end. Available lengths are 2 m, 5 m and 10 m. Wire: cross sectional area 0.34 mm².
Order code:

KAB - XM - M12/5F/G - LITZE

IP69K: **KAB - XM - M12/5F/G/69K - LITZE**

Length in m

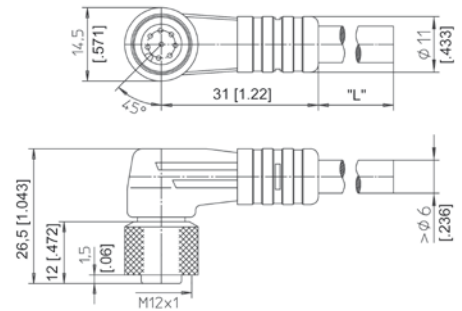


Signal wiring M12, 5 pin	Connector pin / cable color				
	1	2	3	4	5
	brown	white	blue	black	grey

Connector cable
M12, 8 pin

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.
Order code:

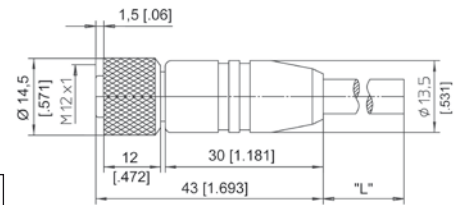
KAB - XM - M12/8F/W - LITZE
IP69K: **KAB - XM - M12/8F/W/69K - LITZE**
Length in m ↑



Connector cable
M12, 8 pin

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.
Order code:

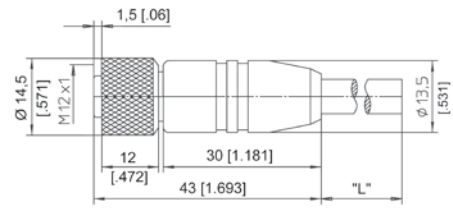
KAB - XM - M12/8F/G - LITZE
IP69K: **KAB - XM - M12/8F/G/69K - LITZE**
Length in m ↑



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

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, 2, 5 and 10 m.



Order code:

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

IP69K: **KAB - XM - M12/5F/G/69K - M12/5M/G/69K - CAN**

Length in m

T-piece for bus cable
M12, 5 pin
CAN bus

Order code:

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



Terminating resistance
5 pin M12
CAN bus

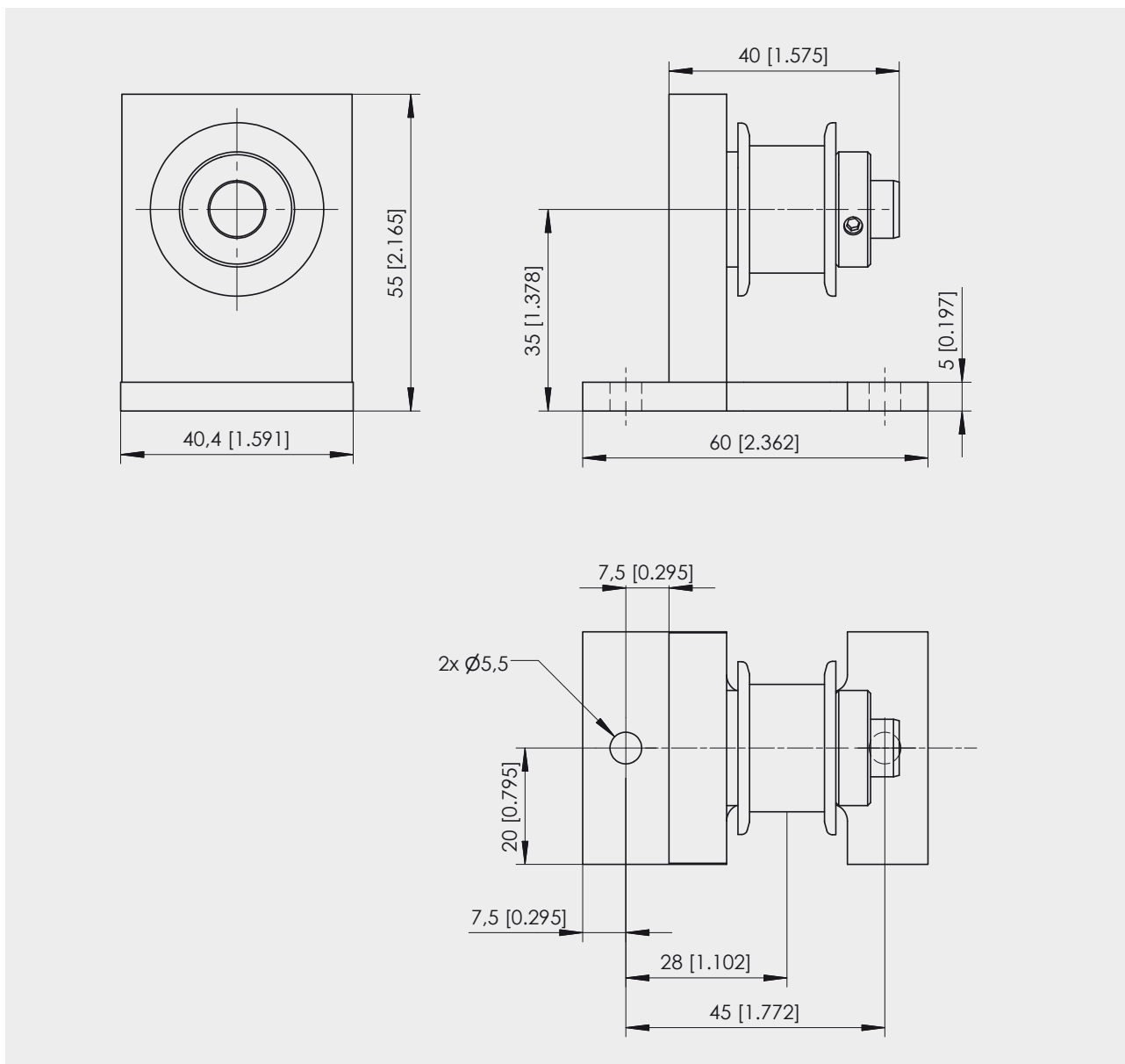
Order code:

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



Tape pulley WBR1

Order code: **WBR1**



Dimensions in mm [inch]

Dimensions informative only.
For guaranteed dimensions consult factory.

Protection Classes According to EN 60529



2nd char. numeral: Protection against ingress of water 1st char. numeral: Protection against solid foreign objects									
Protection against ...	Non protected	Falling water drops vertical / 15°	Spraying water	Splashing water	Water jets	Powerful water jets	Temporary immersion	Continuous Immersion	
EN 60529	IP .. 0	IP .. 1	IP .. 2	IP .. 3	IP .. 4	IP .. 5	IP .. 6	IP .. 8	
IP 0 .. Non 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!

IP69K - Water at high pressure / steam jet cleaning

Note: IP67 / IP69K does not include IP68



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