



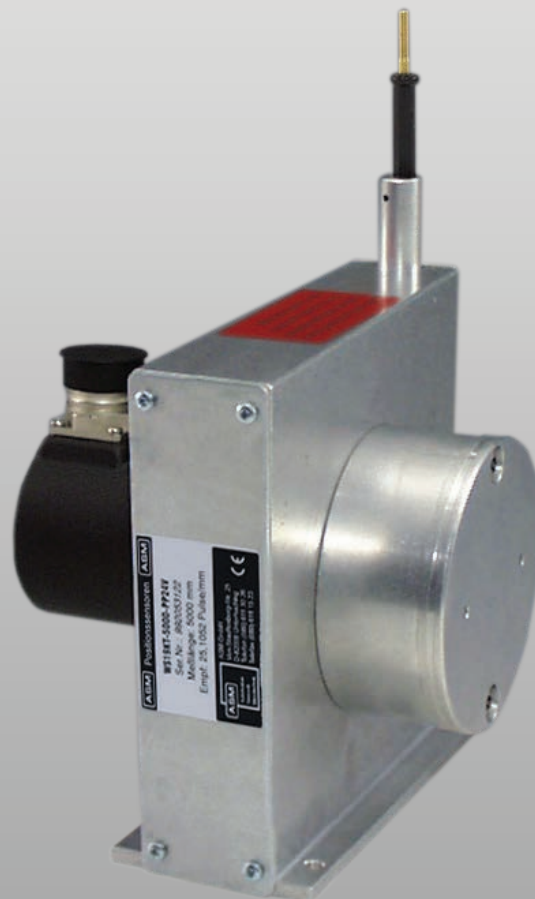
perfect in sensors.

# POSIWIRE<sup>®</sup>

Cable Extension Position Sensors

**WS19KT**  
**Position Sensor**

Datasheet



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## Absolute encoder output



### Sensor features

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



## Specifications

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

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

**Order code**WS19KT – 1 – 2 – 3 – 4**1 Measurement range (in mm)**

2000 / 3000 / 5000 / 8000 / 15000

**2 Output**

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

**3 Linearity (optional)****L01** = ±0.01% f.s.**4 Cable fixing**

**M4** = M4 cable fixing  
**SB0** = cable clip

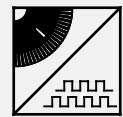
**Order example****WS19KT – 3000 – HSSI – M4****Accessories:****Mating connector CONN-M12-8F-G (see page 22)**

## Incremental encoder output



### Sensor features

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



## Specifications

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

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

**Order code**WS19KT – 1 – 2 – 3 – 4**1 Measurement range (in mm)**

2000 / 3000 / 5000 / 8000 / 15000

**2 Output**

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

**3 Linearity (optional)****L01** = ±0.01% f.s.**4 Cable fixing**

**M4** = M4 cable fixing  
**SB0** = cable clip

**Order example**

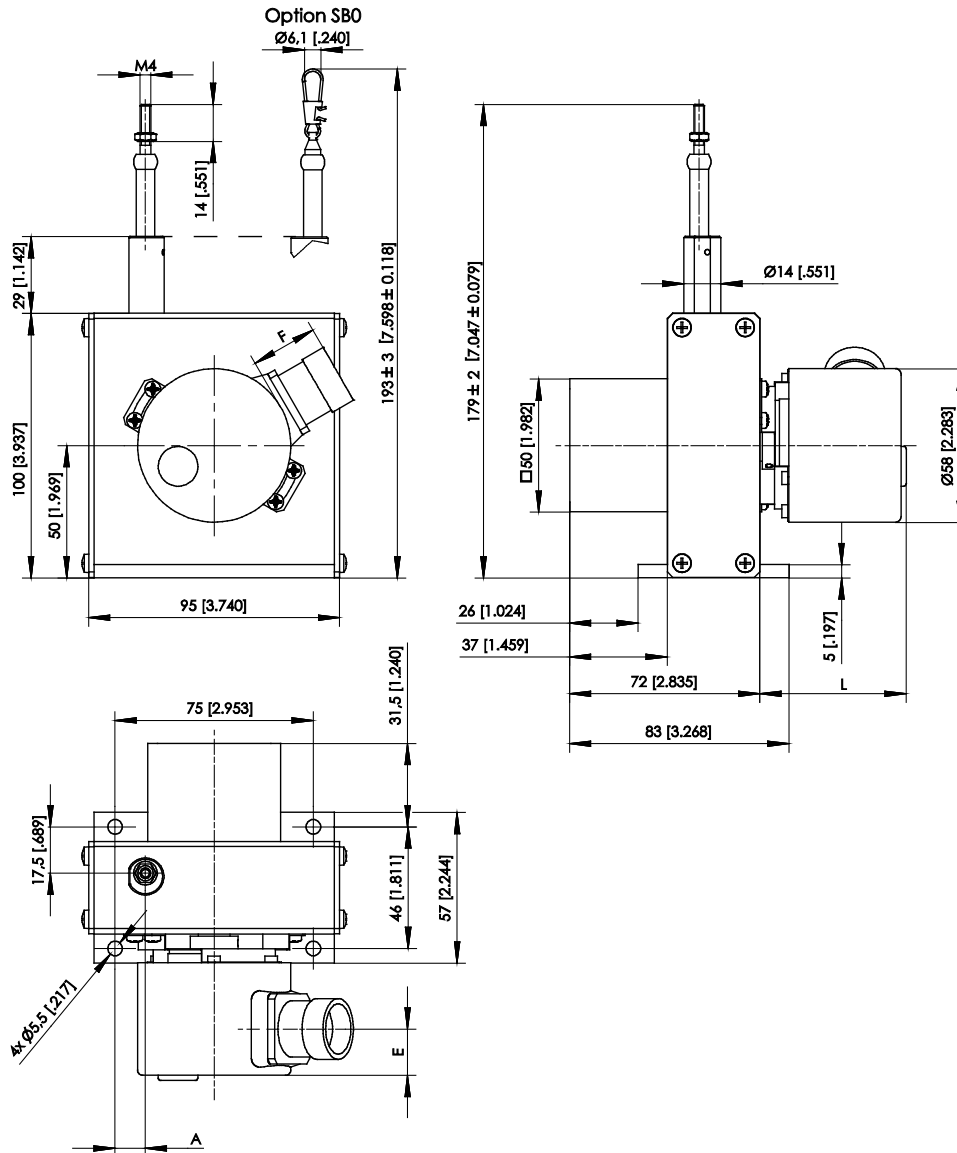
WS19KT – 5000 – LD5VC – M4
----------------------------

**Accessories:****Mating connector CONN-M12-8F-G (see page 22)**



## Dimensions

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



Dimensions in mm	Measurement range	A
	2000	11.5
3000	0	

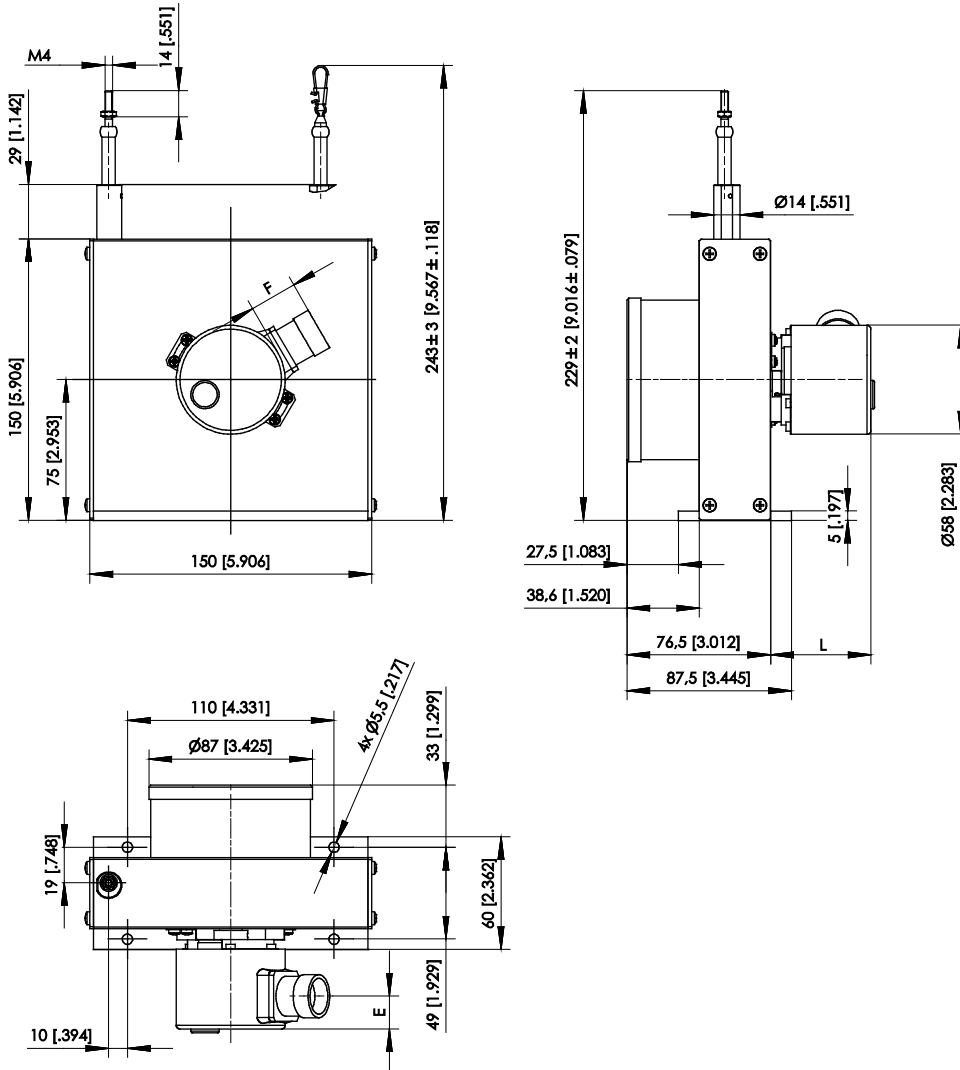
Dimensions in mm [inch]

Dimensions E, F and L depending on the encoder.

Dimensions informative only. For guaranteed dimensions consult factory.

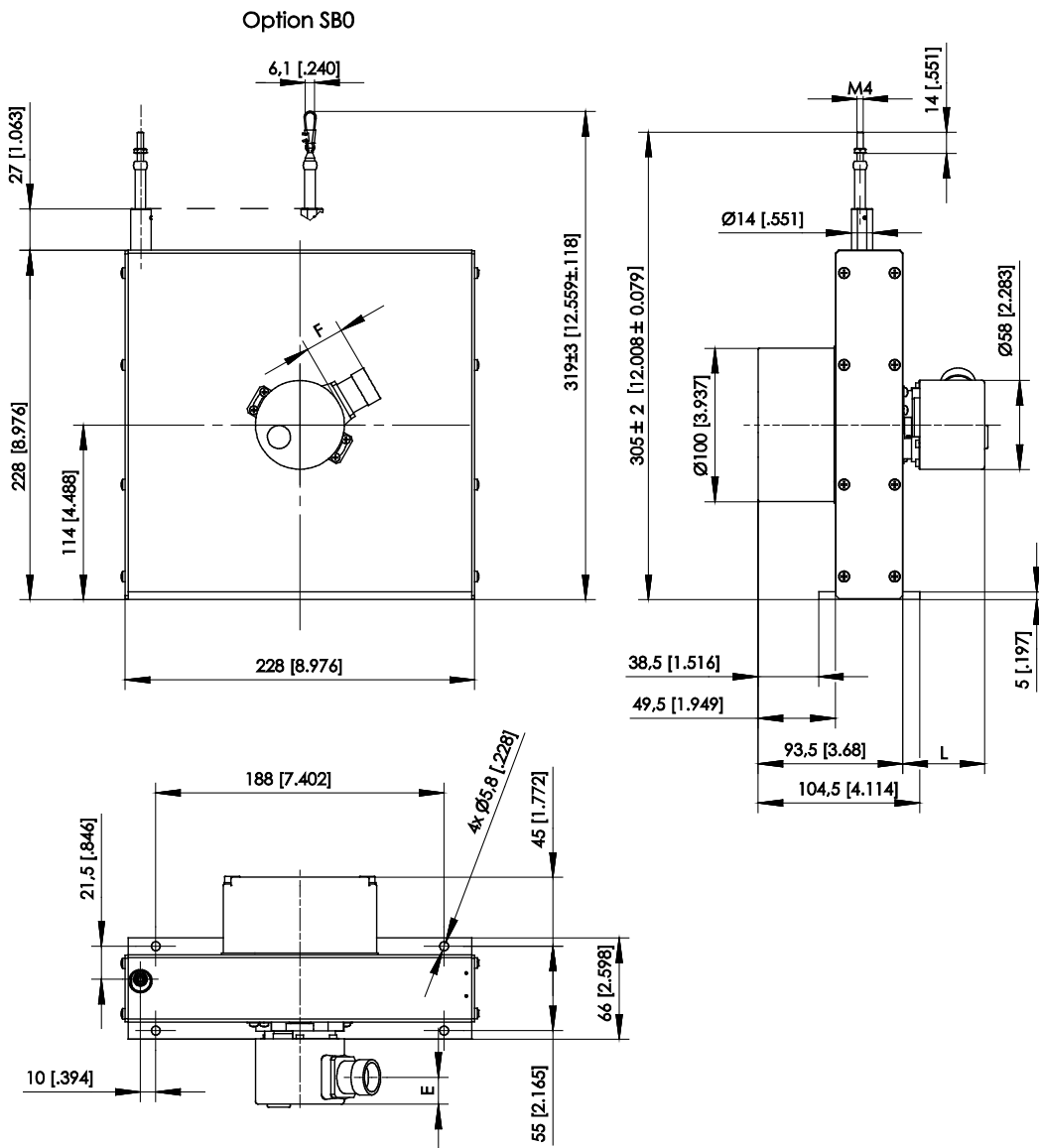
**Measurement range 5000 mm, absolute encoder output, incremental encoder output**

Option SBO



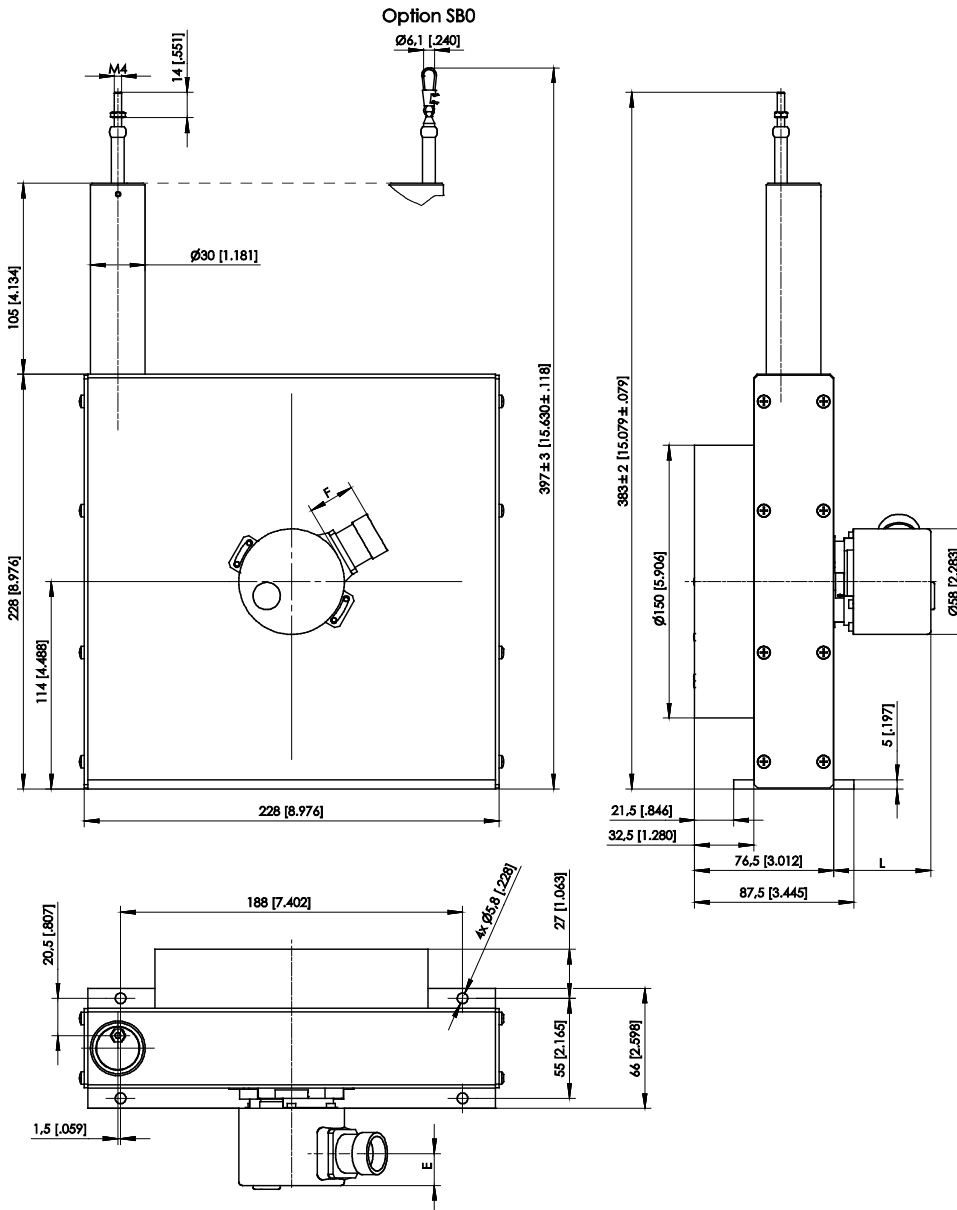
Dimensions in mm [inch]  
 Dimensions E, F and L depending on the encoder.  
 Dimensions informative only.  
 For guaranteed dimensions consult factory.

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



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

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




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

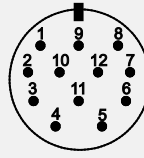
## Output specifications

### Incremental outputs

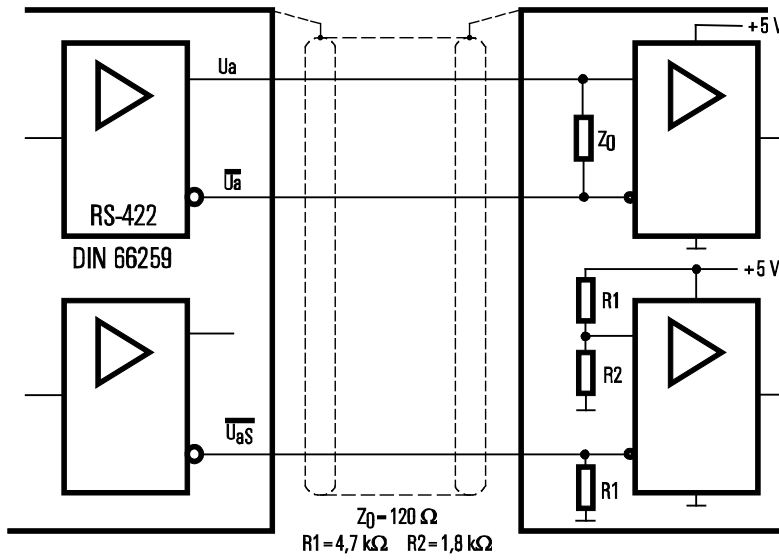
#### Signal conditioner LD5VC

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 <sub>d</sub> High bei I <sub>d</sub> = 20 mA	≥ 2.5 V
	U <sub>d</sub> Low bei I <sub>d</sub> = 20 mA	≥ 0.5 V
	Transition time positive edge	< 100 ns
	Transition time negative edge	< 100 ns
	Stability (temperature)	±20 x 10 <sup>-6</sup> / °C f.s. (sensor-mechanism)
	Operation temperature	-20 ... +85 °C
	Protection	Short circuit, overvoltage
	EMC	DIN EN 61326-1:2013

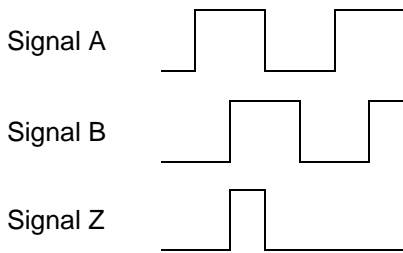
#### Signal wiring

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

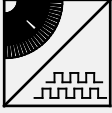
Recommended processing circuit



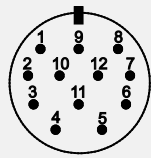
Output signals



**Signal conditioner PP24VC**

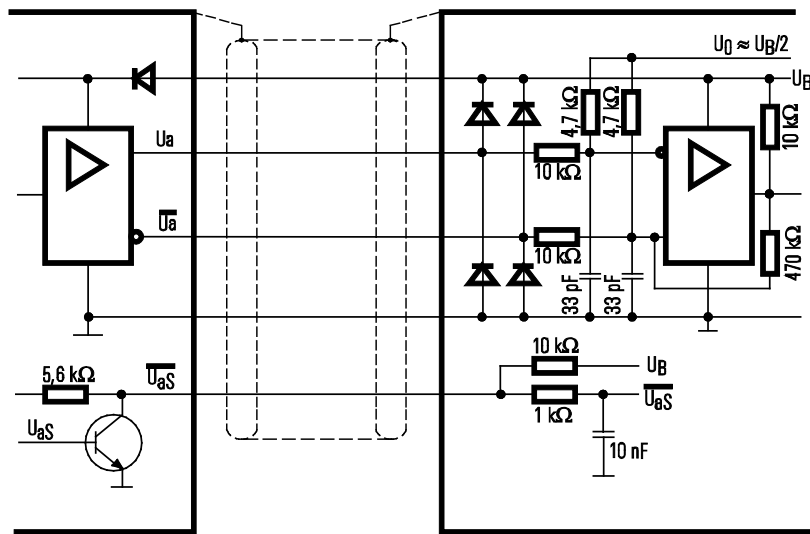
Incremental 	Excitation voltage	10 ... 30 V DC
	Excitation current	150 mA max. w/o load
	Interface	Push-pull line driver (24 V-HTL)
	Output frequency	300 kHz max.
	Output current	100 mA per channel
	Signal level	
	Ud High at Id = 20 mA, Ub = 24 V	≥ 21 V
	Ud Low at Id = 20 mA, Ub = 24 V	≥ 2.8 V
	Transition time positive edge	< 200 ns
	Transition time negative edge	< 200 ns
	Stability (temperature)	±20 x 10 <sup>-6</sup> / °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**

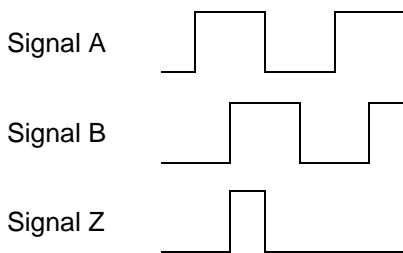
Signal	Connector pin no.	View to sensor connector
Excitation +	12	
Excitation GND	10	
Signal A	5	
Signal $\bar{A}$	6	
Signal B (A + 90°)	8	
Signal $\bar{B}$	1	
Signal Z (reference pulse)	3	
Signal $\bar{Z}$	4	
Fault detection signal	7	
Shield	housing	

CONN-CONIN-12F

Recommended circuit




Output signals





## Absolute encoder outputs

### Signal conditioner HSSI

	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

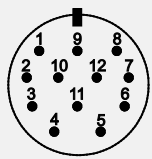
**Data format** (Mx = Multiturn bits, Sx = Singleturn bits)

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	<b>Note:</b> Extension of the cable length will reduce the maximum transmission rate.
< 50 m	< 400 kHz	
< 100 m	< 300 kHz	
< 200 m	< 200 kHz	
< 400 m	< 100 kHz	

### 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	

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


### Interface HPROF

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

### Signal wiring

Signal	Cable terminal no. (bus cover)
U <sub>b</sub> in	1
0 V in	2
U <sub>B</sub> out	3
0 V out	4
B in	5
A in	6
B out	7
A out	8

### Interface HINT

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


### Data format K2 / K3

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

### Signal wiring

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

**Interface HDEV**

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

**Recommended transmission**

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


**Transmission rate**

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

**Signal wiring**

Signal	Cable terminal no. (bus cover)
U <sub>b</sub> 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 <sub>b</sub> 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 <sub>b</sub> out	10

## Accessories

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

Order code:

**CONN-CONIN-12F-G**

Cable diameter  
max. 6 ... 8 mm

