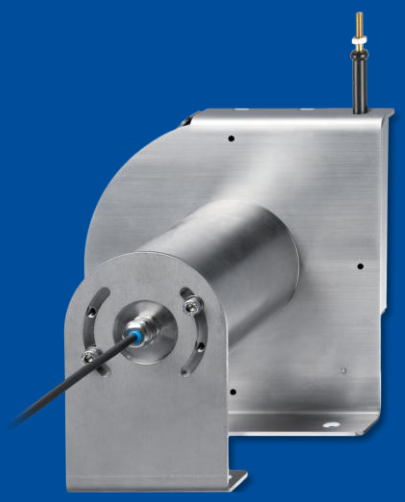
posiwire®
Cable Extension Position Sensors

WS100M

Displacement sensor with measurement length up to 10,000 mm for underwater applications

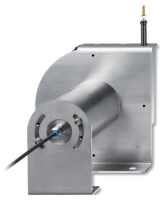


- **Protection class up to IP68/IP69**
- **Stainless steel housing**
- **With magnetic absolute encoder**
- **Redundant version available**

Product versions

Ω / V / mA	**Analog output**
V / mA	**Analog output with magnetic encoder**
V / mA	**Analog output with magnetic encoder, programmable**
V / mA	**Analog output with magnetic encoder, redundant**
SSI	**Digital output SSI with magnetic encoder**
CAN	**Digital output CAN Bus with magnetic encoder**

Ω V / mA



WS100M - Cable Extension Position Sensor
Version with analog output

Specifications

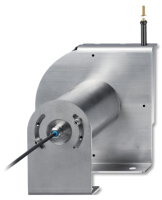
			Order options
Messbereich	2000 / 3500 / 7500 / 10000 mm	1	**2000 / 3500 / 7500 / 10000**
Resolution	Quasi infinite		
Output	Potentiometer 1 kΩ Voltage 0 ... 10 V Current 4 ... 20 mA, 2 wire Current 4 ... 20 mA, 3 wire	2	**R1K** **10V** **420A** **420T**
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)	3	**L10** **L05**
Sensing device	Precision potentiometer		
Material	Stainless steel measuring cablel: stainless steel		
Protection class	IP68/IP69		
Cable fixing	M4 cable fixing	4	**M4VA**
Connection	Cable output, standard length 2 m	5	**KAB2M**
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

Order example: WS100M – 7500 – 420T – L10 – M4VA – KAB2M

V / mA



WS100M - Cable Extension Position Sensor

Version with analog output with magnetic encoder

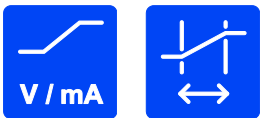
Specifications

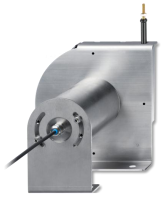
			Order options
Measurement range	2000 / 3500 / 7500 / 10000 mm	1	**2000 / 3500 / 7500 / 10000**
Resolution	<0.002% f.s.		
Output	Voltage 0.5 ... 10 V Voltage 0.5 ... 4.5 V Current 4 ... 20 mA, 3 wire	2	**U2** **U8** **I1**
Signal characteristics	Increasing signal (e.g. 4 ... 20 mA) Decreasing signal (e.g. 20 ... 4 mA)	3	**A** **D**
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)	4	**L10** **L05**
Sensing device	Magnetic absolute encoder		
Material	Stainless steel measuring cablel: stainless steel		
Protection class	IP68/IP69		
Cable fixing	M4 cable fixing	5	**M4VA**
Connection	Cable output, standard length 2 m	6	**KAB2M**
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

Order example: WS100M – 7500 – U2 – A – L10 – M4VA – KAB2M





WS100M - Cable Extension Position Sensor

Version with analog output with magnetic encoder, programmable

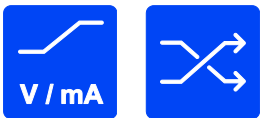
Specifications

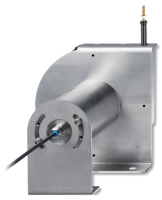
			Order options
Measurement range	2000 / 3500 / 7500 / 10000 mm	1	**2000 / 3500 / 7500 / 10000**
Resolution	<0.002% f.s.		
Output	Voltage 0.5 ... 10 V, programmable Voltage 0.5 ... 4.5 V, programmable Current 4 ... 20 mA, 3 wire, programmable	2	**U2/PMU** **U8/PMU** **I1/PMU**
Signal characteristics	Increasing signal (e.g. 4 ... 20 mA) Decreasing signal (e.g. 20 ... 4 mA)	3	**A** **D**
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)	4	**L10** **L05**
Sensing device	Magnetic absolute encoder		
Material	Stainless steel measuring cablel: stainless steel		
Protection class	IP68/IP69		
Cable fixing	M4 cable fixing	5	**M4VA**
Connection	Cable output, standard length 2 m	6	**KAB2M**
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

Order example: WS100M – 7500 – U2/PMU – A – L10 – M4VA – KAB2M





WS100M - Cable Extension Position Sensor

Version with analog output with magnetic encoder, redundant

Specifications

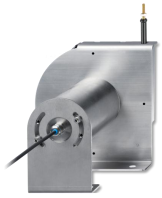
			Order options
Measurement range	2000 / 3500 / 7500 / 10000 mm	1	**2000 / 3500 / 7500 / 10000**
Resolution	<0.002% f.s.		
Output	Voltage 0.5 ... 10 V, redundant Voltage 0.5 ... 4.5 V, redundant Current 4 ... 20 mA, 3 wire, redundant	2	**U2R** **U8R** **I1R**
Signal characteristics	Output 1 increasing, output 2 increasing Output 1 increasing, output 2 decreasing Output 1 decreasing, output 2 decreasing	3	**A/A** **A/D** **D/D**
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)	4	**L10** **L05**
Sensing device	Magnetic absolute encoder		
Material	Stainless steel measuring cablel: stainless steel		
Protection class	IP68/IP69		
Cable fixing	M4 cable fixing	5	**M4VA**
Connection	Cable output, standard length 2 m	6	**KAB2M**
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

Order example: WS100M – 7500 – I1R – A – L10 – M4VA – KAB2M

SSI



WS100M - Cable Extension Position Sensor

Version with digital output SSI with magnetic encoder

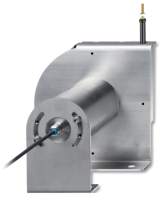
Specifications

			Order options
Measurement range	2000 / 3500 / 7500 / 10000 mm	1	**2000 / 3500 / 7500 / 10000**
Resolution	50 µm	2	**50**
Output	SSI synchronous serial interface	3	**MSSI**
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)	4	**L10** **L05**
Sensing device	Magnetic absolute encoder		
Material	Stainless steel measuring cablel: stainless steel		
Protection class	IP68/IP69		
Cable fixing	M4 cable fixing	5	**M4VA**
Connection	Cable output, standard length 2 m	6	**KAB2M**
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

Order example: WS100M – 7500 – 50 – MSSI – L10 – M4VA – KAB2M



WS100M - Cable Extension Position Sensor
Version with digital output CAN Bus with magnetic encoder

Specifications

			Order options
Measurement range	2000 / 3500 / 7500 / 10000 mm	1	**2000 / 3500 / 7500 / 10000**
Resolution	setting via CAN Bus		
Output	CANopen CAN SAE J1939 CANopen redundant CAN SAE J1939 redundant	2	**MCANOP** **MCANJ1939** **MCANOPR** **MCANJ1939R**
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)	3	**L10** **L05**
Sensing device	Magnetic absolute encoder		
Material	Stainless steel measuring cablel: stainless steel		
Protection class	IP68/IP69		
Cable fixing	M4 cable fixing	4	**M4VA**
Connection	Cable output, standard length 2 m	5	**KAB2M**
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		

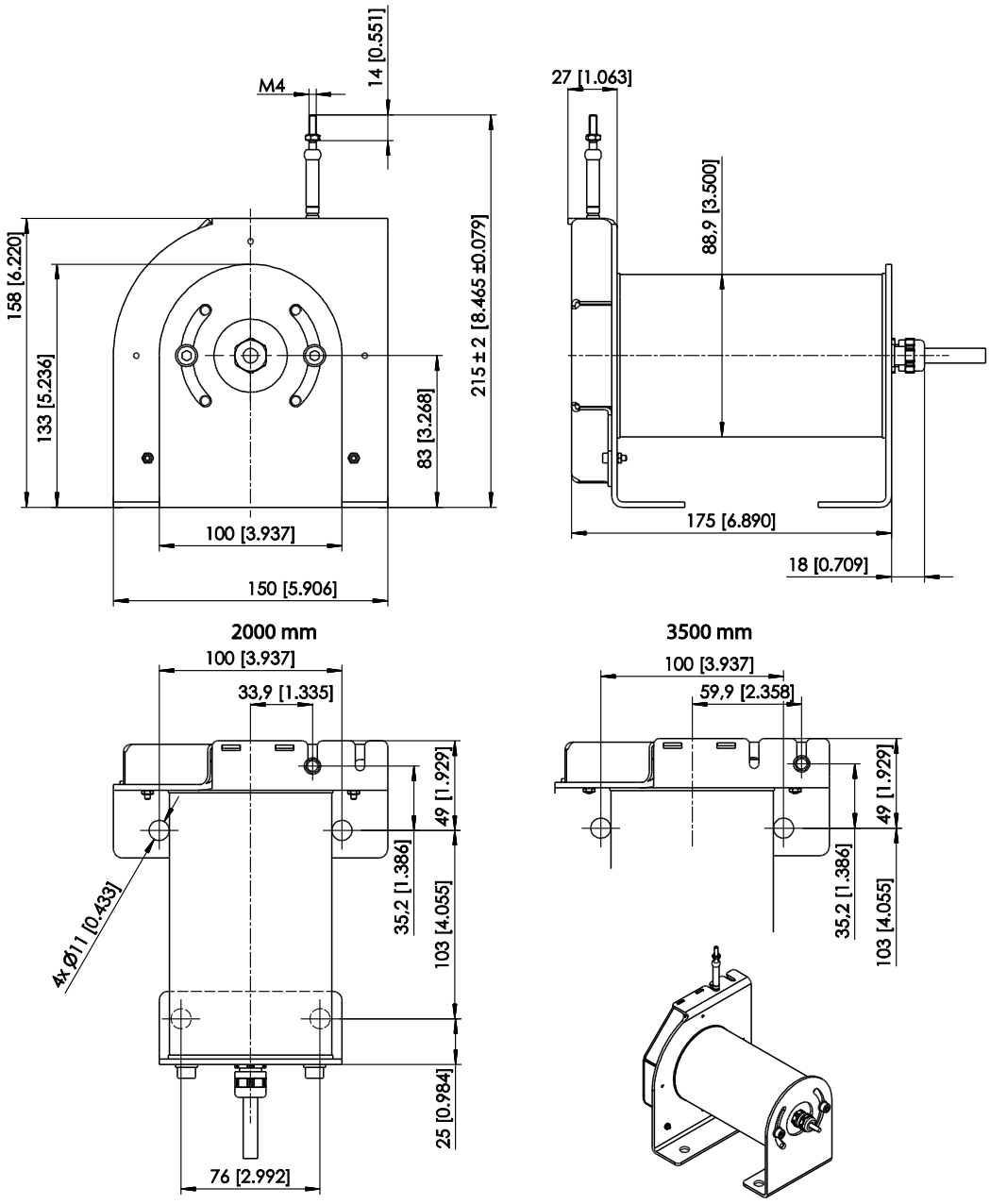
Order code

WS100M – 1 – 2 – 3 – 4 – 5

Order example: WS100M – 7500 – MCANOP – L10 – M4VA – KAB2M

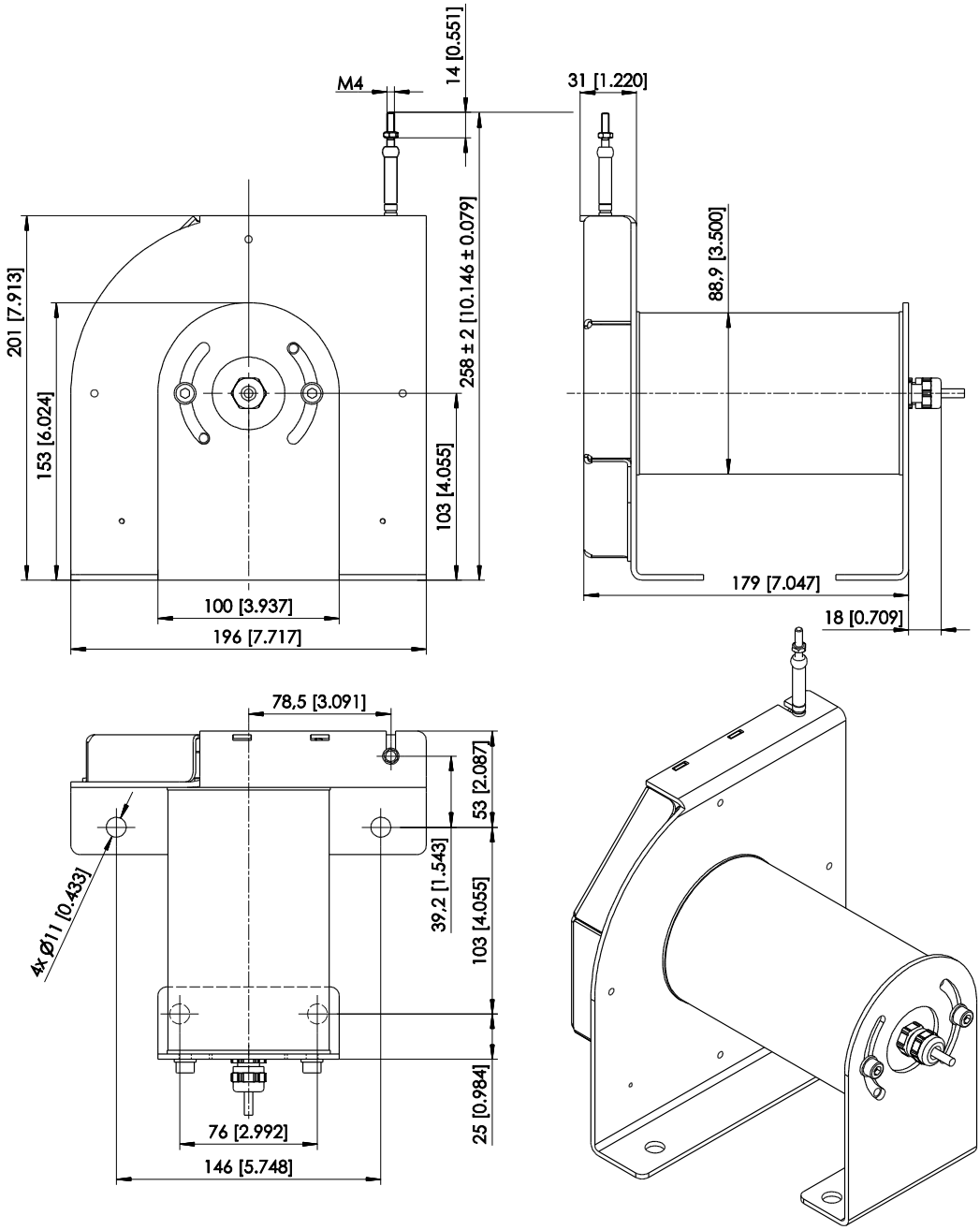
Dimensions

Measurement range 2000 … 3500 mm



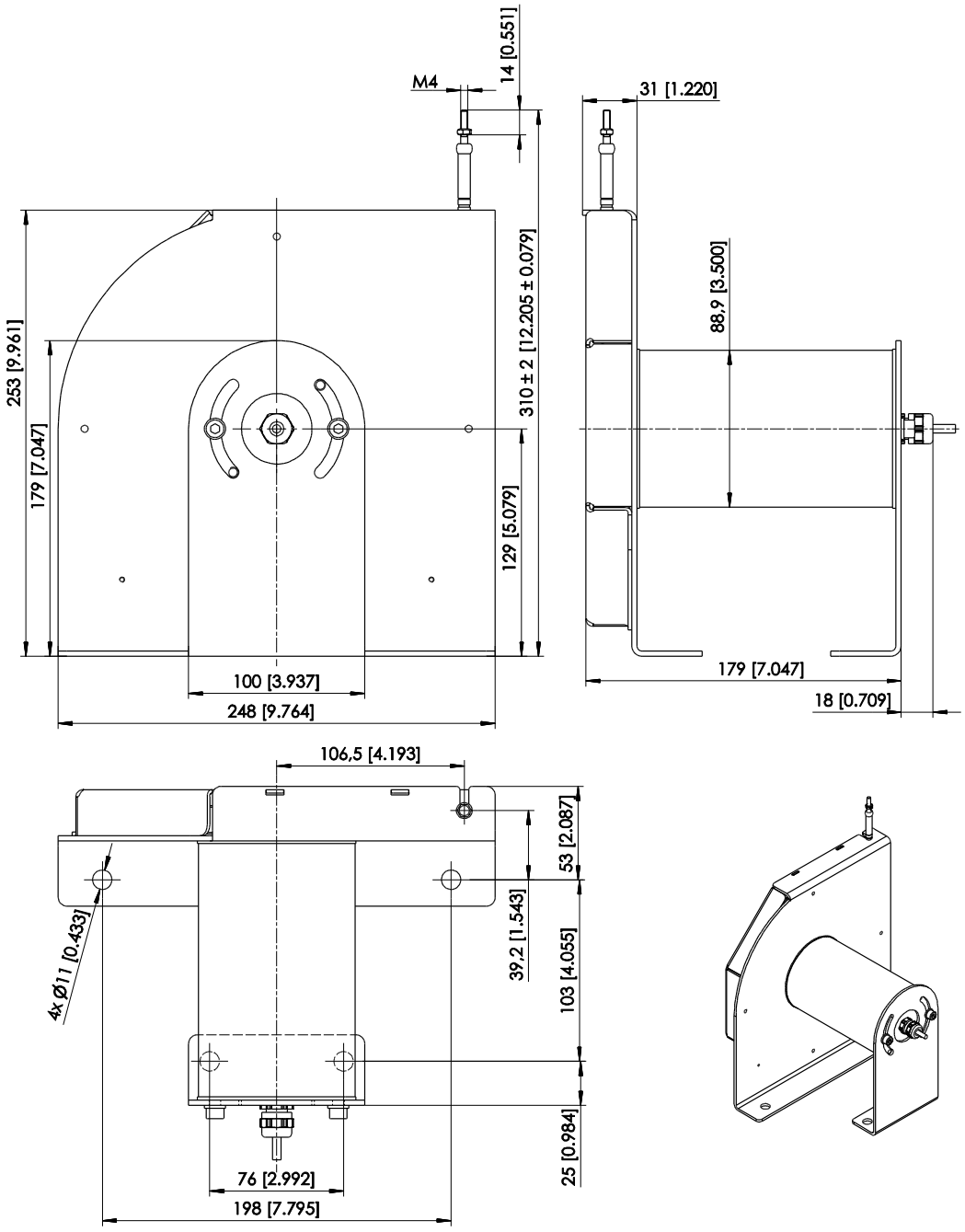
Dimensions in mm [inch]
Dimensions informative only.
For guaranteed dimensions consult factory.

Measurement range 7500 mm



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

Measurement range 10000 mm



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

NOTICE

The potentiometer must be connected as a voltage divider!

The following processing circuit has to be implemented according to the circuit scheme in the Appendix (see „Output information“)!

Electrical current flow impact on the wiper causes linearity errors and shortens the lifetime of the potentiometer

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

Additional information:
https://www.asm-sensor.com/en/downloads.html?file=files/asmTheme/pdf/ws_poti_technote_en.pdf

Signal wiring	**Signal**	**Cable color**
	Poti +	white
	Poti GND	brown
	Poti slider	green
	-	yellow
	-	grey
	-	pink
	-	blue
	-	red

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

Signal wiring	**Output signals**	**Cable color**
	Excitation +	white
	Excitation GND*	brown
	Signal +	green
	Signal GND*	yellow
	Not connected	grey
	Not connected	pink
	Not connected	blue
	Not connected	red

*: internally connected

420A Current output (2 wire) 	Excitation voltage	18 ... 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

Signal wiring	**Output signals**	**Cable color**
	Signal +	white
	Signal -	brown
	Not connected	green
	Not connected	yellow
	Not connected	grey
	Not connected	pink
	Not connected	blue
	Not connected	red

420T Current output (3 wire) 	Excitation voltage	18 ... 27 V DC non stabilized
	Excitation current	40 mA max.
	Load resistor	350 Ω max.
	Output current	4 ... 20 mA equivalent for 0 ... 100 % range
	Stability (temperature)	±50 x 10^{-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

Signal wiring	**Output signals**	**Cable color**
	Excitation +	white
	Excitation GND*	brown
	Signal +	green
	Signal GND*	yellow
	Not connected	grey
	Not connected	pink
	Not connected	blue
	Not connected	red

*: internally connected

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	Output signals	Cable color
	Excitation +	brown
	Signal	white
	GND	blue
	Do not connect!	black
	SPAN/ZERO	(grey)

Magnetic encoder, 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	Output signals	Cable color
	Excitation +	brown
	Signal	white
	GND	blue
	Do not connect!	black
	SPAN/ZERO	grey

Output …/PMU

Programming of the start and end value by the customer (programmable)

Teach-In of start and end value for the analog outputs U2/PMU, U8/PMU, I1/PMU is provided by a binary signal SPAN/ZERO. At the start position connect signal SPAN/ZERO for a period of 2 ... 3 seconds to GND via push button. At the end position connect signal SPAN/ZERO for a period of 5 ... 6 seconds to GND via a push button. The scaling range will be stored non-volatile.

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

Magnetic encoder, 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 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 specification of the respective sensor
	EMC	DIN EN 61326-1:2013

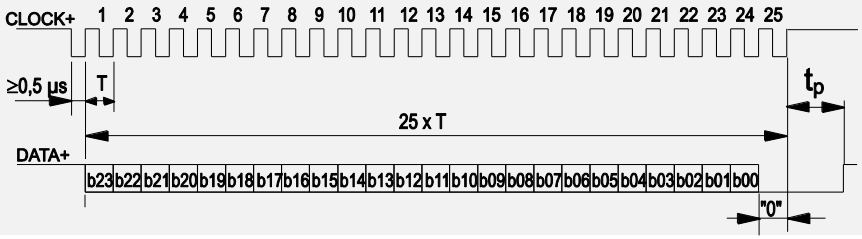
I1R Current output 4 … 20 mA, 3 wires 	Excitation voltage	8 … 36 V DC
	Excitation current	36 mA typical at 24 V DC 76 mA typical at 12 V DC max. 120 mA per channel
	Load R_L	500 Ω max.
	Output current	4 … 20 mA
	Measuring rate	1 kHz standard
	Stability (temperature)	±50 x 10^{-6} / °C f.s. (typical)
	Protection	Reverse polarity, short circuit
	Operating temperature	See specification of the respective sensor
	EMC	DIN EN 61326-1:2013

Signal wiring	Channel	Output signals	Cable color
	1	Excitation +	white
		Signal	brown
		GND	green
		Do not connect!	yellow
	2	Excitation +	grey
		Signal	pink
		GND	blue
		Do not connect!	red

Magnetic encoder, digital output

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)



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

Signal wiring	**Output signals**	**Cable color**
	Excitation +	white
	Excitation GND	brown
	CLOCK	green
	$\overline{\text{CLOCK}}$	yellow
	DATA	grey
	$\overline{\text{DATA}}$	pink
	-	blue
	-	red

MCANOP, CANOPR CANopen 	CAN specification	ISO 11898, Basic and Full CAN 2.0 B
	Communication profile	CANopen CiA 301 V 4.02, Slave
	Encoder profile	Encoder CiA 406 V 3.2
	Error Control	Node Guarding, Heartbeat, Emergency Message
	Node ID	Adjustable via LSS or SDO, default: 127
	PDO	3 TxPDO, 0 RxPDO, no linking, static mapping
	PDO Modes	Event-/Time triggered, Remote-request, Sync cyclic/acyclic
	SDO	1 Server, 0 Client
	CAM	8 cams
	Certified	Yes
	Transmission rate	50 kBit bis 1 Mbit, adjustable via LSS or SDO, default: 125 kBit
	Bus connection	M12 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	**Output signals**	**Cable color**
	Shield	brown
	Excitation +	white
	GND	blue
	CAN-H	black
	CAN-L	grey

MCANJ1939, MCANJ1939R 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	Output signals	Cable color
	Shield	brown
	Excitation +	white
	GND	blue
	CAN-H	black
	CAN-L	grey