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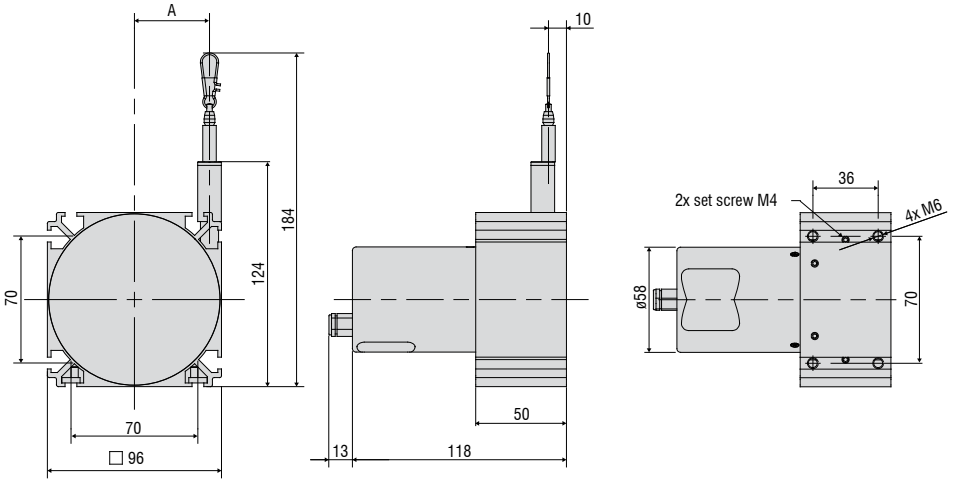
More Precision

wireSENSOR // Draw-wire displacement sensors

wireSENSOR P96 analog

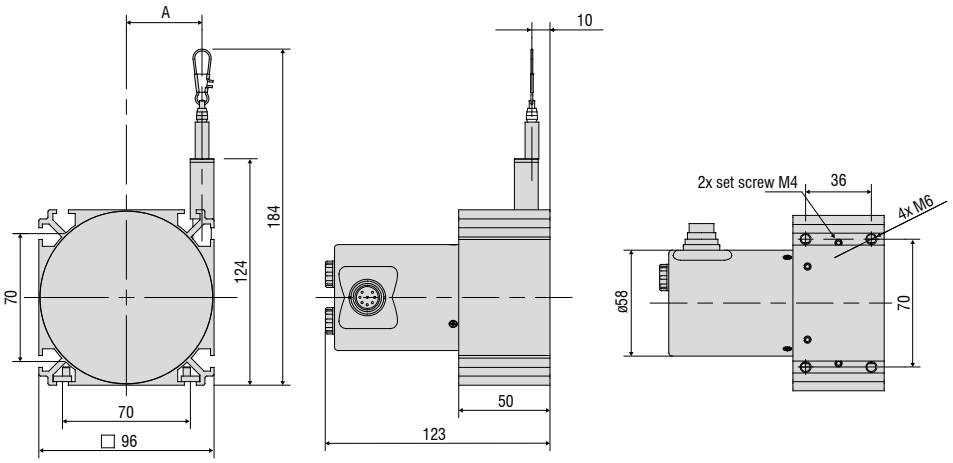
- *Robust aluminum profile housing*
- *Customized versions for OEM*
- *Potentiometer, current and voltage output*

Model P96 Output P



MR (mm)	A (mm)
2000	32
2500	41.4

Model P96 Output U/I



MR (mm)	A (mm)
2000	32
2500	41.4

Model		WDS-2000-P96	WDS-2500-P96
Output		P/U/I	
Measuring range		2000mm	2500mm
Linearity	±0.1% FSO	±2.0mm	±2.5mm
Resolution		towards infinity	
Sensor element		hybrid potentiometer	
Temperature range		-20 °C ... +80 °C	
Material	housing	aluminum	
	draw-wire	coated polyamide stainless steel (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		IP65 (only if connected)	
Vibration		20g, 20Hz - 2kHz	
Mechanical shock		50g, 10ms	
Electrical connection	P	integrated cable, radial, 1m	
	U, I	flange connector, axial, 8-pin DIN45326	
Weight		approx. 1.1kg	

FSO = Full Scale Output
Specifications for analog outputs on page 51.

Article description

WDS - 2000 - P96 - CA - P

- **2000** – Measuring range in mm
- **P96** – Model P96
- **CA** – Connection:
  SR: radial plug
  CA: integrated cable, axial, 1m
- **P** – Output option:
  P = potentiometer (with connection CA)
  U = voltage (with connection SR)
  I = current (with connection SR)

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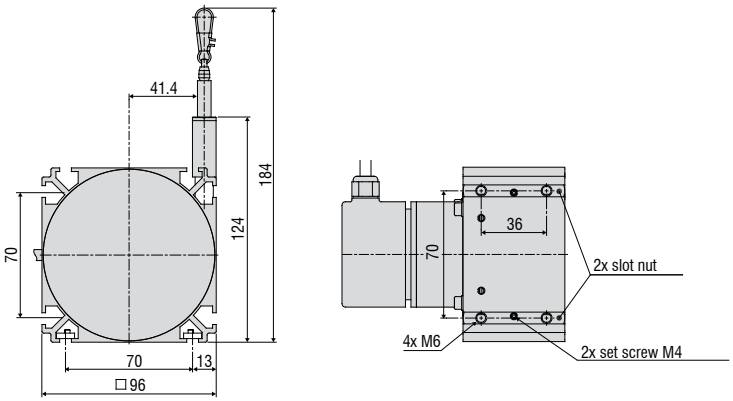
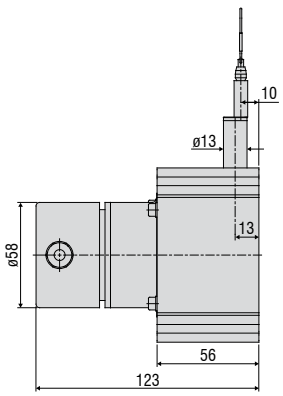
wireSENSOR P96 digital

- *Robust aluminum profile housing*
- *Incremental / absolute encoder*

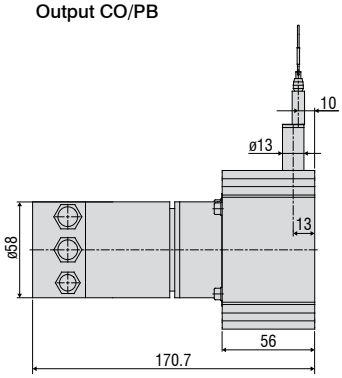
Model P96



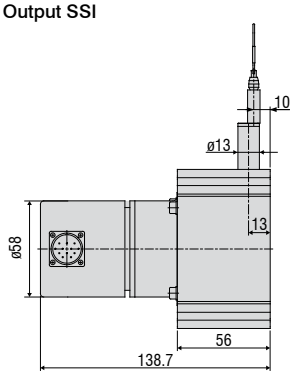
Output HTL/TTL



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 °C ... +80 °C
Material	housing	aluminum
	draw-wire	coated polyamide 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		IP65 (only if connected)
Vibration		20g, 20Hz - 2kHz
Mechanical shock		50g, 10ms
Electrical connection	HTL, TTL	integrated cable, radial, 1m
	SSI	flange connector, radial, 12-pin
	PB, CO	bus cover
Weight		approx. 1.7kg

FSO = Full Scale Output
Specifications for digital outputs on page 52.

Article description

WDS - **3000 -** **P96 -** **CR -** **TTL**

- **TTL** — Output option:
  HTL
  TTL
  CO: CANopen
  PB: Profibus DP
  SSI
- **CR -** — Connection:
  SR (Output SSI): radial plug
  CR (Output HTL, TTL): integrated cable, radial, 1m
  BH (Output CO, PB): bus cover
- **P96 -** — Model P96
- **3000 -** — Measuring range in mm

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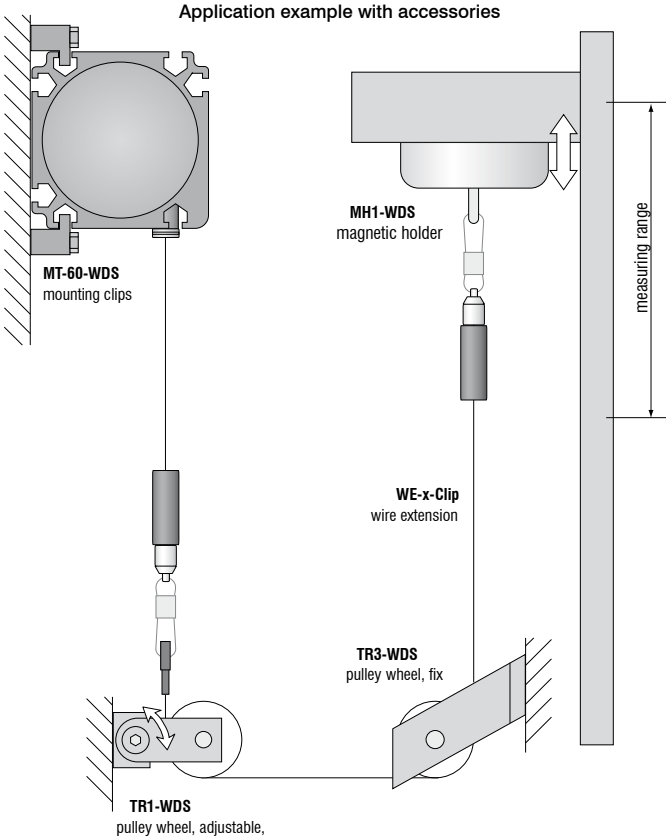
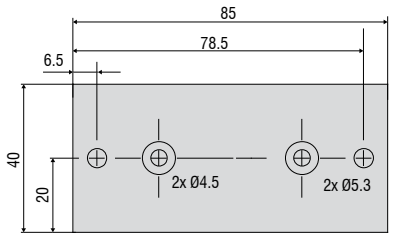
Accessories:	
WE-xxxx-M4	Wire extension with M4-wire connection, x=length
WE-xxxx-Clip	Wire extension with eyelet, x=length
TR1-WDS	Pulley wheel, adjustable
TR3-WDS	Pulley wheel, fixed
GK1-WDS	Attachment head for M4
MH1-WDS	Magnetic holder for wire mounting
MH2-WDS	Magnetic holder for sensor mounting
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-WDS	Sensor cable, length 3m
PS 2020	(Power Supply 24 V / 2,5 A, Input 100 - 240 VAC, output 24 VDC / 2.5 A, for snap in mounting on DIN 50022 rail)
WDS-MP60	Mounting plate for P60 sensors

Application example with accessories





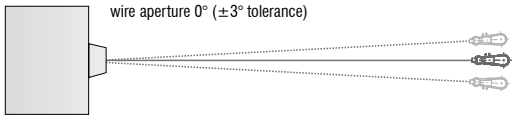
Mounting plate WDS-MP60

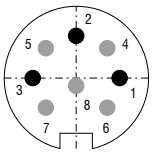
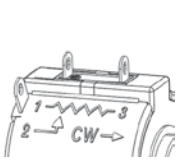
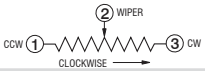
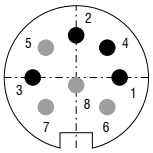
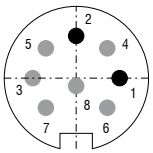
Installation information:

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:

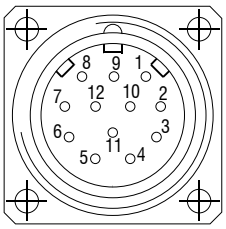
When mounting a draw-wire displacement sensor, a straight wire exit (±3° tolerance) must be taken into account. If this tolerance is exceeded, increased material wear on the wire and at the wire aperture must be expected.



Output		Plug M16 -SA / -SR	Integrated cable -CA / -CR	Open contacts
Potentiometric output (P)		 sensor side		 
Supply voltage	max. 32VDC at 1kOhm / 1 Wmax			
Resistance	1kOhm ±10% (potentiometer)			
Temperature coefficient	±0.0025% FSO/°C			
		1 = input + 2 = grounding 3 = signal	white = input + brown = grounding green = signal	1 = input + 2 = signal 3 = grounding
				
Voltage output (U)		 sensor side		
Supply voltage	14 ... 27VDC (non stabilized)			
Current consumption	max. 30mA			
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 61000-6-4 EN 61000-6-2			
Adjustment ranges (if supported by the model)		1 = supply 2 = grounding 3 = signal 4 = ground	white = supply brown = grounding green = signal yellow = ground	
Zero	±20% FSO			
Sensitivity	±20%			
Current Output (I)		 sensor side		
Supply voltage	14 ... 27VDC (non stabilized)			
Current consumption	max. 35mA			
Output current	4 ... 20mA			
Load	<600Ohm			
Signal noise	$<1,6\ \mu A_{eff}$			
Temperature coefficient	±0.01% FSO/°C			
Electromagnetic compatibility (EMC)	EN 61000-6-4 EN 61000-6-2			
Adjustment range (if supported by the model)		1 = supply 2 = grounding	white = supply brown = grounding	
Zero	±18% FSO			
Sensitivity	±15%			

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 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

Pin assignment		
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/ DOWN
10	black/yellow	$\overline{\text{DATAVALID}}$ $\overline{\text{MT}}$
11	-	-
12	-	-

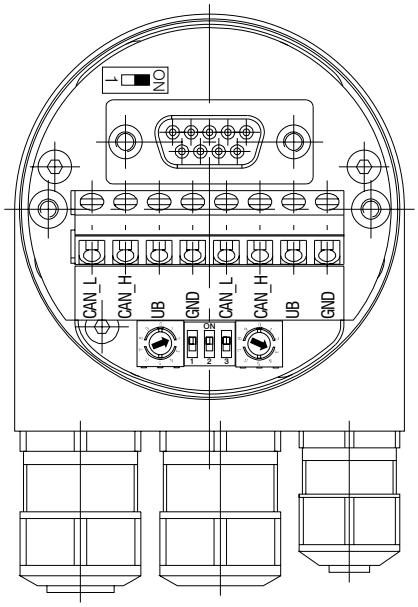


Please use leads twisted in pairs for extension cables.

Inputs	
Control signals UP/DOWN and Zero	
Level High	> 0.7 UB
Level Low	< 0.3 UB
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	≤ 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.)	Polling Mode (asynch, via SDO) 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. Acyclic Mode (synch-acyclic)
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	The encoder supports the following error messages: - 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

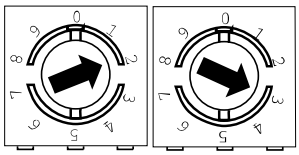
OFF = User X

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

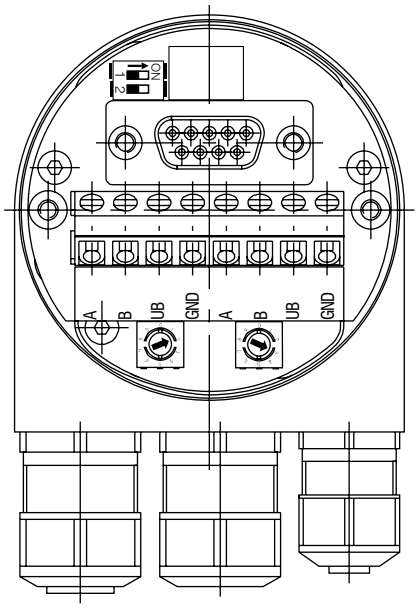
Contact description CANopen	
CAN_L	CAN Bus Signal (dominant Low)
CAN_H	CAN Bus Signal (dominant High)
UB	Supply voltage 10...30VDC
GND	Ground contact for UB
	(Terminals with the same designation are internally interconnected)

Settings of user address for CANopen

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



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

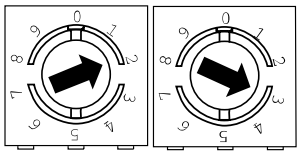


Settings of terminating resistors for Profibus-DP

ON = last user
OFF = user X

Settings of user address for Profibus-DP

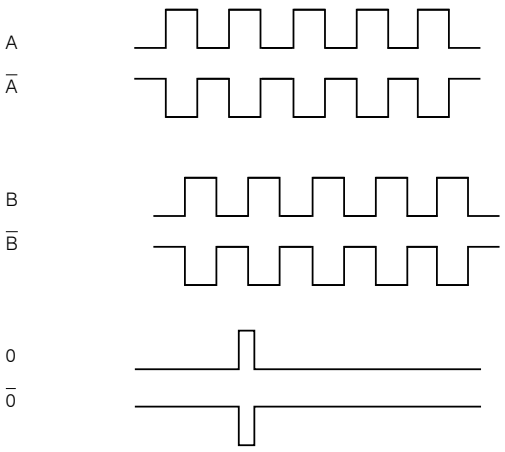
Settings of user address for Profibus-DP



Contact description Profibus-DP
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 (5 VDC)	
Level High	≥ 2.5V	(with I = -20mA)
Pegel Low	≤ 0.5V	(with I = 20mA)
Load High	≤ 20mA	
Output	A, $\overline{A}$, B, $\overline{B}$, 0	

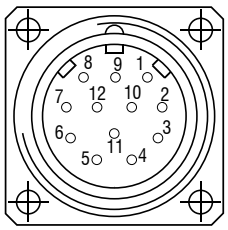
Output TTL01/TTL02	NPN (5 VDC ±5%)
Level High	> 4.5V
Level Low	< 1.0V
Load High	≤ 3mA
Output (TTL01)	A, B, 0
Output (TTL02)	A, $\overline{A}$, B, $\overline{B}$, 0

Output HTL	Push-pull (10 ... 30 VDC)	
Level High	≥ UB -3V	(with I = -20mA)
Level Low	≤ 1.5V	(with I = 20mA)
Load High	≤ 40mA	
Output	A, $\overline{A}$, B, $\overline{B}$, 0	

Output E	Push-pull ((5 VDC)
Level High	≥ UB -2.5V
Level Low	≤ 0.5V
Load High	≤ 50mA
Output	A, B, 0

Output E830	Push-pull ((8 ... 30 VDC)
Level High	≥ UB -3V
Level Low	≤ 2.5V
Load High	≤ 50mA
Output	A, B, 0

Pin assignment TTL, HTL		
Pin	Cable color	Assignment
Pin 1	pink	B inv.
Pin 2	blue	UB Sense
Pin 3	red	N (zero impulse)
Pin 4	black	N inv. (zero impulse inv.)
Pin 5	brown	A
Pin 6	green	A inv.
Pin 7	-	-
Pin 8	gray	B
Pin 9	-	-
Pin 10	white/green	GND
Pin 11	white	GND Sense
Pin 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	
Cable color	Assignment
white	0V
brown	+UB
green	A
-	$\overline{A}$
yellow	B
-	$\overline{B}$
gray	0

Connection assignment TTL01	
Cable color	Assignment
brown	0V
gray	+UB
white	A
green	B
yellow	0

Connection assignment TTL02	
Cable color	Assignment
red	+UB
black	0V
brown	A
black	$\overline{A}$
orange	B
black	$\overline{B}$
yellow	0
black	n.c.

High performance sensors made by Micro-Epsilon

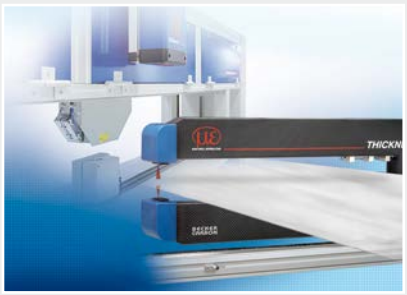
Sensors and systems for displacement and position

Sensors and measurement devices for non-contact temperature measurement

2D/3D profile sensors (laser scanner)

Optical micrometers, fiber optic sensors and fiber optics

Color recognition sensors, LED analysers and color inline spectrometer



Measurement and inspection systems

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