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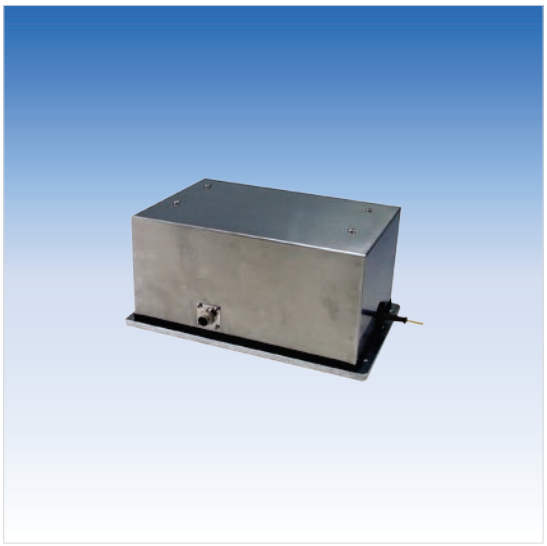
POSIWIRE®

Cable Extension Position Sensors

WS7.5
Position Sensor

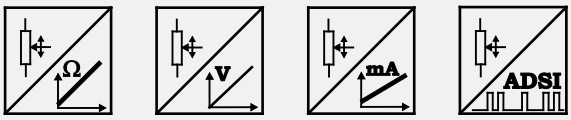
Datasheet

Analog output, SSI output



Sensor features

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



Specifications

Output	**R1K** = Potentiometer 1 kΩ **10V** = Voltage 0 ... 10 V **420A** = Current 4 ... 20 mA, 2- wires **420T** = Current 4 ... 20 mA, 3 wires **PMUI** = Current output, programmable **PMUV** = Voltage output, programmable **ADSI** = Signal conditioner SSI 12 bit,replaced by MSSI12 **ADSI14** = Signal conditioner SSI 14 bit,replaced by MSSI14 **ADSI16** = Signal conditioner SSI 16 bit,replaced by MSSI16
Resolution	Analog: quasi infinite
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)
Sensing device	Precision potentiometer
Housing material	Aluminium, stainless steel and plastic; measuring cable: stainless steel
Protection class	IP52
Connection	Connector M12, 8 pin
Temperature range	-20 ... +85 °C
Weight	Approx. 10 kg
EMC	DIN EN 61326-1:2013

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

Order code

WS7.5 – **1** – **2** – **3** – **4** – **5**

1 Measurement range (in mm)

10000 / 20000 / 30000 / 40000

2 Output

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

3 Linearity

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

4 Cable fixing

M4	= M4 cable fixing
SB0	= cable clip

5 Connection

M12	= Connector M12, 8 pin

Order example

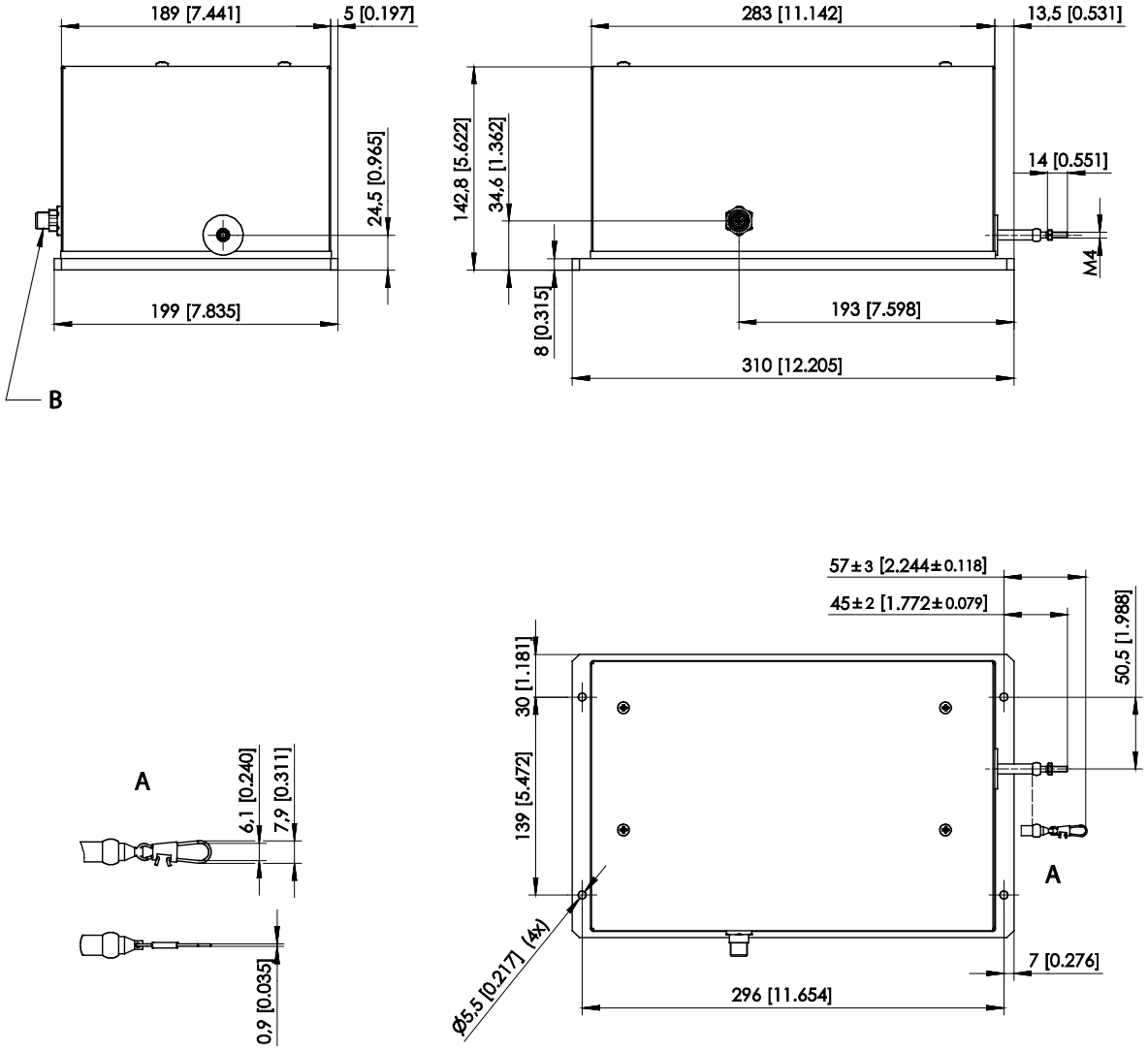
WS7.5 – 30000 – 420T – L10 – M4 – M12

Accessories:

Connector cable (see page 49)

Dimensions

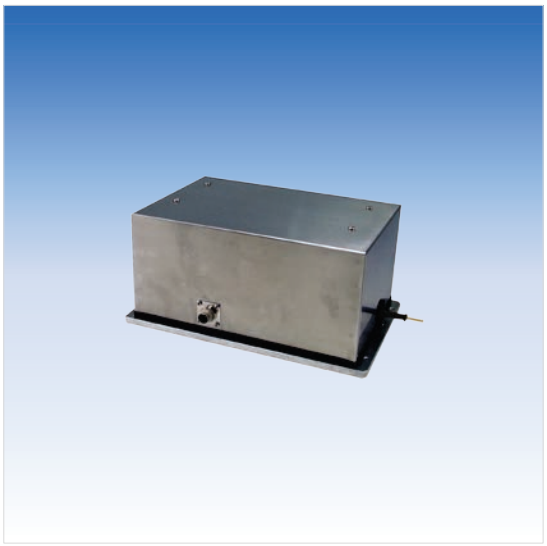
Measurement range 10000 … 40000 mm, analog output, SSI output



A – Option SB0
B – Connector M12

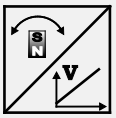
Dimensions in mm [inch]
Dimensions informative only.
For guaranteed dimensions consult factory.

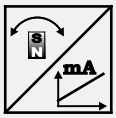
Magnetic encoder, analog output



Sensor features

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





Specifications

Output	**U2** = Voltage 0.5 ... 10 V **U8** = Voltage 0.5 ... 4.5 V **I1** = Current 4 ... 20 mA, 3 wire
Resolution	<0.002% f.s.
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)
Sensing device	Magnetic absolute encoder
Housing material	Aluminium, stainless steel and plastic; measuring cable: stainless steel
Protection class	IP52
Connection	Connector M12, 5 pin (standard) Connector M12, 8 pin (optional)
Shock	DIN EN 60068-2-27:2010, 100 g/11 ms, 100 shocks
Vibration	DIN EN 60068-2-6:2008, 20 g 10 Hz-2 kHz, 10 cycles
Temperature range	-20 ... +85 °C
Weight	Approx. 10 kg
EMC	DIN EN 61326-1:2013

Order code

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

1 Measurement range (in mm)

10000 / 15000 / 20000 / 25000 / 30000 / 40000

2 Output

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

3 Signal characterisitics

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

4 Linearity

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

5 Cable fixing

M4	= M4 cable fixing
SB0	= cable clip

6 Connection

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

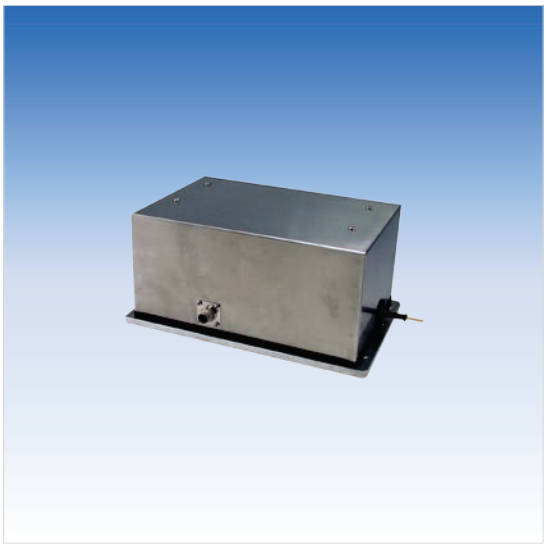
Order example

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

Accessories:

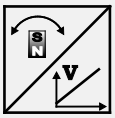
Connector cable (see page 47)

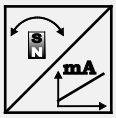
Magnetic encoder, analog output, programmable



Sensor features

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





Specifications

Output	**U2/PMU** = Voltage 0.5 ... 10 V, programmable **U8/PMU** = Voltage 0.5 ... 4.5 V, programmable **I1/PMU** = Current 4 ... 20 mA, 3 wire, programmable
Resolution	<0.002% f.s.
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)
Sensing device	Magnetic absolute encoder
Housing material	Aluminium, stainless steel and plastic; measuring cable: stainless steel
Protection class	IP52
Connection	Connector M12, 5 pin
Shock	DIN EN 60068-2-27:2010, 100 g/11 ms, 100 shocks
Vibration	DIN EN 60068-2-6:2008, 20 g 10 Hz-2 kHz, 10 cycles
Temperature range	-20 ... +85 °C
Weight	Approx. 10 kg
EMC	DIN EN 61326-1:2013

Order code

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

1 Measurement range (in mm)

10000 / 15000 / 20000 / 25000 / 30000 / 40000

2 Output

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

3 Signal characteristics

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

4 Linearity

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

5 Cable fixing

M4	= M4 cable fixing
SB0	= cable clip

6 Connection

M12A5	= Connector M12, 5 pin

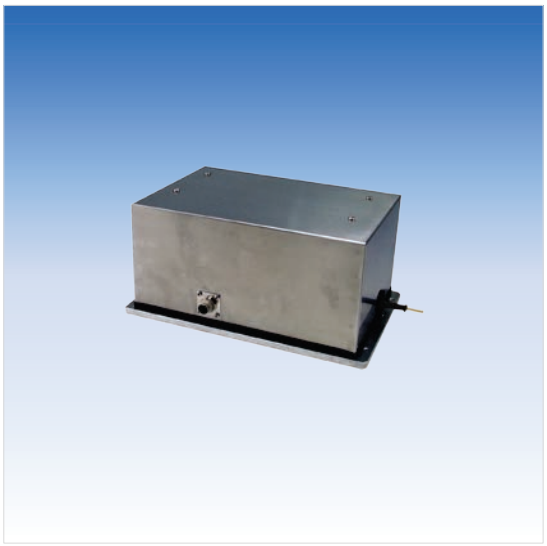
Order example

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

Accessories:

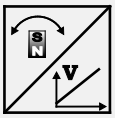
Connector cable (see page 48)

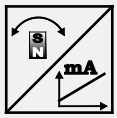
Magnetic encoder, analog output, redundant



Sensor features

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





Specifications

Output	**U2R** = Voltage 0.5 ... 10 V, redundant **U8R** = Voltage 0.5 ... 4.5 V, redundant **I1R** = Current 4 ... 20 mA, 3 wire, redundant
Resolution	<0.002% f.s.
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)
Sensing device	Magnetic absolute encoder
Housing material	Aluminium, stainless steel and plastic; measuring cable: stainless steel
Protection class	IP52
Connection	Connector M12, 8 pin
Shock	DIN EN 60068-2-27:2010, 100 g/11 ms, 100 shocks
Vibration	DIN EN 60068-2-6:2008, 20 g 10 Hz-2 kHz, 10 cycles
Temperature range	-20 ... +85 °C
Weight	Approx. 10 kg
EMC	DIN EN 61326-1:2013

Order code

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

1 Measurement range (in mm)

10000 / 15000 / 20000 / 25000 / 30000 / 40000

2 Output

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

3 Signal characteristics

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

4 Linearity

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

5 Cable fixing

M4	= M4 cable fixing
SB0	= cable clip

6 Connection

M12A8	= Connector M12, 8 pin

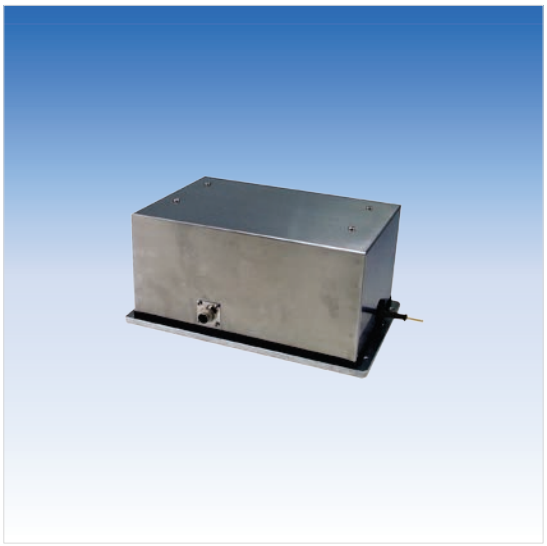
Order example

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

Accessories:

Connector cable (see page 48)

Magnetic encoder, digital output SSI



Sensor features

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

Specifications

Output	**MSSI** = SSI synchronous serial interface
Resolution	100
Linearity	±0.10% f.s. (standard) ±0.05% f.s. (optional)
Sensing device	Magnetic absolute encoder
Housing material	Aluminium, stainless steel and plastic; measuring cable: stainless steel
Protection class	IP52
Connection	Connector M12, 8 pin
Shock	DIN EN 60068-2-27:2010, 100 g/11 ms, 100 shocks
Vibration	DIN EN 60068-2-6:2008, 20 g 10 Hz-2 kHz, 10 cycles
Temperature range	-20 ... +85 °C
Weight	Approx. 10 kg
EMC	DIN EN 61326-1:2013

Order code

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

1 Measurement range (in mm)

10000 / 15000 / 20000 / 25000 / 30000 / 40000

2 Resolution (in µm)

100

3 Output

MSSI	= SSI synchronous serial interface

4 Linearity

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

5 Cable fixing

M4	= M4 cable fixing
SB0	= cable clip

6 Connection

M12A8	= Connector M12, 8 pin

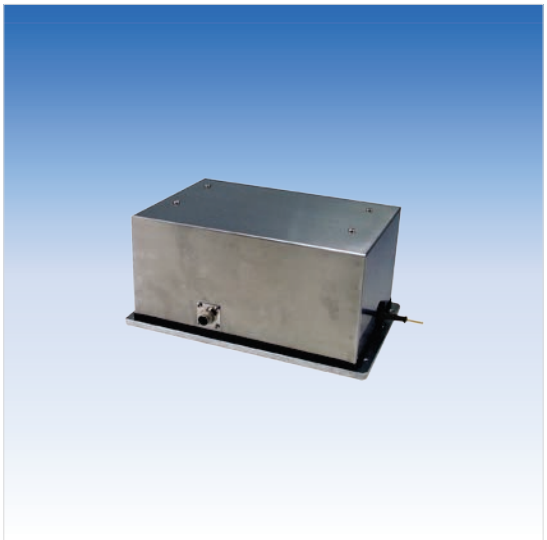
Order example

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

Accessories:

Connector cable (see page 49)

Magnetic encoder, digital output CAN Bus



Sensor features

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

Specifications

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

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

Order code

WS7.5 – **1** – **2** – **3** – **4** – **5**

1 Measurement range (in mm)

10000 / 15000 / 20000 / 25000 / 30000 / 40000

2 Output

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

3 Linearity

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

4 Cable fixing

M4	= M4 cable fixing
SB0	= cable clip

5 Connection

M12/CAN	= Connector M12, 5 pin

Order example

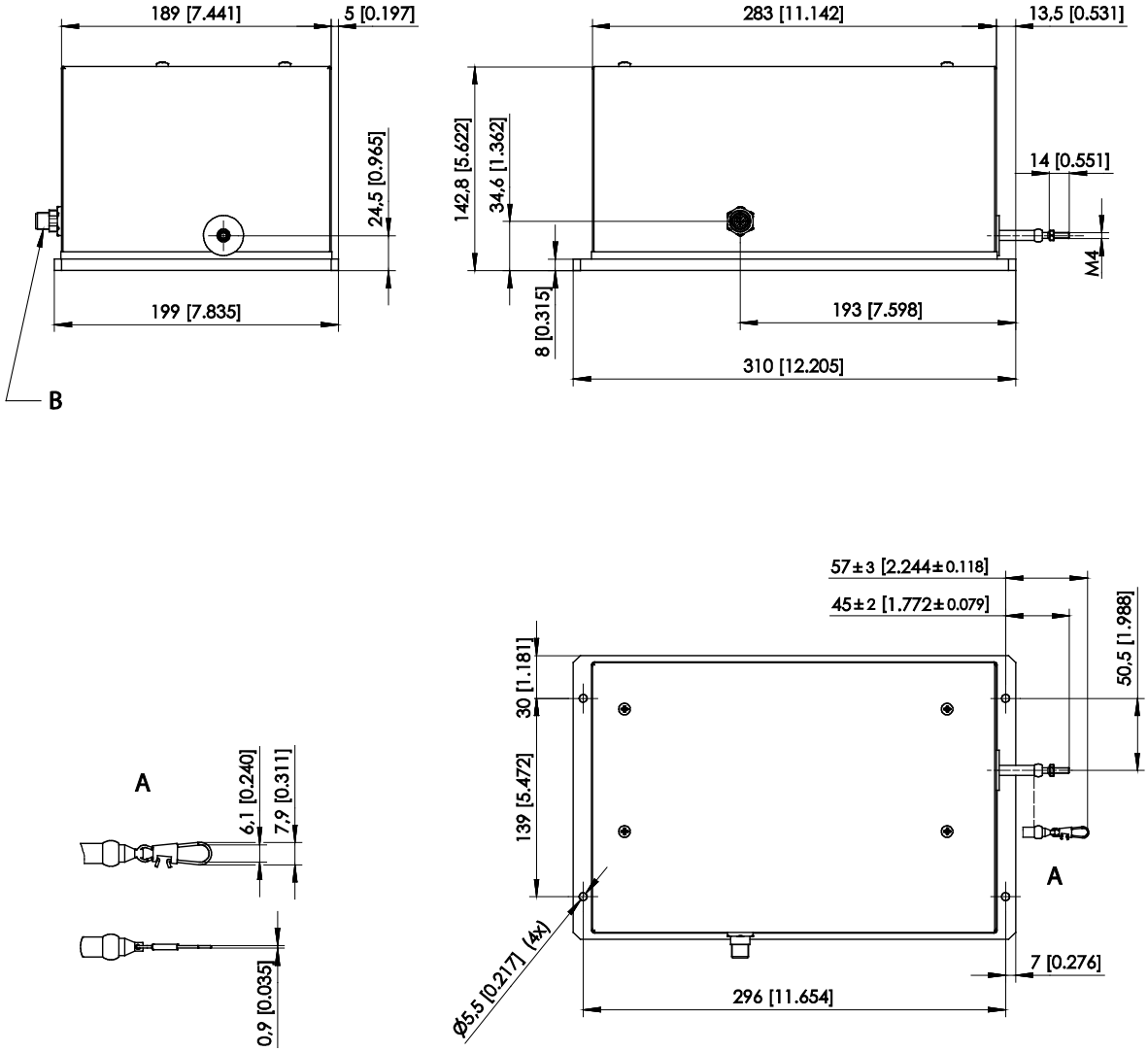
WS7.5 – 30000 – MCANOP – L10 – M4 – M12/CAN

Accessories:

Connector cable (see page 50)

Dimensions

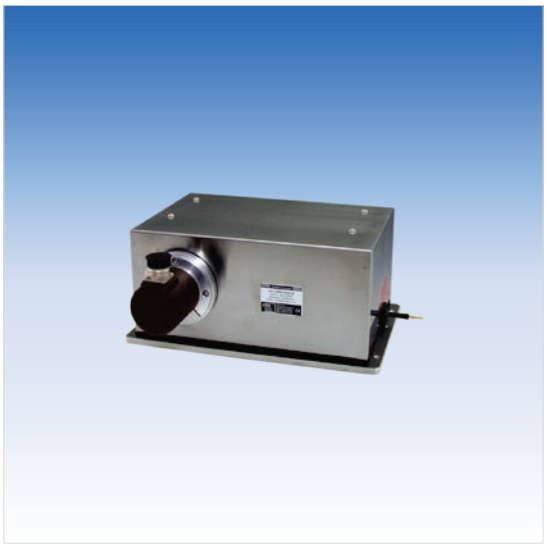
Measurement range 10000 … 40000 mm, magnetic encoder output



A – Option SB0
B – Connector M12

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

Absolute encoder output



Sensor features

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

Specifications

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

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

Order code

WS7.5 – 1 – 2 – 3 – 4

1	Measurement range (in mm)

10000 / 15000 / 20000 / 25000 / 30000 / 40000

2	Output

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

3	Linearity (optional)

L01	= ±0.01% f.s.

4	Cable fixing

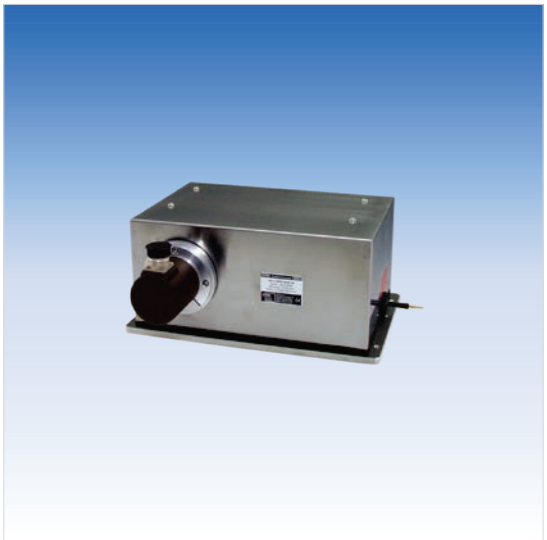
M4	= M4 cable fixing
SB0	= cable clip

Order example

WS7.5 – 3000 – HSSI – M4

Accessories:
Mating connector CONN-M12-8F-G (see page 51)

Incremental encoder output



Sensor features

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

Specifications

Output	**LD5VC** = Incremental encoder TTL compatible **PP24VC** = Incremental encoder HTL compatible
Resolution	Up to 30000 mm: 13,69 pulses / mm 40000mm: 11,36 pulses / mm
Linearity	±0.05% f.s. (standard) ±0.01% f.s. (optional)
Sensing device	Incremental encoder
Housing material	Aluminium, stainless steel and plastic; measuring cable: stainless steel
Protection class	IP52, encoder IP64
Connection	Connector 12 pin
Temperature range	-20 ... +85 °C
Weight	Approx. 10 kg max.
EMC	DIN EN 61326-1:2013

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

Order code

WS7.5 – **1** – **2** – **3** – **4**

1 Measurement range (in mm)

10000 / 20000 / 30000 / 40000

2 Output

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

3 Linearity (optional)

L01	= ±0.01% f.s.

4 Cable fixing

M4	= M4 cable fixing
SB0	= cable clip

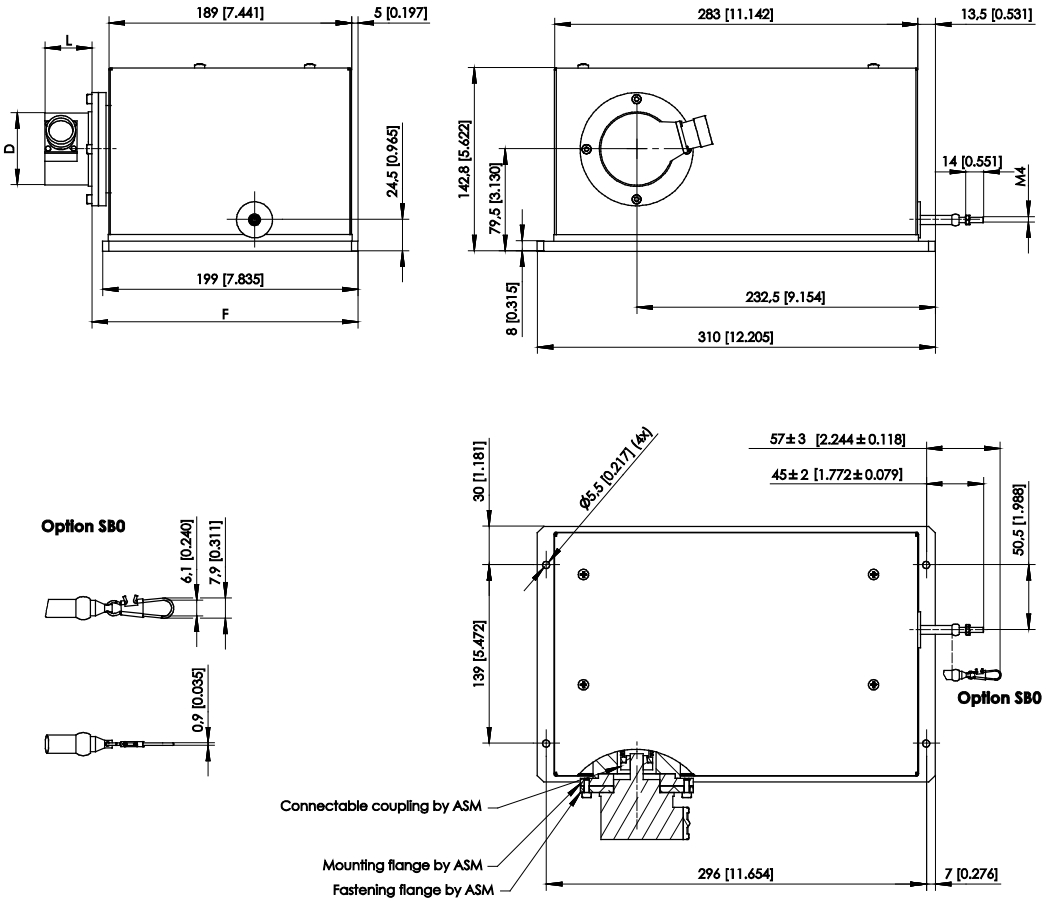
Order example

WS7.5 – 30000 – LD5VC – M4

Accessories:
Mating connector CONN-M12-8F-G (see page 51)

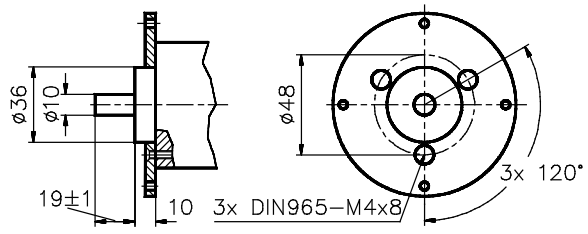
Dimensions

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



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

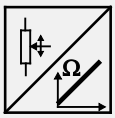
Output ME



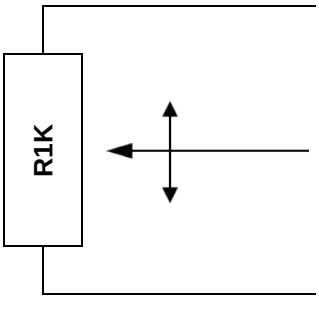
Dimensions for encoder mounting

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

Output specification
Analog outputs
Voltage divider R1K

Potentiometer 	Excitation voltage	32 V DC max. at 1 kΩ (max. power 1 W)
	Potentiometer impedance	1 kΩ ±10 %
	Thermal coefficient	±25 x 10^{-6} / °C f.s.
	Sensitivity	Depends on the measuring range, individual sensitivity of the sensor is specified on the label
	Voltage divider utilization range	approx. 3 % … 97 %
	Operating temperature	Refer to output specification
	EMC	DIN EN 61326-1:2013

Output signals



Note:

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

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

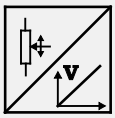
Additional information:
http://www.asm-sensor.com/asm/pdf/pro/ws_poti_technote_en.pdf

Signal wiring

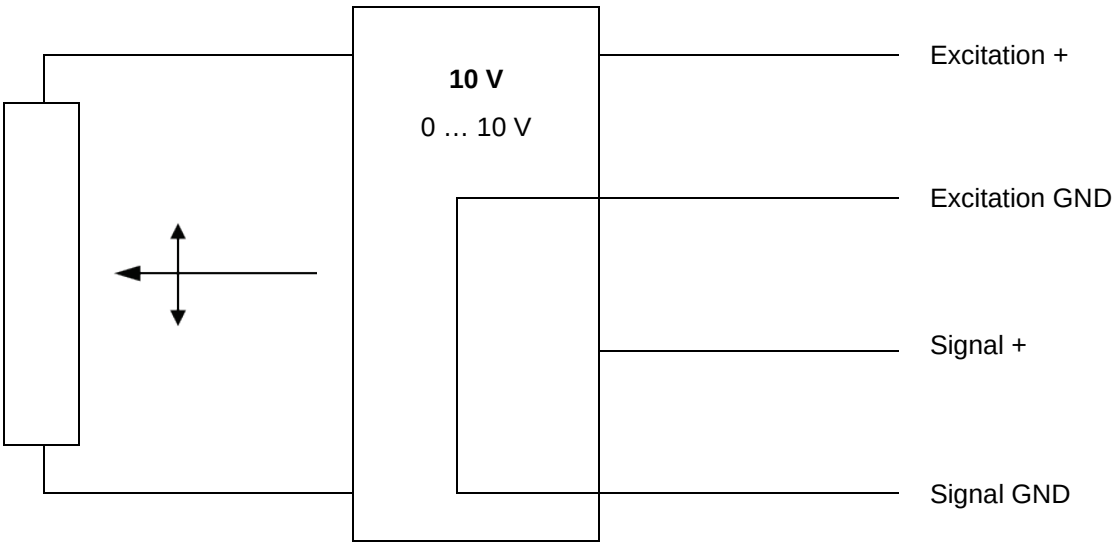
Signal	Connector pin no.	Cable color	Cable color
Poti +	1	white	brown
Poti GND	2	brown	white
Poti slider	3	green	blue
-	4	yellow	black
-	5	grey	-
-	6	pink	-
-	7	blue	-
-	8	red	-

View to sensor connector	 CONN-M12-8F	

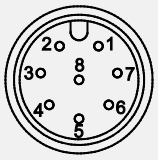
Signal conditioner 10V and 10V5

Voltage output 	Excitation voltage	18 ... 27 V DC non stabilized
	Excitation current	20 mA max.
	Output voltage	**10V**: 0 ... 10 V DC; **10V5**: 0.5 ... 10 V DC
	Output current	2 mA max.
	Output load	> 5 kΩ
	Stability (temperature)	±50 x 10^{-6} / °C f.s.
	Protection	Reverse polarity, short circuit
	Output noise	0.5 mV_{RMS}
	Operating temperature	Refer to output specification
	EMC	DIN EN 61326-1:2013

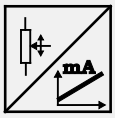
Output signals



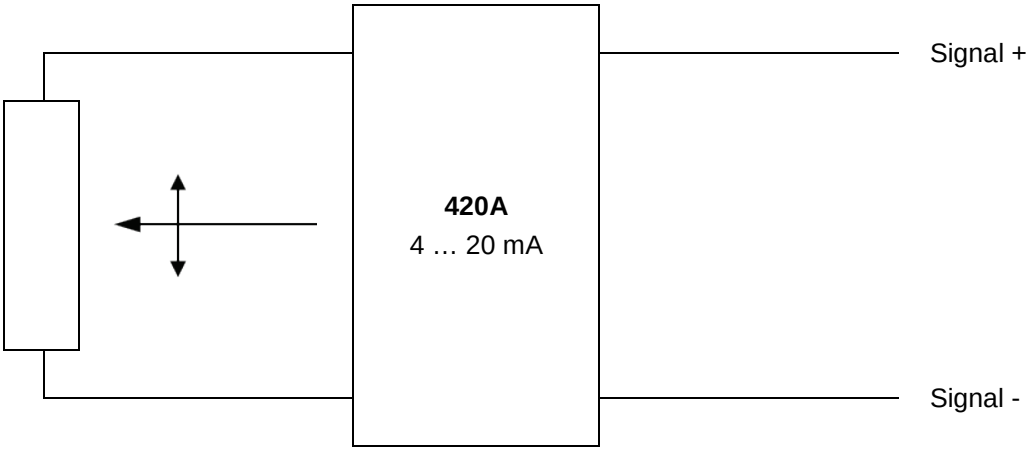
Signal wiring

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

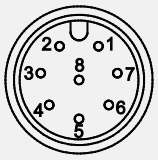
Signal conditioner 420A

Current output (2 wire) 	Excitation voltage	12 ... 27 V DC non stabilized, measured at the sensor terminals
	Excitation current	35 mA max.
	Output current	4 ... 20 mA equivalent for 0 ... 100 % range
	Stability (temperature)	±100 x 10^{-6} / °C f.s.
	Protection	Reversed polarity, short circuit
	Output noise	0.5 mV_{eff}
	Operating temperature	Refer to output specification
	EMC	DIN EN 61326-1:2013

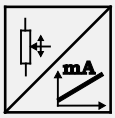
Output signals



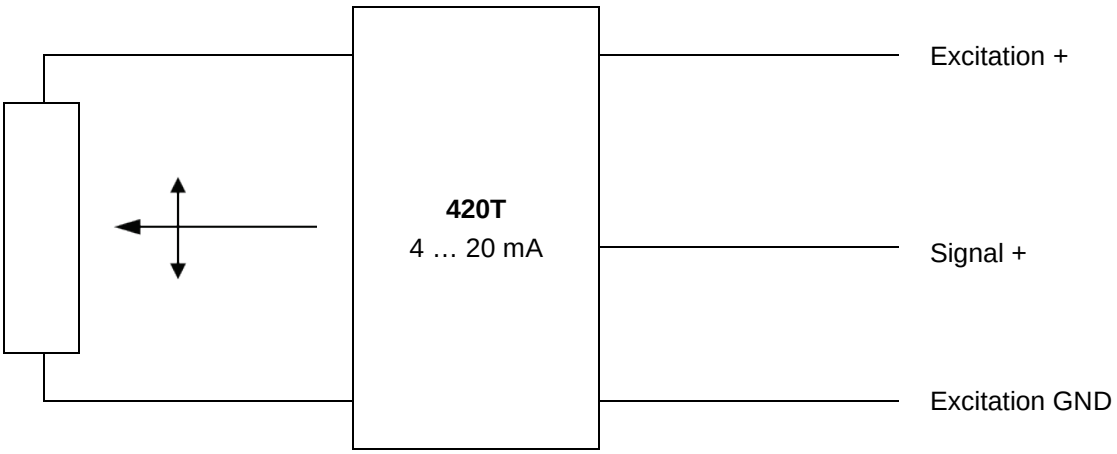
Signal wiring

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

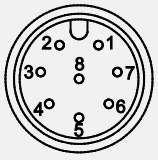
Signal conditioner 420T

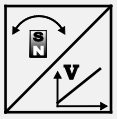
Current output (3 wire) 	Excitation voltage	18 ... 27 V DC non stabilized
	Excitation curren	40 mA max.
	Load resistor	350 Ω max.
	Output current	4 ... 20 mA equivalent for 0 ... 100 % range
	Stability (temperature)	±50 x 10^{-6} / °C f.s.
	Protection	Reverse polarity, short circuit
	Output noise	0.5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

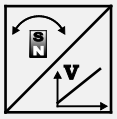
Output signals

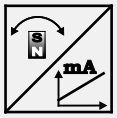


Signal wiring

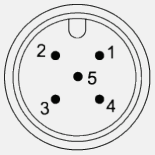
Signal	Connector pin no.	Cable color	View to sensor connector
Excitation +	1	white	
Excitation GND	2	brown	
Signal +	3	green	
Not connected	4	yellow	
Not connected	5	grey	
Not connected	6	pink	
Not connected	7	blue	
Not connected	8	red	CONN-M12-8F

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

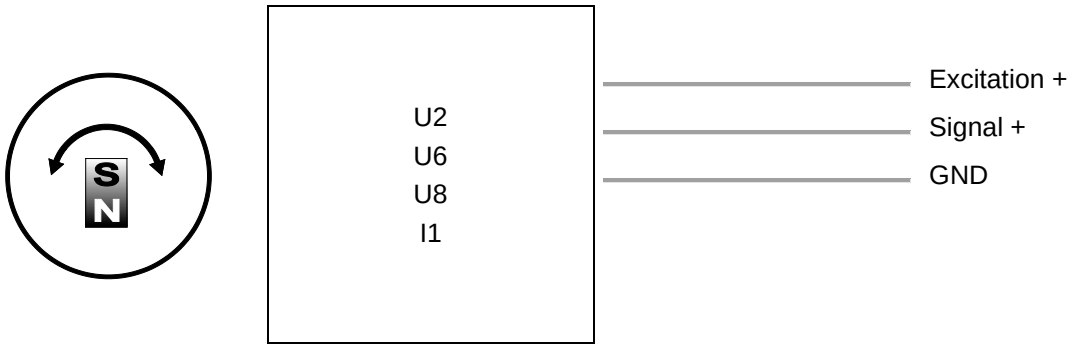
U8 Voltage output 0.5 … 4.5 V 	Excitation voltage	8 … 36 V DC
	Excitation current	17 mA typical at 24 V DC 32 mA typical at 12 V DC 50 mA max.
	Output voltage	0.5 … 4.5 V DC
	Output current	2 mA max.
	Measuring rate	1 kHz standard
	Stability (temperature)	±50 x 10^{-6} / °C f.s. (typical)
	Protection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

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

Signal wiring

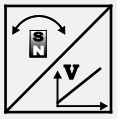
Signal	Connector pin no.	Cable connection	View to the sensor connector
Excitation +	1	brown	
Signal	2	white	
GND	3	blue	
Do not connect!	4	black	
Do not connect!	5	(grey)	

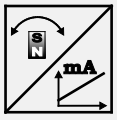
Signal diagram



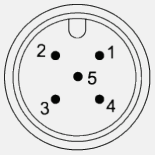
Analog output, programmable

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

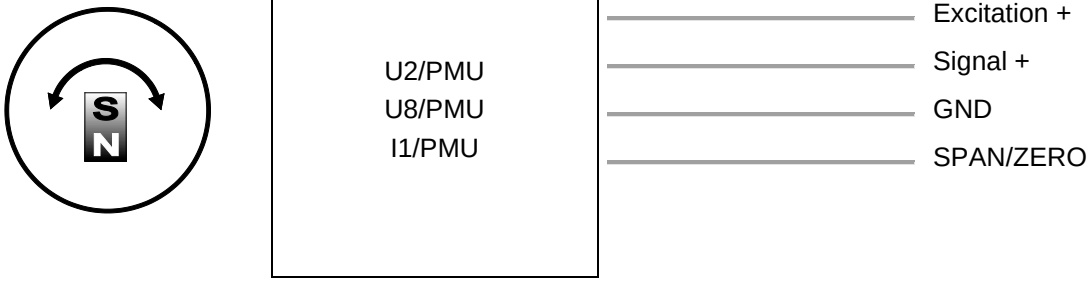
U8/PMU Voltage output 0.5 … 4.5 V 	Excitation voltage	8 … 36 V DC
	Excitation current	17 mA typical at 24 V DC 32 mA typical at 12 V DC max. 50 mA
	Output voltage	0.5 … 4.5 V DC
	Output current	2 mA max.
	Measuring rate	1 kHz standard
	Stabilität (Temperatur)	±50 x 10^{-6} / °C f.s. (typical)
	Protection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

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

Signal wiring

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

Signal diagram



Option -PMU

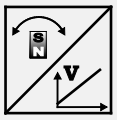
Programming of the start and end value by the customer

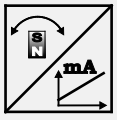
Teach-In of start and end value for the options U2/PMU, I1/PMU, U8/PMU is provided by a binary signal SPAN/ZERO. At the start position connect signal SPAN/ZERO for a period of 2 … 3 seconds to GND via push button. At the end position connect signal SPAN/ZERO for a period of 5 … 6 seconds to GND via a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

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

Analog output, redundant

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

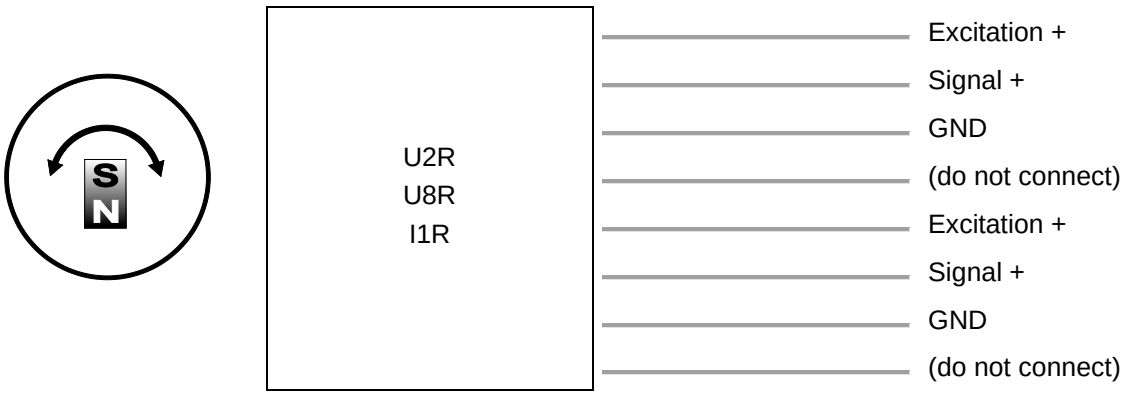
U8R Voltage output 0.5 … 4.5 V 	Excitation voltage	8 … 36 V DC
	Excitation current	17 mA typical at 24 V DC 32 mA typical at 12 V DC max. 50 mA per channel
	Output voltage	0.5 … 4.5 V DC
	Output current	2 mA max.
	Measuring rate	1 kHz standard
	Stability (temperature)	±50 x 10^{-6} / °C f.s. (typical)
	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	Signal	Connector pin no.	Cable color	View to the sensor connector
1	Excitation +	1	white	
1	Signal	2	brown	
1	GND	3	green	
1	Do not connect!	4	yellow	
2	Excitation +	5	grey	
2	Signal	6	pink	
2	GND	7	blue	
2	Do not connect!	8	red	

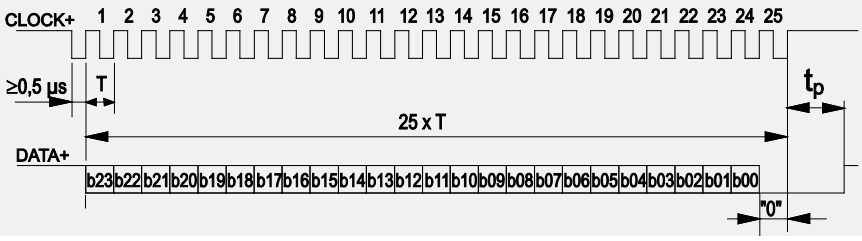
Signal diagram



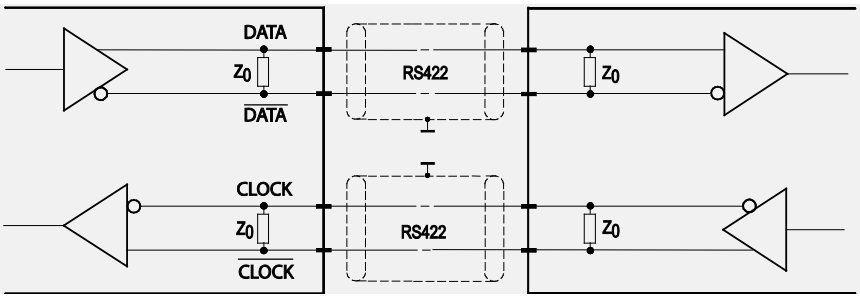
Digital output SSI

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

Data format
(Train of 26 pulses)



Recommended processing circuit



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

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

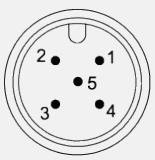
Signal wiring

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

Digital output CANopen

MCANOP, CANOPR CANopen	CAN specification	ISO 11898, Basic and Full CAN 2.0 B
	Communication profile	CANopen CiA 301 V 4.02, Slave
	Encoder profile	Encoder CiA 406 V 3.2
	Error Control	Node Guarding, Heartbeat, Emergency Message
	Node ID	Adjustable via LSS, default: 127
	PDO	3 TxPDO, 0 RxPDO, no linking, static mapping
	PDO Modes	Event-/Time triggered, Remote-request, Sync cyclic/acyclic
	SDO	1 Server, 0 Client
	CAM	8 cams
	Certified	Yes
	Transmission rate	50 kBit bis 1 Mbit, adjustable via LSS, default: 125 kBit
	Bus connection	M12 conncector, 5 pin
	Integrated bus terminating resistor	120Ω adjustable by the customer
	Bus, galvanic isolated	no

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

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

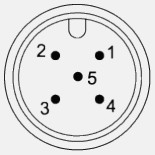
Digital output CAN SAE J1939

MCANJ1939/R CAN SAE J1939	CAN Specification		ISO 11898, Basic and Full CAN 2.0 B
	Transceiver		24V-compliant, not isolated
	Communication profile		SAE J1939
	Baud Rate		250 kbit/s
	Internal termination resistor		120 Ω adjustable by the customer
	Address		Default 247d, configurable

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

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

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

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

Absolute encoder outputs

Signal conditioner HSSI

Absolute encoder synchronous serial

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

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

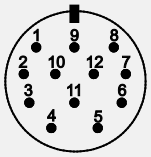
Resolution	**Clock**												
	T1	T2	T3	…	T12	T13	…	T21	T22	T23	T24	T25	T26
	Data bits												
24 Bit	M11	M10	M09	…	M0	S11	…	S3	S2	S1	S0	0	

Transmission rate

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

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

Signal wiring

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

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

Interface HINT

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

Data format K2 / K3

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

Signal wiring

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

Interface HPROF

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

Signal wiring

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

Interface HDEV

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

Recommended transmission

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

Transmission rate

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

Signal wiring

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

Interface HCAN / HCANOP

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

Signal wiring

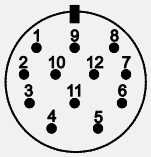
Signal	Cable terminal no. (bus cover)
U_b in	1
0 V in	2
CAN in – (dominant L)	4
CAN in + (dominant H)	6
CAN GND in	3
CAN GND out	5
CAN out + (dominant H)	7
CAN out – (dominant L)	8
0 V out	9
U_b out	10

Incremental outputs

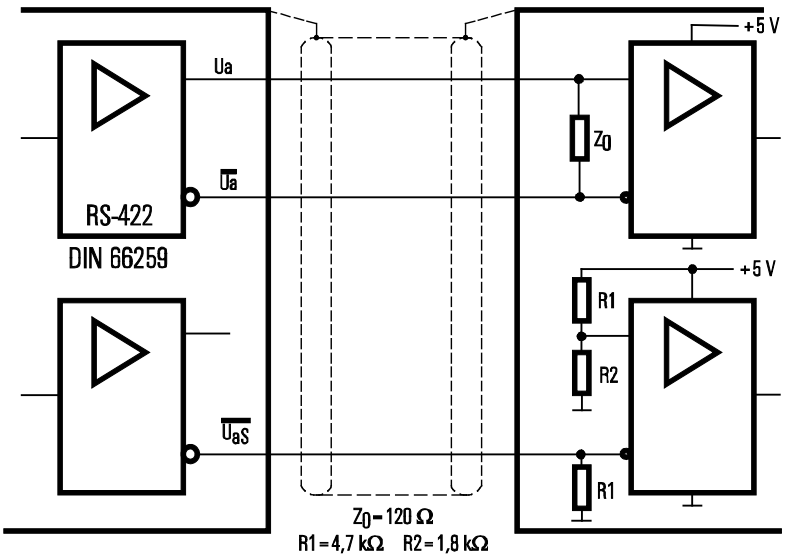
Signal conditioner LD5VC

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

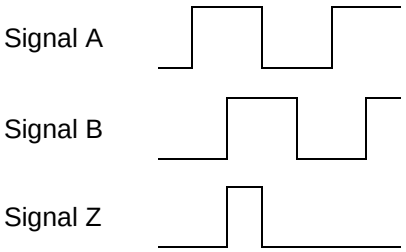
Signal wiring

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

Recommended processing circuit



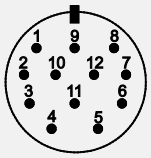
Output signals



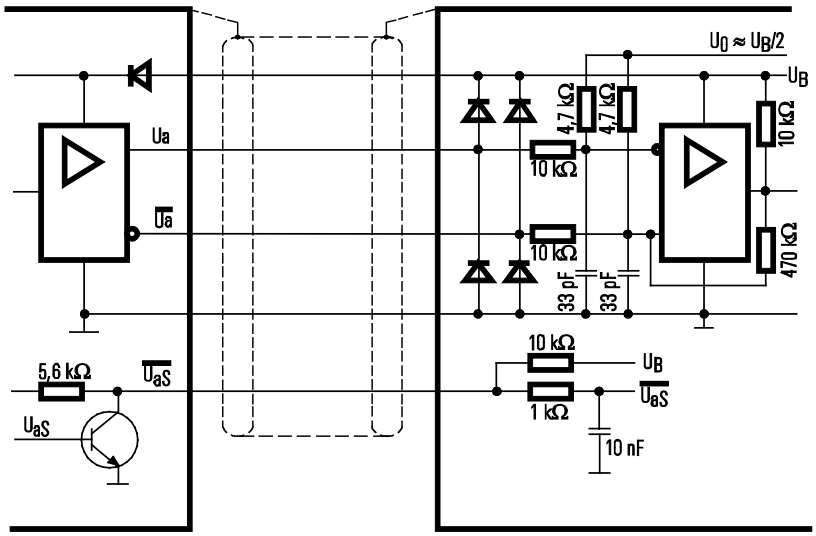
Signal conditioner PP24VC

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

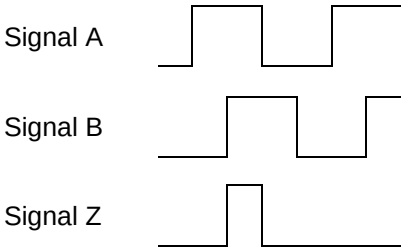
Signal wiring

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

Recommended circuit



Output signals



Accessories

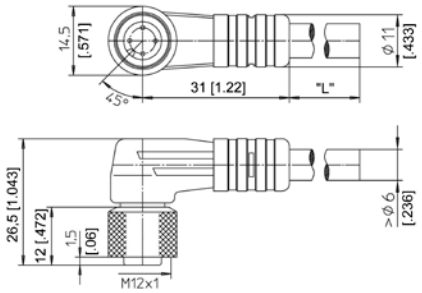
Connector cable M12, 4 pin

(angular coupling)

shielded connector

Suitable for 5-pin sensor connectors

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



Order code

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

xM = length in m

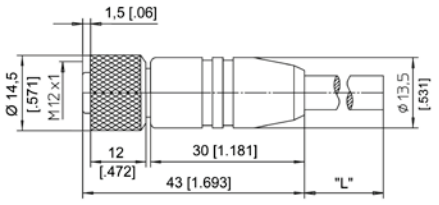
Connector cable M12, 4 pin

(straight coupling)

shielded connector

Suitable for 5-pin sensor connectors

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



Order code

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

xM = length in m

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

Applicable for cable carriers

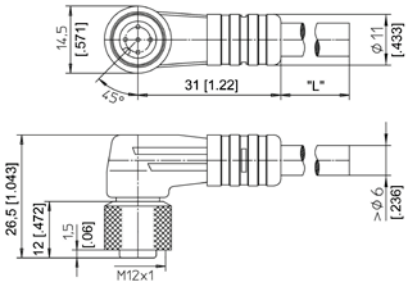
Maximum movement speed	3 m/s
Maximum acceleration	5 m/s^2
Minimum bending radius	10 x cable diameter

Connector cable M12, 5 pin

(angular coupling)

shielded connector

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



Order code

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

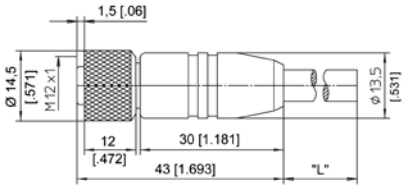
xM = length in m

Connector cable M12, 5 pin

(straight coupling)

shielded connector

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



Order code

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

xM = length in m

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

Applicable for cable carriers

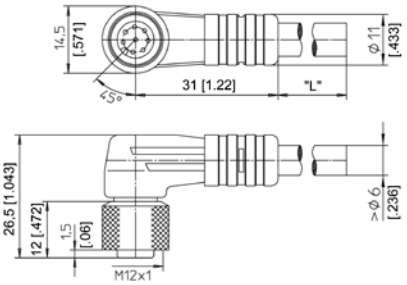
Maximum movement speed	3 m/s
Maximum acceleration	5 m/s^2
Minimum bending radius	10 x cable diameter

Connector cable M12, 8 pin

(angular coupling)

shielded connector

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



Order code

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

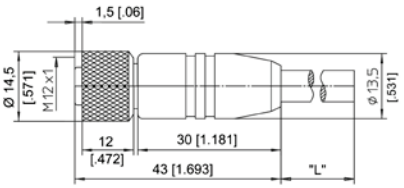
xM = length in m

Connector cable M12, 8 pin

(straight coupling)

shielded connector

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



Order code

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

xM = length in m

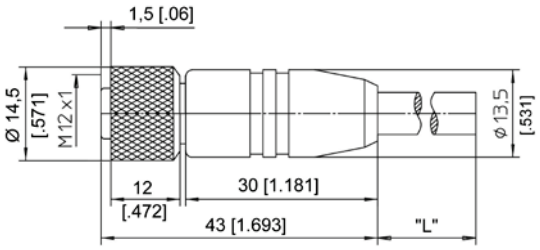
Signal wiring M12, 8 pin	**Plug connection / cable color**							
	1	2	3	4	5	6	7	8
	white	brown	green	yellow	grey	pink	blue	red

Applicable for cable carriers

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

Connector/bus cable - M12, 5 pin CAN-Bus

The 5-lead shielded cable is supplied with a female 5 pin M12 connector at one end and a male 5 pin M12 connector at the other end.
Available lengths are 0.3 m, 2 m, 5 and 10 m.
Cable diameter: 6.7 ±0.2 mm



Order code:

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

xM = length in m

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

Order code:

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

Terminating resistance M12, 5 pin CAN-Bus

Order code:

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

Applicable for cable carriers

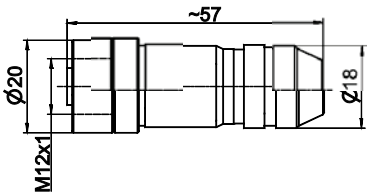
Maximum movement speed	3 m/s
Maximum acceleration	5 m/s^2
Minimum bending radius	10 x cable diameter

Plug-in connectors

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

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

Cable diameter
max. 6 … 8 mm



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

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

Cable diameter
max. 6 … 8 mm