



More Precision.

wireSENSOR

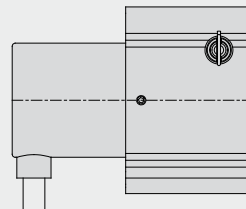
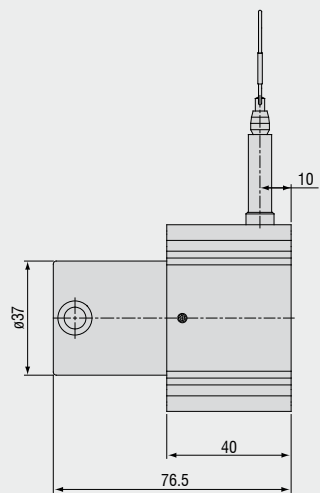
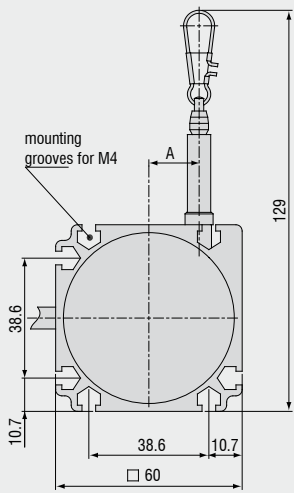
Draw-wire displacement sensors





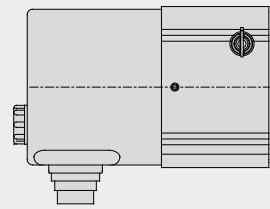
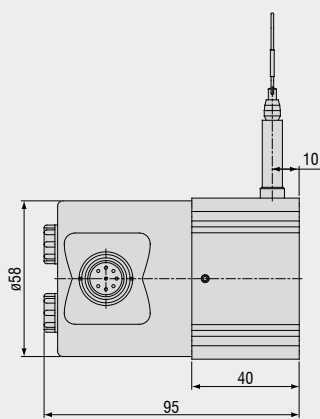
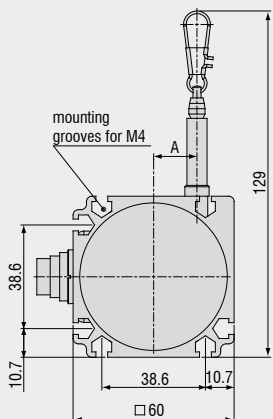
- Robust aluminium profile housing
- Customized versions for OEM
- Potentiometer, current and voltage output

Model P60 Output P



Measuring range (mm)	A (mm)
100 / 300 / 500 / 1000	16.15
150 / 750 / 1500	24.2

Model P60 Output U/I



Measuring range (mm)	A (mm)
100 / 300 / 500 / 1000	16.15
150 / 750 / 1500	24.2

Model		WDS-100- P60	WDS-150- P60	WDS-300- P60	WDS-500- P60	WDS-750- P60	WDS-1000- P60	WDS-1500- P60	
Output		P/U/I							
Measuring range	mm	100	150	300	500	750	1000	1500	
Linearity	±0.1% FSO	±mm	-	-	-	0.5	0.75	1	1.5
	±0.25% FSO	±mm	-	-	0.75	-	-	-	-
	±0.5% FSO	±mm	0.5	0.75	-	-	-	-	-
Resolution		quasi infinite							
Sensor element		conductive plastic/wire potentiometer				hybrid potentiometer			
Temperature range		-20 ... +80°C							
Material	housing	aluminium							
	draw wire	coated polyamid stainless steel (ø 0.45mm)							
Sensor mounting		mounting grooves in the housing							
Wire mounting		wire clip							
Wire acceleration		appr. 10 - 15g (dependent upon measuring range)							
Wire retraction force (min)	N	6.5	4.5	6	6	4	5	3.5	
Wire extension force (max)	N	7.5	5.5	7.5	7.5	5.5	7.5	5.5	
Protection class		IP 65 (only if connected)							
Vibration		20g, 20Hz - 2kHz							
Mechanical shock		50g, 10ms							
Electrical connection	P	integrated cable, radial, 1m long							
	U/I	flange connector, radial, 8-pin, DIN45326							
Weight		appr. 370g							

FSO = Full Scale Output

Specifications for analog outputs on page 43.

Article description

WDS - 100 - P60 - CR - P

Output option:

P = potentiometer (with connection CR)

U = voltage (with connection SR)

I = current (with connection SR)

Connection:

SR: radial plug

CR: integrated cable, radial, 1m

Model P60

Measuring range in mm

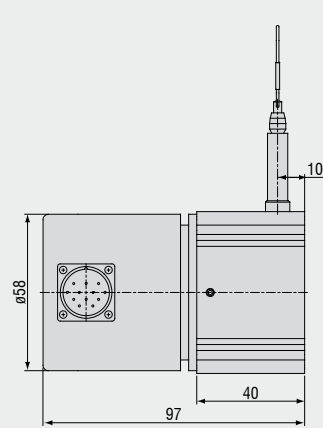
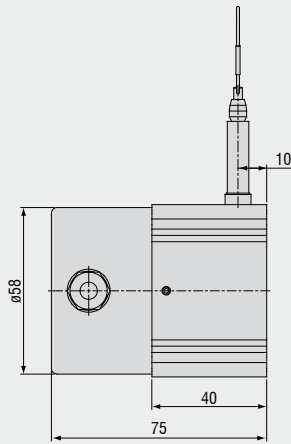
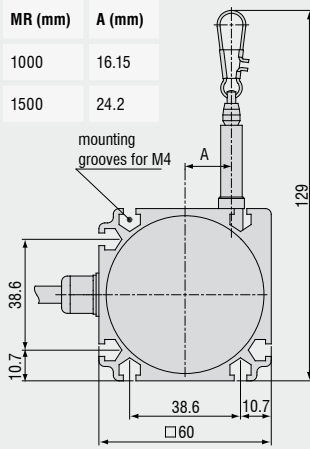


- Robust aluminium profile housing
- Customized versions for OEM
- Incremental/absolute encoder

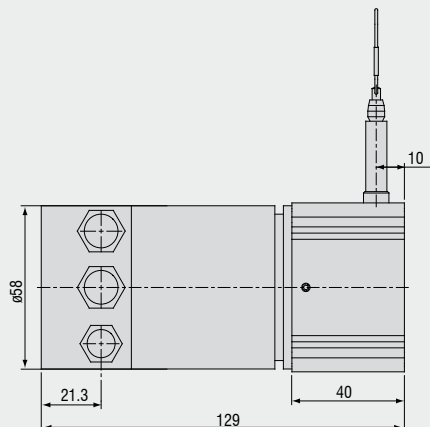
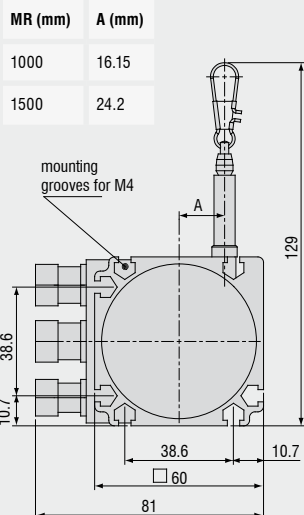
Model P60

Output HTL/TTL

Output SSI



Model P60 Output CO/PB



Model		WDS-1000-P60	WDS-1500-P60
Output		HTL/ TTL/ PB/ CO/ SSI	
Measuring range		1000mm	1500mm
Linearity	±0.02% FSO	±0.2mm	±0.3mm
Resolution	HTL, TTL	0.067mm (15 Pulses/mm)	0.1mm (10 Pulses/mm)
	SSI, PB, CO	0.024mm	0.03mm
Sensor element		incremental encoder	
Temperature range		-20 ... +80°C	
Material	housing	aluminium	
	draw wire	coated polyamid stainless steel (ø 0.45mm)	
Sensormontage		mounting grooves in the housing	
Wire mounting		wire clip	
Wire acceleration		10g	15g
Wire retraction force (min)		5N	3.5N
Wire extension force (max)		7.5N	5.5N
Protection class		IP 65 (only if connected)	
Vibration		20g, 20Hz - 2kHz	
Mechanical shock		50g, 10ms	
Electrical connection	HTL/TTL	integrated cable, radial, 1m long	
	SSI	flange connector, radial, 12-pin	
	PB/CO	bus cover	
Weight		appr. 1kg	

FSO = Full Scale Output
 Specifications for digital outputs on page 44.

Article description

WDS - 1000 - P60 - CR - TTL

Output option:

HTL

TTL

CO: CANopen

PB: Profibus DP

SSI

Connection:

SR (Output SSI): radial plug

CR (Output HTL, TTL): integrated cable, radial, 1m

BH (Output CO, PB): bus cover

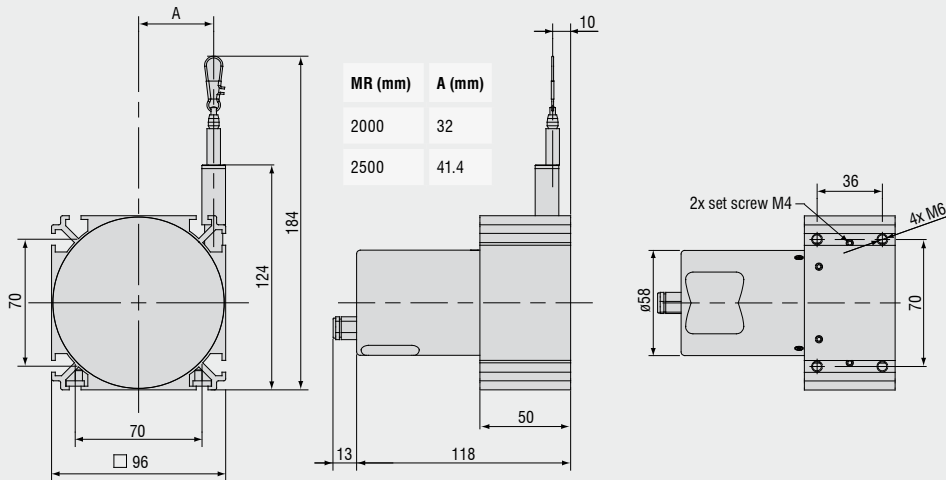
Model P60

Measuring range in mm

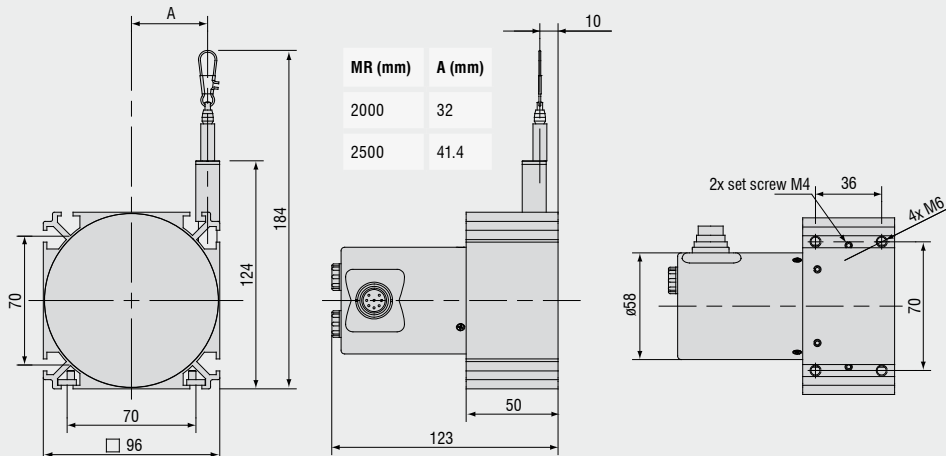


- Robust aluminium profile housing
- Customized versions for OEM
- Potentiometer, current and voltage output

Model P96 Output P



Model P96 Output U/I



Model		WDS-2000-P96	WDS-2500-P96
Output		P/U/I	
Measuring range	mm	2000	2500
Linearity	±0.1% FSO ±mm	2.0	2.5
Resolution		quasi infinite	
Sensor element		hybrid potentiometer	
Temperature range		-20 ... +80°C	
Material	housing	aluminium	
	draw wire	ø 0.8mm	
Sensor mounting		slot nuts	
Wire mounting		wire clip	
Wire acceleration		8g	
Wire retraction force (min)		7.5N	5.5N
Wire extension force (max)		11N	9N
Protection class		IP 65 (only if connected)	
Vibration		20g, 20Hz - 2kHz	
Mechanical shock		50g, 10ms	
Electrical connection	P	integrated cable, radial, 1m long	
	U/I	flange connector, axial, 8-pin DIN45326	
Weight		appr. 1.1kg	

FSO = Full Scale Output
 Specifications for analog outputs on page 43.

Article description

WDS - 2000 - P96 - CA - P

Output option:
 P = potentiometer (with connection CA)
 U = voltage (with connection SR)
 I = current (with connection SR)

Connection:
 SR: radial plug
 CA: integrated cable, axial, 1m

Model P96

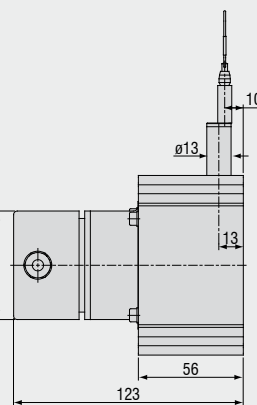
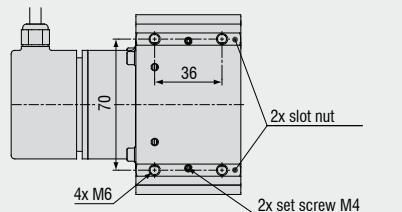
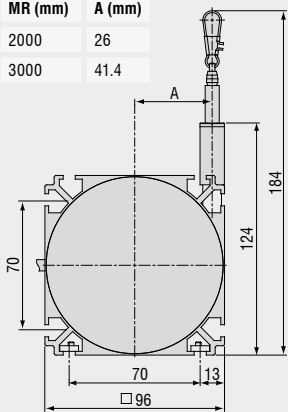
Measuring range in mm



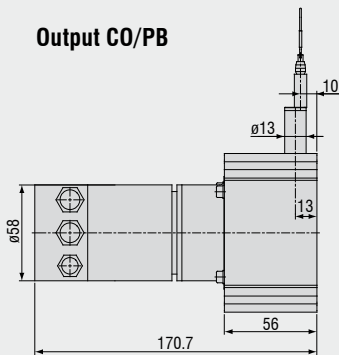
- Robust aluminium profile housing
- Incremental/absolute encoder

Model P96

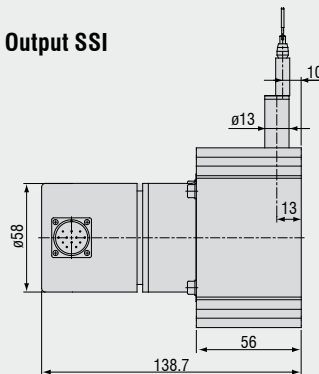
MR (mm)	A (mm)
2000	26
3000	41.4



Output CO/PB



Output SSI



Model	WDS-3000-P96	
Output	HTL/ TTL/ SSI/ PB/ CO	
Measuring range	3000mm	
Linearity	±0.02% FSO	±0.6mm
Resolution	HTL, TTL	0.087mm (11.53 pulses/mm)
Resolution	SSI, PB, CO	0.032mm
Sensor element	Incremental/absolute encoder	
Temperature range	-20 ... +80°C	
Material	housing	aluminium
	draw wire	coated polyamid stainless steel (ø 0.8mm)
Sensor mounting	slot nuts	
Wire mounting	wire clip	
Wire acceleration	7g	
Wire retraction force (min)	5.5N	
Wire extension force (max)	9N	
Protection class	IP 65 (only if connected)	
Vibration	20g, 20Hz - 2kHz	
Mechanical shock	50g, 10ms	
Electrical connection	HTL, TTL	integrated cable, radial, 1m long
	SSI	flange connector, radial, 12-pin
	PB, CO	bus cover
Weight	appr. 1.7kg	

FSO = Full Scale Output

Specifications for digital outputs on page 44.

Article description

WDS - 3000 - P96 - CR - TTL

Output option:

HTL

TTL

CO: CANopen

PB: Profibus DP

SSI

Connection:

SR (Output SSI): radial plug

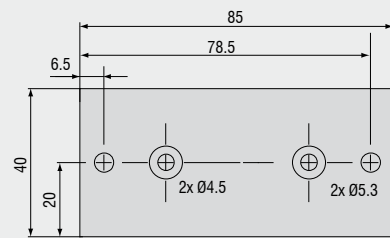
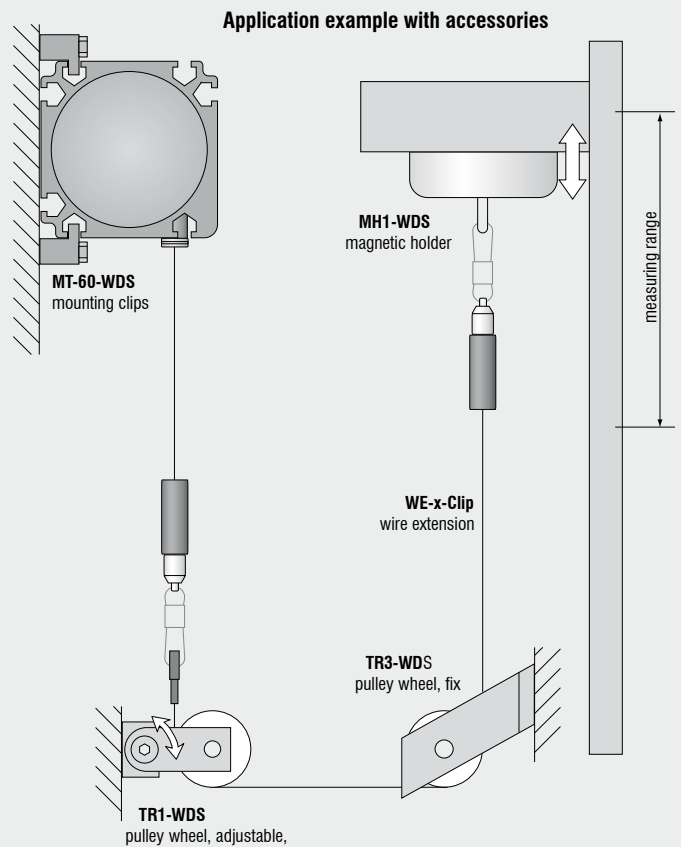
CR (Output HTL, TTL): integrated cable, radial, 1m

BH (Output CO, PB): bus cover

Model P96

Measuring range in mm

WE-x-M4, WE-x-Clip	Wire extension x=length
TR1-WDS	Pulley wheel, adjustable
TR3-WDS	Pulley wheel, fixed
GK1-WDS	Attachment head for M4
MH1-WDS	Magnetic holder for wire mounting
MH2-WDS	Magnetic holder for sensor mounting
MT-60-WDS	Mounting clamp for WDS-P60
FC8	Female connector for WDS, 8-pin
FC8/90	Female connector 90° for WDS
PC 3/8	Sensor cable, length 3 m
PS 2010	Power supply (chassis mounting 35 x 7.5 mm); input 120/230 VAC; output 24 VDC/2.5 A; L/B/H 120 x 20 x 40 mm
WDS-MP60	Mounting plate for P60 sensors



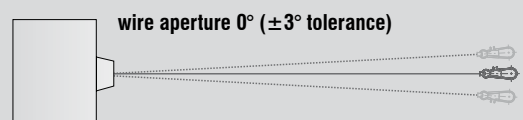
Mounting plate WDS-MP60

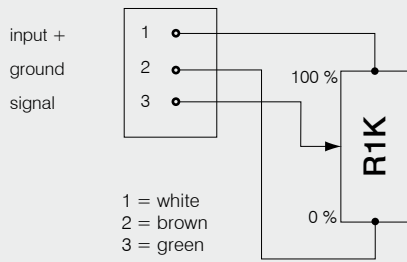
Installation information:

Wire attachment: The free return of the measurement wire is not permissible and it is essential that this is avoided during installation.

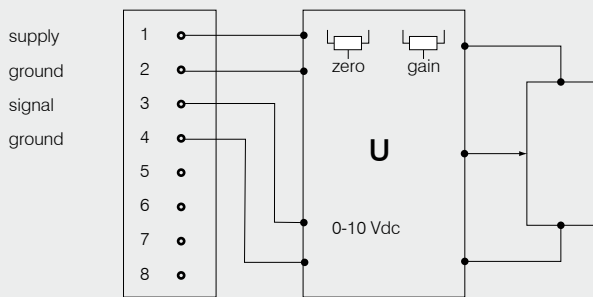
Wire exit angle:

When mounting a draw-wire displacement sensor, a straight wire exit ($\pm 3^\circ$ tolerance) must be taken into account. If this tolerance is exceeded, increased material wear on the wire and at the wire aperture must be expected.

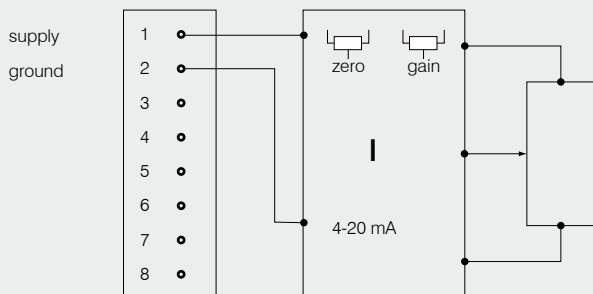




Potentiometric output (P)	
Supply voltage	max. 32VDC at 1kOhm / 1 Wmax
Resistance	1kOhm ±10% (potentiometer)
Temperature coefficient	±0.0025% FSO/°C
Sensitivity	depends on measuring range individually shown on test report



Voltage output (U)	
Supply voltage	14 ... 27VDC (non stabilized)
Current consumption	30mA max
Output voltage	0 ... 10VDC Option 0 ... 5 / ±5V
Load impedance	>5kOhm
Signal noise	0.5mV _{eff}
Temperature coefficient	±0.005% FSO/°C
Electromagnetic compatibility (EMC)	EN 50081-2 EN 50082-2
Adjustment ranges	
Zero	±20 %FSO
Sensitivity	±20 %



Current Output (I)	
Supply voltage	14 ... 27VDC (non stabilized)
Current consumption	35mA max
Output current	4 ... 20mA
Load	<600Ohm
Signal noise	<1.6µA _{eff}
Temperature coefficient	±0.01% FSO/°C
Electromagnetic compatibility (EMC)	EN 50081-2 EN 50082-2
Adjustment ranges	
Zero	±18% FSO
Sensitivity	±15%

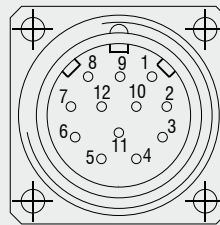
Output specifications SSI

Contact description

1 UB	Encoder power supply connection.
2 GND	Encoder ground connection. The voltage drawn to GND is UB.
3 Pulses +	Positive SSI pulse input. Pulse + forms a current loop with pulse -. A current of approx. 7 mA in direction of pulse + input generates a logical 1 in positive logic.
4 Data +	Positive, serial data output of the differential line driver. A High level at the output corresponds to logical 1 in positive logic.
5 ZERO	Zero setting input for setting a zero point at any desired point within the entire resolution. The zeroing process is triggered by a High pulse (pulse duration ≥ 100 ms) and must take place after the rotating direction selection (UP/DOWN). For maximum interference immunity, the input must be connected to GND after zeroing.
6 Data -	Negative, serial data output of the differential line driver. A High level at the output corresponds to logical 0 in positive logic.
7 Pulses -	Negative SSI pulse input. Pulse - forms a current loop with pulse +. A current of approx. 7 mA in direction of pulse - input generates a logical 0 in positive logic.
8 / 10 $\overline{\text{DATAVALID}}$ $\overline{\text{DATAVALID MT}}$	Diagnosis outputs $\overline{\text{DV}}$ and $\overline{\text{DV MT}}$ Jumps in data word, e.g. due to defective LED or photoreceiver, are displayed via the $\overline{\text{DV}}$ output. In addition, the power supply of the multiturn sensor unit is monitored and the $\overline{\text{DV MT}}$ output is set when a specified voltage level is dropped below. Both outputs are Low-active, i.e. are switched through to GND in the case of an error.
9 UP/DOWN	UP/DOWN counting direction input. When not connected, this input is on High. UP/ $\overline{\text{DOWN}}$ -High means increasing output data with a clockwise shaft rotating direction when looking at the flange. UP/ $\overline{\text{DOWN}}$ -Low means increasing values with a counter-clockwise shaft rotating direction when looking at the flange.
11 / 12	Not in use

Anschlussbelegung

Pin	Cable color	Assignment
1	brown	UB
2	black	GND
3	blue	Pulses +
4	beige	Data +
5	green	ZERO
6	yellow	Data -
7	violet	Pulses -
8	brown/yellow	$\overline{\text{DATAVALID}}$
9	pink	UP/ $\overline{\text{DOWN}}$
10	black/yellow	$\overline{\text{DATAVALID MT}}$
11	-	-
12	-	-



Please use leads twisted in pairs for extension cables.

Inputs

Control signals UP/DOWN and Zero

Level High	> 0.7UB
Level Low	< 0.3UB

Connection: UP/DOWN input with 10kohms to UB, zeroing input with 10kohms to GND.

SSI pulse

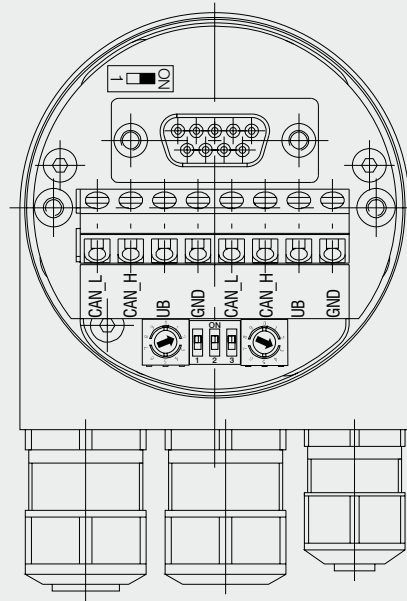
Optocoupler inputs for electrical isolation

Outputs

SSI data	RS485 driver
Diagnostic outputs	
Push-pull outputs are short-circuit-proof	
Level High	> UB -3.5V (with I = -20mA)
Level Low	$\leq 0.5V$ (with I = 20mA)

CANopen features

Bus protocol	CANopen
Device profile	CANopen - CiA DSP 406, V 3.0
CANopen Features	Device Class 2, CAN 2.0B
Operating modes (with SDO progr.)	<p>Polling Mode (asynch, via SDO)</p> <p>Cyclic Mode (asynch-cyclic) The encoder cyclically sends the current process actual value without a request by a master. The cycle time can be parameterized for values between 1 and 65535 ms. Synch Mode (synch-cyclic) The encoder sends the current actual process value after receiving a synch telegram sent by a master. The synch counter in the encoder can be parameterized so that the position value is not sent until after a defined number of synch telegrams.</p> <p>Acyclic Mode (synch-acyclic)</p>
Preset value	With the "Preset" parameter the encoder can be set to a desired actual process value that corresponds to the defined axis position of the system. The offset value between the encoder zero point and the mechanical zero point of the system is saved in the encoder.
Rotating direction	With the operating parameter the rotating direction in which the output code is to increase or decrease can be parameterized. Scaling The steps per revolution and the total revolution can be parameterized.
Scaling:	The steps per revolution and the total revolution can be parameterized.
Diagnose	<p>The encoder supports the following error messages:</p> <ul style="list-style-type: none"> - Position and parameter error - Lithium cell voltage at lower limit (Multiturn)
Default setting	50kbit/s, node number 1



Setting of terminating Resistor for CANopen



ON = Last user
OFF = User X

Setting CANopen baud rate

Baud rate	Setting Dip Switch		
	1	2	3
10kBit/s	OFF	OFF	OFF
20kBit/s	OFF	OFF	ON
50kBit/s	OFF	ON	OFF
125kBit/s	OFF	ON	ON
250kBit/s	ON	OFF	OFF
500kBit/s	ON	OFF	ON
800kBit/s	ON	ON	OFF
1MBit/s	ON	ON	ON

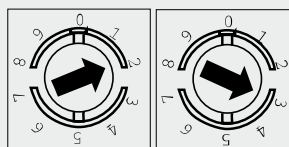
Contact description CANopen

CAN_L	CAN Bus Signal (dominant Low)
CAN_H	CAN Bus Signal (dominant High)
UB	Versorgungsspannung 10...30VDC
GND	Ground contact for UB

(Terminals with the same designation are internally interconnected)

Settings of user address for CANopen

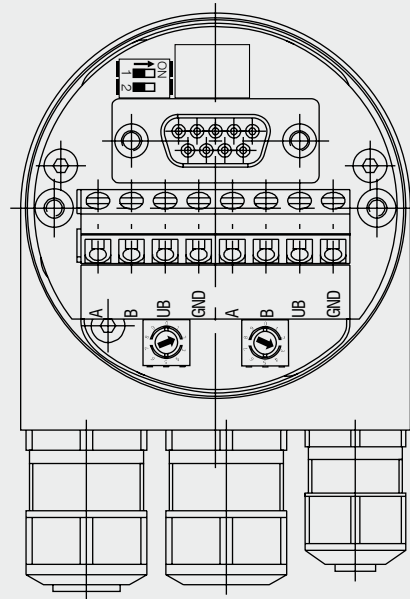
Address can be set with rotary switch. Example: User address 23



Output specifications Profibus

Profibus-DP features

Bus protocol	Profibus-DP
Profibus features	Device Class 1 and 2
Data exch. functions	Input: Position value Additional parameterized speed signal (readout of the current rotary speed) Output: Preset value
Preset value	With the "Preset" parameter the encoder can be set to a desired actual value that corresponds to the defined axis position of the system.
Parameter functions	Rotating direction: With the operating parameter the rotating direction for which the output code is to increase or decrease can be parameterized.
Diagnose	The encoder supports the following error messages: - Position error - Lithium cell voltage at lower limit (Multiturn)
Default setting	User address 00



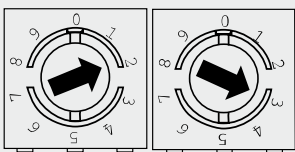
Settings of terminating resistors for Profibus-DP



ON = last user
OFF = user X

Settings of user address for Profibus-DP

Address can be set with rotary switch. Example: User address 23

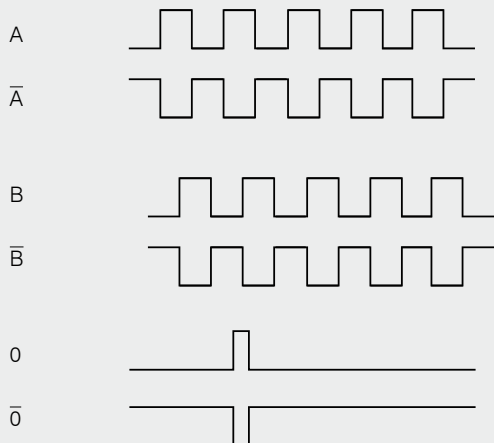


Contact description Profibus-DP

A	A negative serial data line
B	Positive serial data line
UB	Supply voltage 10...30VDC
GND	Ground contact for UB

(Terminals with the same designation are internally interconnected)

Signal output



Output TTL	Linedriver (5VDC)
Level High	$\geq 2.5V$ (with $I = -20mA$)
Level Low	$\leq 0.5V$ (with $I = 20mA$)
Load High	$\leq 20mA$
Output	A, \bar{A} , B, \bar{B} , O

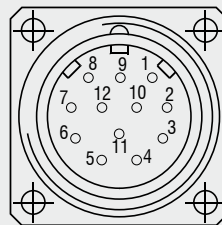
Output HTL	Push-pull (10 ... 30VDC)
Level High	$\geq UB -3V$ (with $I = -20mA$)
Level Low	$\leq 1.5V$ (with $I = 20mA$)
Load High	$\leq 40mA$
Output	A, \bar{A} , B, \bar{B} , O

Output E	Push-pull (5VDC)
Level High	UB -2.5V
Level Low	$\leq 0.5V$
Load High	$\leq 50mA$
Output	A, B, O

Output E830	Push-pull (8 ... 30VDC)
Level High	UB -3V
Level Low	$\leq 2.5V$
Load High	$\leq 50mA$
Output	A, B, O

Pin assignment TTL, HTL

Pin	Cable color	Assignment
1	pink	B inv.
2	blue	UB Sense
3	red	N (Nullimpulses)
4	black	N inv. (Nullimpulses inv.)
5	brown	A
6	green	A inv.
7	-	-
8	grey	B
9	-	-
10	white/green	GND
11	white	GND Sense
12	brown/green	UB



Pin 2 and Pin 12 are internally connected as well as Pin 11 and 10.
For cable length >10m twisted pair wires are required.

Connection assignment E, E830

Pin	Cable color	Assignment
-	white	0V
-	brown	+UB
-	green	A
-	-	\bar{A}
-	yellow	B
-	-	\bar{B}
-	grey	O

High performance sensors made by Micro-Epsilon



Sensors and systems for displacement, position and dimension

Eddy current displacement sensors
Optical and laser sensors
Capactive sensors
Linear inductive sensors
Draw wire displacement sensors
Laser micrometer
2D/3D profile sensors (laser scanner)
Image processing



Sensors and systems for non-contact temperature measurement

IR handheld
Stationary IR sensors
Thermal imager



Turn key systems for quality inspection

of plastics and film
of tires and rubber
of endless band material
of automotive components
of glass



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