



# More Precision

**wireSENSOR** // Draw-wire displacement sensors





- *Measuring ranges to 50,000mm*
- *Resolution quasi infinite*
- *Compact overall design*
- *Easy mounting for any application*
- *High reliability and long life cycle*
- *Analogue and digital outputs*

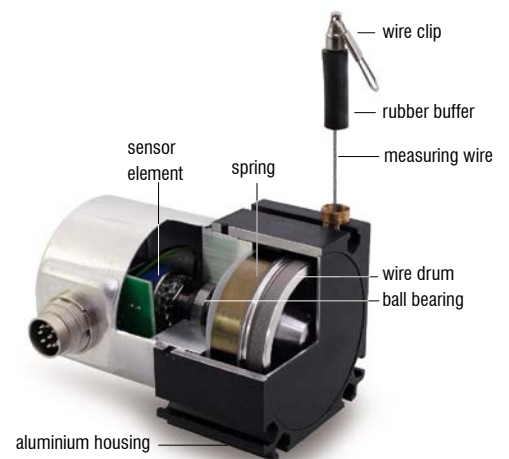
### Principle

Draw-wire displacement sensors measure linear movements using a highly flexible steel cable. The cable drum is attached to a sensor element which provides a proportional output signal. Measurements are performed with high accuracy and high dynamic response. The use of high quality components guarantees a long life cycle and high operational reliability.

MICRO-EPSILON offers a wide selection of draw-wire displacement sensors with numerous types of output signal. This means

that each customer has the opportunity of selecting the best sensor for his application. Choose between analogue and digital outputs to optimise your individual measurement task. OEM-solutions for customised integration possible.

wireSENSORS are application friendly due to the excellent measurement range to size ratio and the fact that they are easy to mount and use. The rugged sensor construction ensures reliable operation even under difficult ambient conditions.



Sensor design WDS-P60

## Available sensor series



wireSENSOR MK30/MK46/MK77/MK88/MK120



wireSENSOR MPM/MPW



wireSENSOR P60/P96



wireSENSOR P115



wireSENSOR P200



wireSENSOR mechanics

Measuring range (mm)																									
Model	50	100	150	250	300	500	750	1000	1250	1500	2000	2100	2300	2500	3000	3500	4000	5000	7500	10.000	15.000	30.000	40.000	50.000	Page
MK30 analogue	P		P	P		P	P																		6-7
MK30 digital						E	E																		8-9
MK46 analogue								P	P U I																10-11
MK46 digital									E																12-13
MK 77 analogue												P													14-15
MK 77 digital												E													16-17
MK 88 analogue													P U I			P U I		P U I							18-19
MK 120 analogue															P U I			P U I	P U I						20-21
MPM analogue	P		P	P																					22-23
MP/MPW analogue		P			P	P		P																	24-25
P60 analogue		P U I	P U I		P U I	P U I	P U I	P U I		P U I															26-27
P60 digital								E A		E A															28-29
P96 analogue										P U I				P U I											30-31
P96 digital															E A										32-33
P115 analogue															P U I		P U I	P U I	P U I	P U I	P U I				34-35
P115 digital																		E A	E A	E A	E A				36-37
P200 digital																						E A	E A	E A	38-39
Mechanics										M			M		M	M		M	M	M	M	M	M	M	40-45

P Potentiometer

U Voltage

I Current

E Incremental encoder

A Absolute encoder

M Mechanics



Positioning of catering trucks at Airbus A380



Positioning of operating tables



Variable support for mobile cranes and cherry picker platforms



Release of satellites into space





Displacement measurement on slag transporter



Position measurement on X-ray machines



Lift-height measurement  
in fork-lift trucks

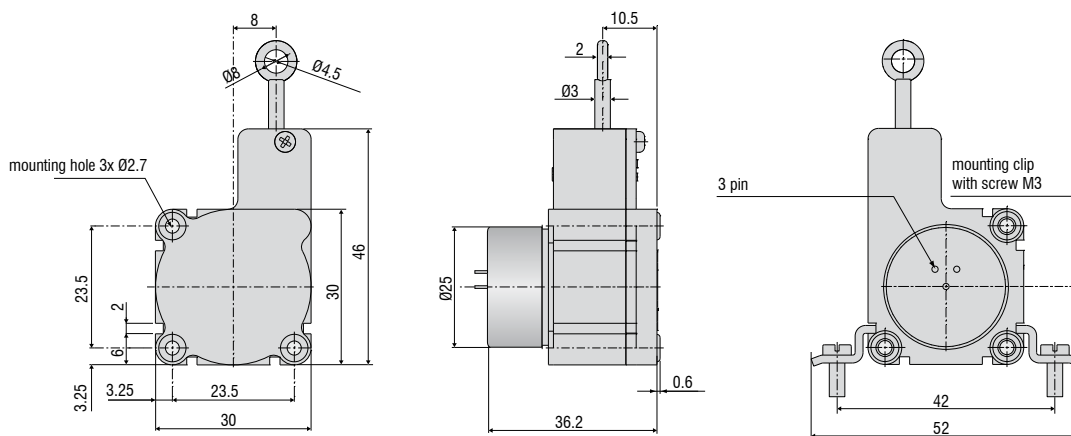


Height of lifting platforms on automobile production lines

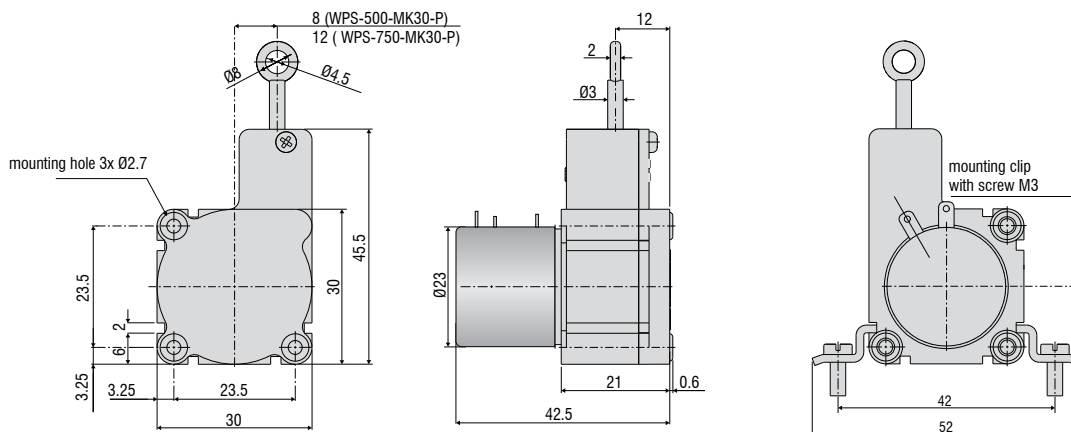


- Robust plastic housing
- Customised versions for OEM
- Conductive plastic/wire/hybrid potentiometer
- Smallest design in its class

Model MK30-P (Measuring range 50mm)



Model MK30-P (Measuring range 150/250/500/750/1000/1250mm)



Model			WPS-50-MK30	WPS-150-MK30	WPS-250-MK30	WPS-500-MK30	WPS-750-MK30
Output			P				
Measuring range			50mm	150mm	250mm	500mm	750mm
Linearity	conductive plastic pot.	±0.5% FSO	±0.25mm	-	-	-	-
	wire pot. P25	±0.25% FSO	-	-	-	±1.25mm	±1.87mm
	hybrid pot. P25	±0.25% FSO	-	±0.375mm	±0.625mm	-	-
	hybrid pot. P25	±0.1% FSO	-	-	±0.25mm	±0.5mm	±0.75mm
Resolution	conductive plastic pot.		quasi infinite				
	wire pot.		-	0.1mm	0.1mm	0.15mm	0.2mm
	hybrid pot.		quasi infinite				
			conductive plastic/wire/hybrid potentiometer				
Temperature range			-20 ... +80°C				
Material	housing		plastic				
	draw wire		coated polamide stainless steel (ø 0.36mm)				
Wire mounting			eyelet				
Sensor mounting			mounting holes / mounting grooves				
Wire acceleration			appr. 5g				
Wire retraction force (min)			appr. 1N				
Wire extension force (max)			appr. 2.5N				
Protection class			IP 20				
Electrical connection			soldering tag				
Weight			appr 45g				

FSO = Full Scale Output

Specifications for analogue outputs on page 47.

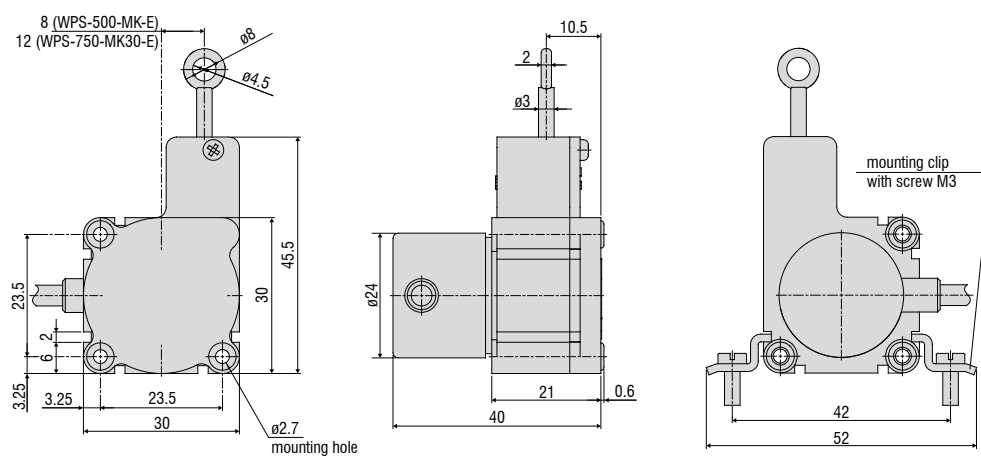
## Article description

WPS -	50 -	MK30 -	P25
			Output option: potentiometer P50 (Linearity ±0.5% FSO) potentiometer P25 (Linearity ±0.25% FSO) potentiometer P10 (Linearity ±0.1% FSO)
			Model MK30
			Measuring range in mm



- Robust plastic housing
- Customised versions for OEM
- Smallest design in its class
- Incremental encoder

Model MK30





Model	WPS-500-MK30	WPS-750-MK30
Output	E/E830	E/E830
Measuring range	500mm	750mm
Linearity E	±0.05% FSO	±0.375mm
Resolution	10 pulses/mm	6.7 pulses/mm
	0.1mm	0.15mm
Sensor element	Incremental encoder	
Temperature range	-20 ... +80 °C	
Material	housing	plastic
	draw wire	coated polamide stainless steel (ø 0.36mm)
Wire mounting	eyelet	
Sensor mounting	mounting holes / mounting grooves	
Wire acceleration	appr. 5g	
Wire retraction force (min)	appr. 1N	
Wire extension force (max)	appr. 2.5N	
Protection class	IP54	
Electrical connection	cable radial, 1m	
Weight	appr. 80g	

FSO = Full Scale Output  
Specifications for digital outputs on page 48.

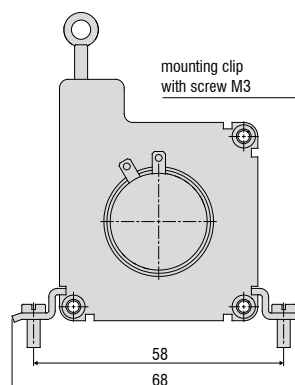
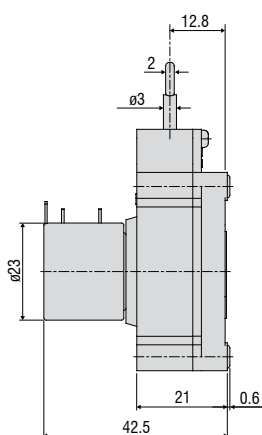
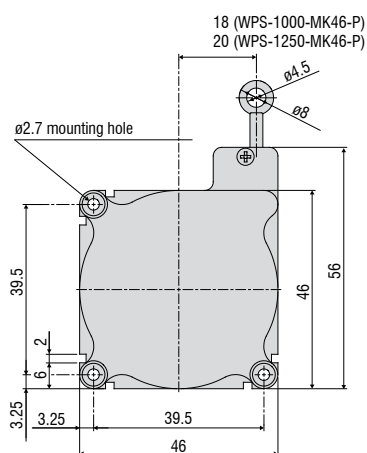
Article description

WPS -	500 -	MK30 -	E830
			Output option: encoder E (5 ... 24 VDC) encoder E830 (8 ... 30 VDC)
			Model MK30
			Measuring range in mm

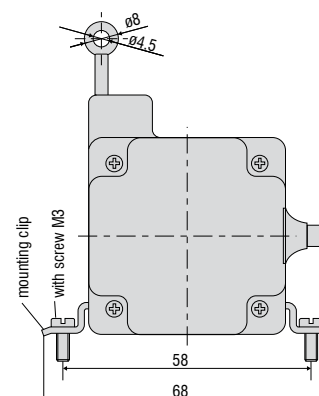
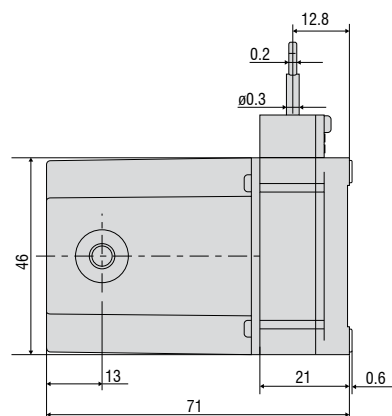
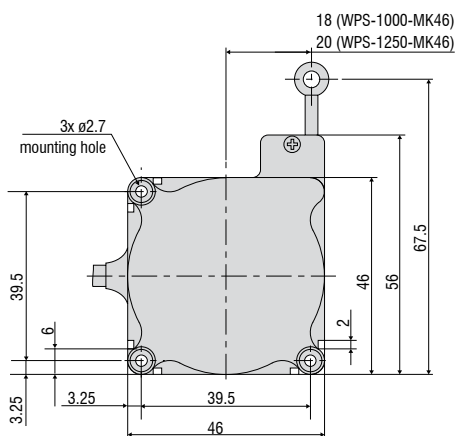


- Robust plastic housing
- Customised versions for OEM
- Wire/hybrid potentiometer

Model MK46 Output P10/P25



Model MK46 Output CR-P25



Model			WPS-1000-MK46	WPS-1250-MK46
Output			P	P/U/I
Measuring range			1000mm	1250mm
Linearity	wire pot. P25	±0.25% FSO	±2.5mm	±3.12mm
	Hybridpot. P10/U10/I10	±0.1% FSO	±1mm	±1.2mm
Resolution	wire pot. P25		0.3mm	0.4mm
	Hybridpot. P10/U10/I10		quasi infinite	
Sensor element			wire/hybrid potentiometer	
Temperature range			-20 ... +80°C	
Material	housing		plastic	
	draw wire		coated polyamide stainless steel (ø 0.36mm)	
Wire mounting			eyelet	
Sensor mounting			mounting holes / mounting grooves	
Wire acceleration			appr. 5g	
Wire retraction force (min)			appr. 1N	
Wire extension force (max)			1.6N	1.5N
Protection class			IP 20	
Electrical connection	P10, P25		soldering tag	
	CR-P25/CR-U10/ CR-I10		integrated cable, radial, 1m	
Weight			appr. 80g	

FSO = Full Scale Output

Specifications for analogue outputs on page 47.

## Article description

WPS - 1000 - MK46 - P25

Output option:  
P25: potentiometer  
P10: potentiometer  
CR-P25: potentiometer, integrated cable, radial, 1m

Model MK46

Measuring range in mm

WPS - 1250 - MK46 - P25

Output option:  
P25: potentiometer  
P10: potentiometer  
CR-P25: potentiometer, integrated cable, radial, 1m  
CR-U10: voltage, integrated cable, radial, 1m  
CR-I10: current, integrated cable, radial, 1m

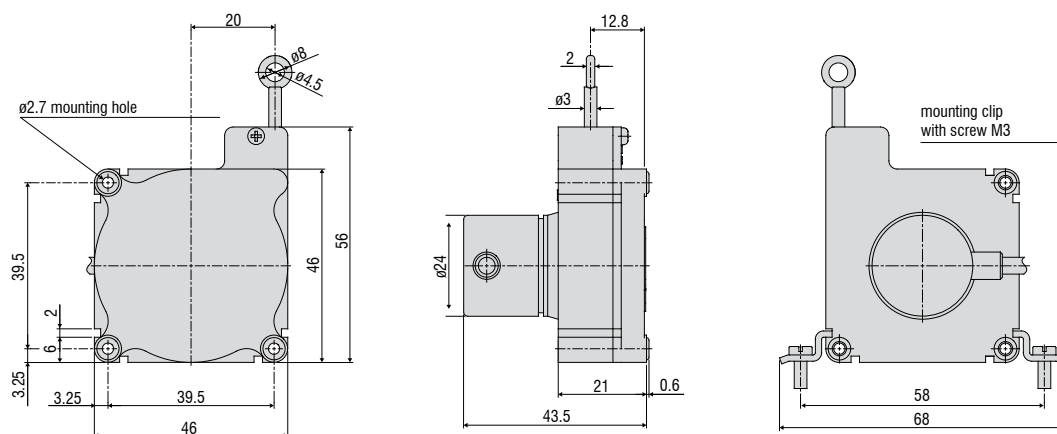
Model MK46

Measuring range in mm



- Robust plastic housing
- Customised versions for OEM
- Incremental encoder

Model MK46



mounting clip  
with screw M3



Model			WPS-1250-MK46
Output			E/E830
Measuring range			1250mm
Linearity	± 0.05% FSO	encoder	± 0.625mm
Resolution			4 pulses/mm
			0.25mm
Sensor element			incremental encoder
Temperature range			-20 ... +80°C
Material	housing		plastic
	draw wire		coated polyamide stainless steel (ø 0.36mm)
Wire mounting			eyelet
Sensor mounting			mounting holes / mounting grooves
Wire acceleration			appr. 5g
Wire retraction force (min)			appr. 1N
Wire extension force (max)			1.5N
Protection class			IP54
Electrical connection			cable radial, 1m
Weight			appr. 120g

FSO = Full Scale Output

Specifications for digital outputs on page 48.

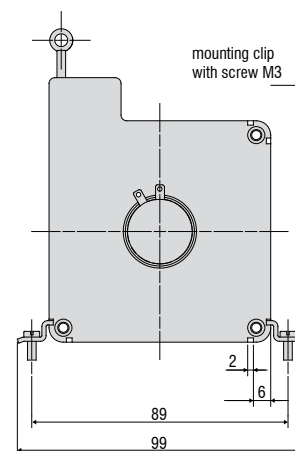
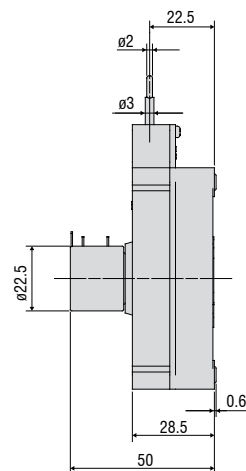
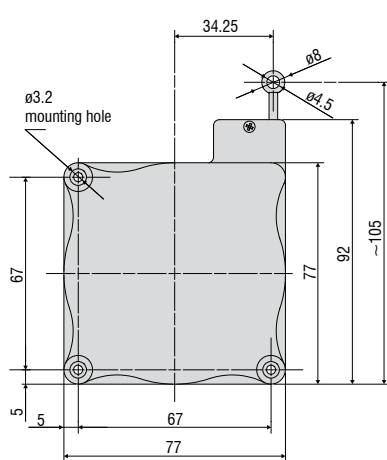
#### Article description

WPS -	1250 -	MK46 -	E
			Output option: encoder E (5 ... 24 VDC) encoder E830 (8 ... 30 VDC)
			Model MK46
			Measuring range in mm

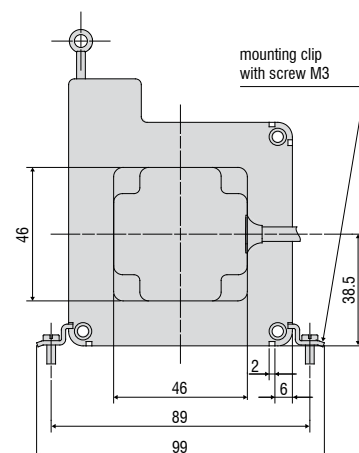
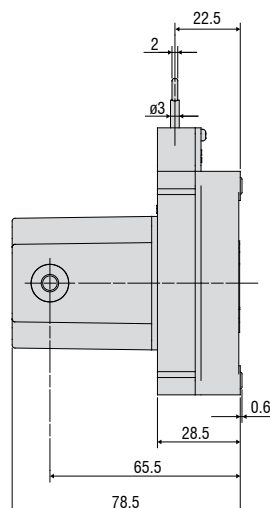
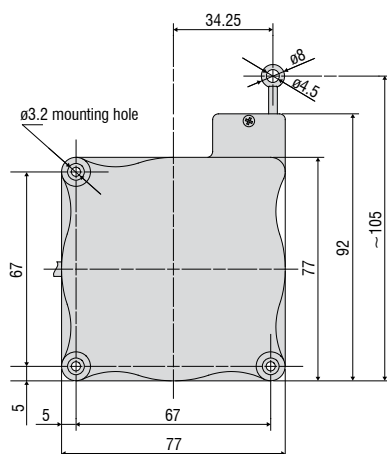


- Robust plastic housing
- Customised versions for OEM
- Wire potentiometer

Model MK77 Output P25



Model MK77 Output CR-P25



Model		WPS-2100-MK77	
Output		P25	
Measuring range		2100mm	
Linearity	wire pot.	±0.25% FSO	±5.25mm
Resolution	wire pot.		0.55mm
Sensor element		wire potentiometer	
Temperature range		-20 to 80°C	
Material	housing	plastic	
	draw wire	coated polamide stainless steel (ø 0.45mm)	
Wire mounting		eyelet	
Sensor mounting		mounting holes / mounting grooves	
Wire retraction force (min)		3.5N	
Wire extension force (max)		5N	
Wire acceleration (max)		5g	
Protection class		IP 20	
Electrical connection	P25	soldering tag	
	CR-P25	integrated cable radial, 1m	
Weight	P25	appr. 0.2kg	
	CR-P25	appr. 0.25kg	

FSO = Full Scale Output  
Specifications for analogue outputs on page 47.

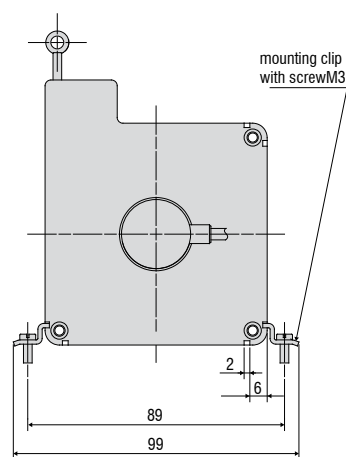
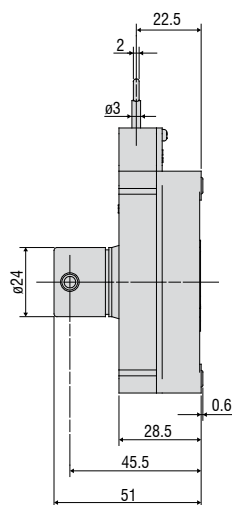
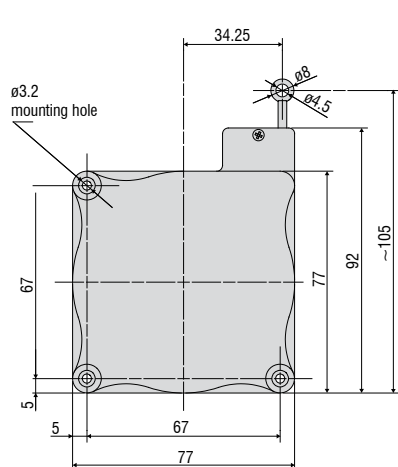
Article description

WPS -	2100 -	MK77 -	P25
			Output option: potentiometer P25 (Linearity ±0.25 % FSO) potentiometer CR-P25, integrated cable, radial, 1m
			Model MK77
			Measuring range in mm



- Robust plastic housing
- Customised versions for OEM
- Incremental/absolute encoder

Model MK77





Model		WPS-2100-MK77
Output		E/ E830
Measuring range		2100mm
Linearity	±0.05% FSO	±1.05mm
Resolution		0.43mm
Sensor element		incremental encoder
Temperature range		-20 to 80°C
Material	housing	plastic
	draw wire	coated polamide stainless steel (ø 0.45mm)
Wire mounting		eyelet
Sensor mounting		mounting holes / mounting grooves
Wire retraction force (min)		3.5N
Wire extension force (max)		5N
Wire acceleration (max)		5g
Protection class		IP 54
Electrical connection		cable radial, 2m
Weight		appr. 0.27kg

FSO = Full Scale Output  
Specifications for digital outputs on page 48.

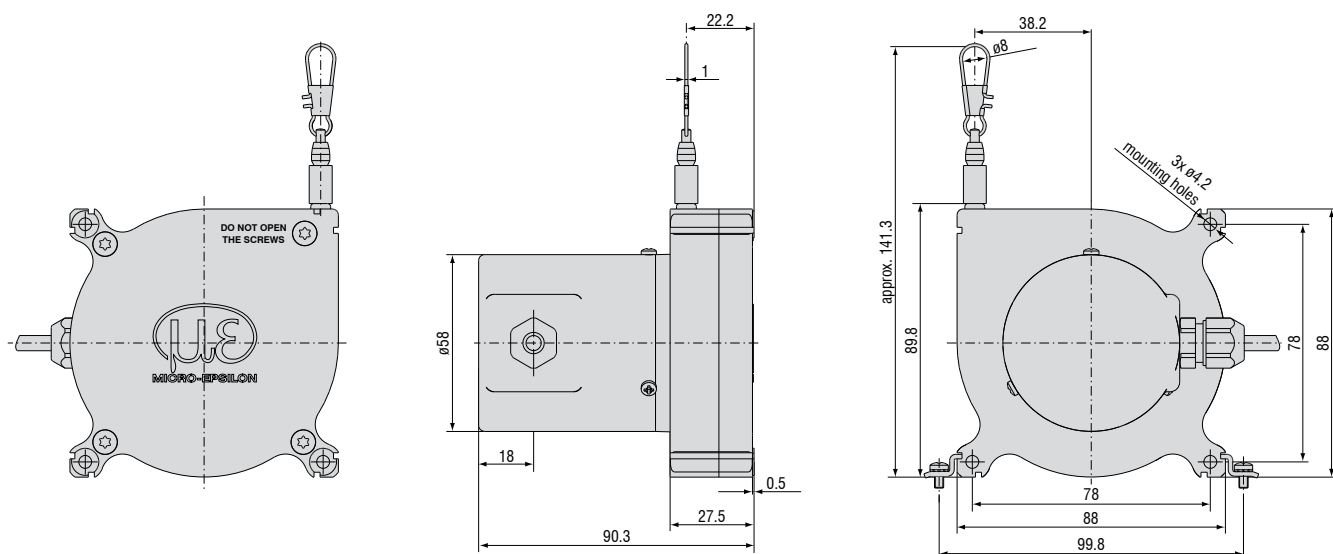
Article description

WPS -	2100 -	MK77 -	E
			Output option: encoder E (5 ... 24 VDC) encoder E830 (8 ... 30 VDC)
			Model MK77
			Measuring range in mm



- Robust plastic housing
- Customised versions for OEM
- Potentiometer, current and voltage output

Model MK88



Model	WPS-2300-MK88 (01)		WPS-3500-MK88 (01)	WPS-5000-MK88 (01)
Output	P/U/I			
Sensor element	potentiometer			
Measuring range	2300mm	3500mm	5000mm	
Linearity	±0.15% FSO	±0.3% FSO	±0.4% FSO	
Resolution/Empfindlichkeit	quasi infinite			
Temperature range	-20 to 80°C			
Material	housing	plastic, PA 6 GF 30		
	draw wire	coated polamide stainless steel (ø 0.45mm)		
	protection cap	aluminium		
Wire mounting	wire clip			
Sensor mounting	mounting holes / mounting grooves on the sensor housing			
Wire retraction force (min)	4N			
Wire extension force (max)	9N			
Wire acceleration (max)	appr. 7g			
Protection class	IP 65			
Electrical connection	cable, radial, 1m			
Weight (with cable)	400-430g			

FSO = Full Scale Output

Specifications for analogue outputs on page 47.

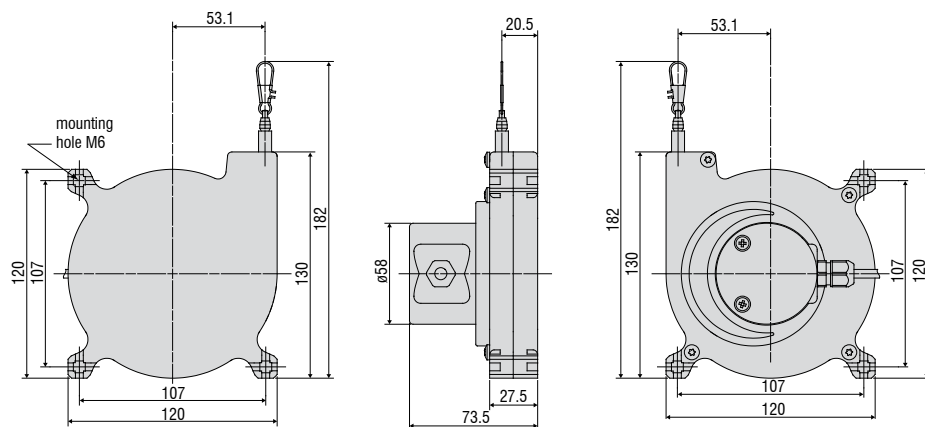
#### Article description

WPS -	2300 -	MK88 -	CR -	P
				Output option: P: potentiometer U: voltage I: current
				Connection CR: integrated cable, radial, 1m
				Model MK88
				Measuring range in mm

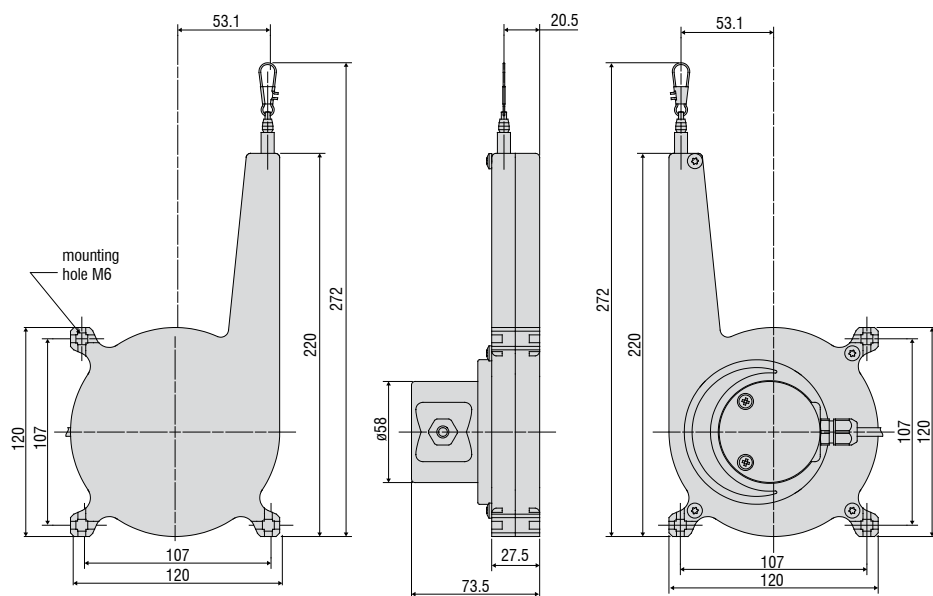


- Robust plastic housing
- Customised versions for OEM
- Potentiometer, current and voltage output

Model MK120 (Measuring range 3000, 5000mm)



Model MK120 (Measuring range 7500mm)





Model		WPS-3000-MK120	WPS-5000-MK120	WPS-7500-MK120
Output		P, U, I		
Measuring range		3000mm	5000mm	7500mm
Linearity	±0.15% FSO	± 4.5mm	± 7.5mm	± 11.25mm
Resolution		quasi infinite		
Temperature range		-20 to 80°C		
Material	housing	plastic PA6		
	draw wire	coated polamide stainless steel (ø 0.45mm)		
Wire mounting		wire clip		
Wire acceleration		2.5g		1.5g
Wire retraction force (min)		5.5N	5N	7N
Wire extension force (max)		8N		13N
Electrical connection		integrated cable, radial, 1m		
Protection class		IP 65		
Weight		0.75kg		0.9kg

FSO = Full Scale Output

Specifications for analogue outputs on page 47.

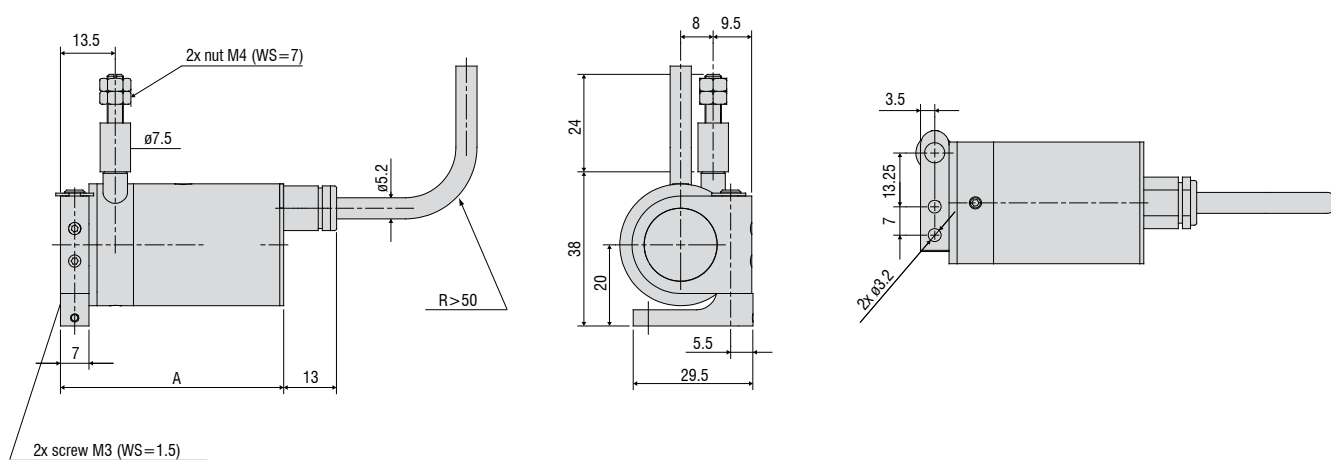
#### Article description

WPS -	3000 -	MK120 -	CR -	P
				Output option: P: potentiometer U: voltage I: current
				Connection CR: integrated cable, radial, 1m
				Model MK120
Measuring range in mm				



- Extreme compact miniature sensor
- Flexible mounting via swivel flange
- High speed measurement, wire acceleration up to 100g

Model MPM



Measuring range (mm)	A (mm)
50	55
150 / 250	64
50-HG	61
150 / 250-HG	70

Model		WDS-50-MPM	WDS-150-MPM	WDS-250-MPM
Output		P		
Measuring range		50mm	150mm	250mm
Linearity	±0.2% FSO	-	±0.3mm	±0.5mm
	±0.25% FSO	±0.125mm	-	-
Resolution		quasi infinite		
Sensor element		conductive plastic potentiometer	hybrid potentiometer	
Temperature range		-20 ... +80 °C		
Material	housing	aluminium		
	draw wire	stainless steel (ø 0.45mm)		
Sensor mounting		swivel flange in two axes 180° / 360°		
Wire mounting		thread M4		
Wire acceleration		appr. 25g (option HG: 100g)		
Wire retraction force (min)		1.5N (option HG: 10N)		
Wire extension force (max)		3.5N (option HG: 17N)		
Protection class		IP 65		
Vibration		20g, 20Hz - 2kHz		
Mechanical shock		50g, 20ms		
Electrical connection		integrated cable, axial, 3-leads, 1m		
Weight		appr. 150g		

FSO = Full Scale Output

Specifications for analogue outputs on page 47.

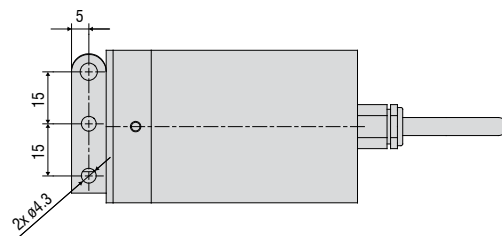
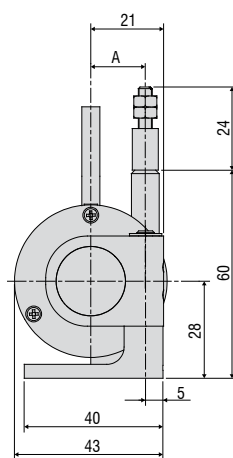
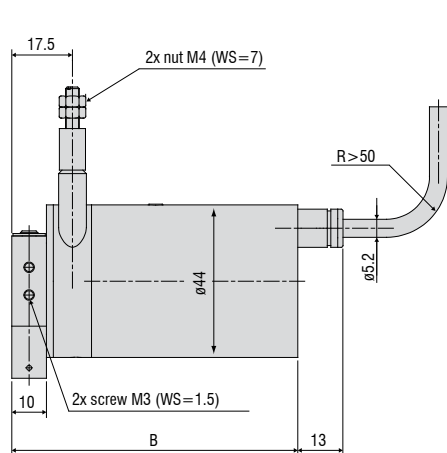
#### Article description

WDS -	50 -	MPM -	C -	P -	HG
					Option HG: wire acceleration up to 100g
					Output option: P: potentiometer
					Connection: C: integrated cable, axial, 1m
					Model MPM
					Measuring range in mm



- Miniature design
- Optional IP 67 (MPW)
- For fast measurement and harsh environments

Model MP / MPW



Measuring range (mm)	A (mm)	B (mm)
100 / 300 / 500 / 1000-MP	15.7	82.5
100 / 300 / 500 / 1000-MPW	15.7	86.5



Model		WDS-100 MP(W)	WDS-300 MP(W)	WDS-500 MP(W)	WDS-1000 MP(W)
Output		P			
Measuring range		100mm	300mm	500mm	1000mm
Linearity	±0.1% FSO	-	-	±0.5mm	±1mm
	±0.25% FSO	-	±0.75mm	-	-
	±0.5% FSO	±0.5mm	-	-	-
Resolution		0.15mm	0.2mm	quasi infinite	
Sensor element		wire potentiometer		hybrid potentiometer	
Temperature range		-20 ... +80 °C			
Material	housing	aluminium			
	draw wire	stainless steel (ø 0.45mm)			
Wire mounting		thread M4			
Sensor mounting		swivel flange in two axes 180° / 360°			
Wire acceleration		appr. 30g			
Wire retraction force (min)		7N	7N	6.5N	5N
Wire extension force (max)		8.5N	8.5N	8.5N	8N
Protection class	series MP	IP 65			
	series MPW	IP 67			
Vibration		20g, 20Hz - 2kHz			
Mechanical shock		50g, 10ms			
Electrical connection		integrated cable, axial, 3-leads, 1m			
Weight		appr. 270g			

FSO = Full Scale Output  
Specifications for analogue outputs on page 47.

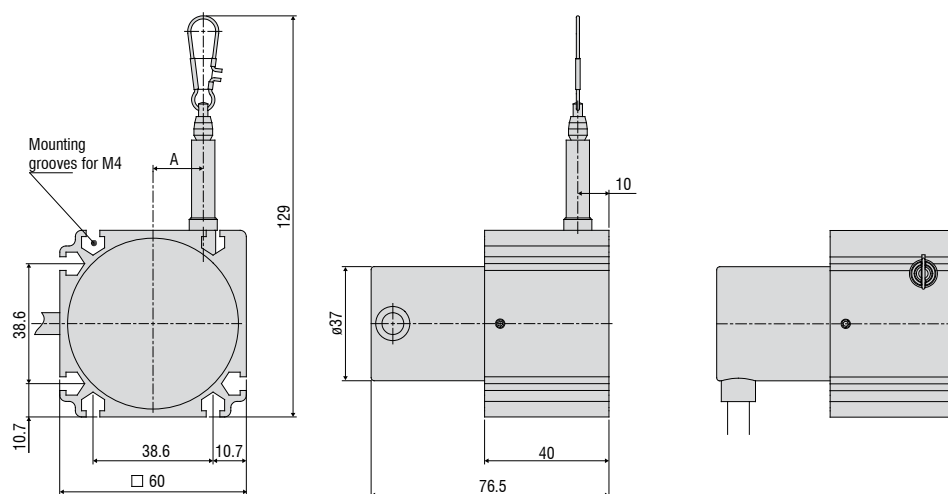
Article description

WDS -	100 -	MP -	C -	P
				Output option: P: potentiometer
				Connection: C: integrated cable, axial, 1m
				Model MP / MPW (IP67)
				Measuring range in mm



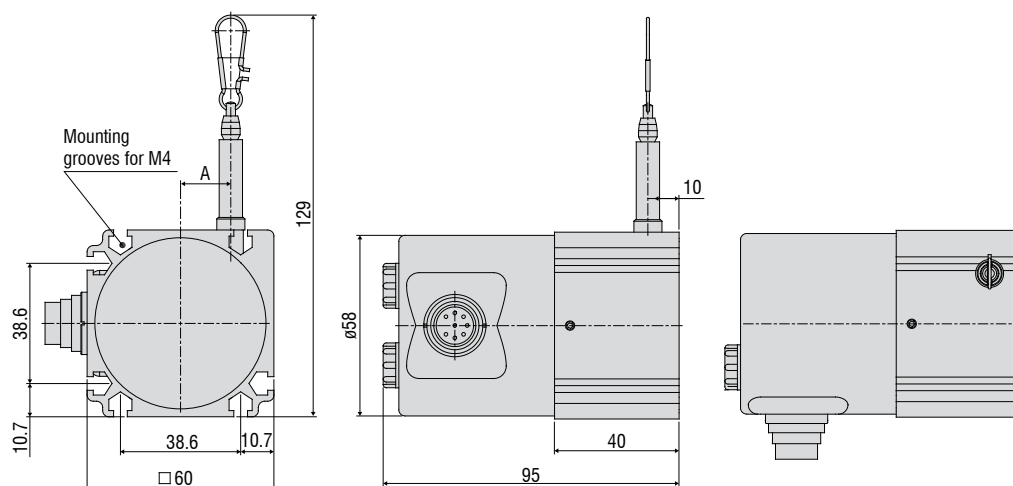
- Robust aluminium profile housing
- Customised versions for OEM
- Potentiometer, current and voltage output

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		100mm	150mm	300mm	500mm	750mm	1000mm	1500mm
Linearity	±0.1% FSO	-	-	-	±0.5mm	±0.75mm	±1mm	±1.5mm
	±0.25% FSO	-	-	±0.75mm	-	-	-	-
	±0.5% FSO	±0.5mm	±0.75mm	-	-	-	-	-
Resolution		quasi infinite						
Sensor element		conductive plastic/ wire potentiometer		hybrid potentiometer				
Temperature range		-20 ... +80°C						
Material	housing	aluminium						
	draw wire	coated polamide 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)		6.5N	4.5N	6N	6N	4N	5N	3.5N
Wire extension force (max)		7.5N	5.5N	7.5N	7.5N	5.5N	7.5N	5.5N
Protection class		IP 65 (only if connected)						
Vibration		20g, 20Hz - 2kHz						
Mechanical shock		50g, 10ms						
Electrical connection	P	integrated cable, radial, 1m						
	U, I	flange connector, radial, 8-pin, DIN45326						
Weight		appr. 370g						

FSO = Full Scale Output

Specifications for analogue outputs on page 47.

## Article description

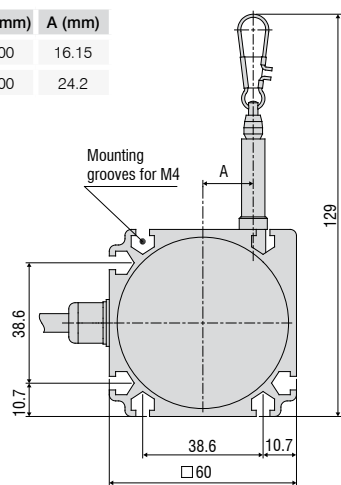
WDS -	100 -	P60 -	CR -	P
				Output option: P = potentiometer (with connection CR) U = voltage (with connection SR) I = current (with connection SR)
				Connection: SR: radial plug CR: integrated cable, radial, 1m
				Model P60
				Measuring range in mm



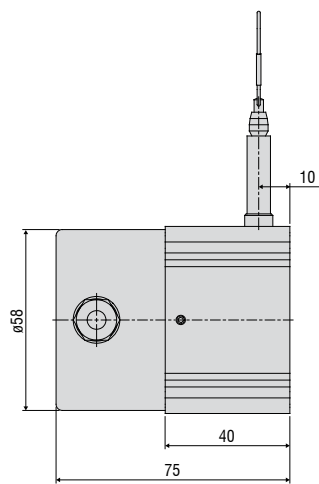
- Robust aluminium profile housing
- Customised versions for OEM
- Incremental/absolute encoder

Model P60

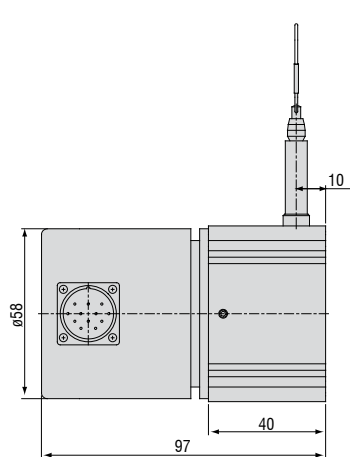
MR (mm)	A (mm)
1000	16.15
1500	24.2



Output HTL/TTL

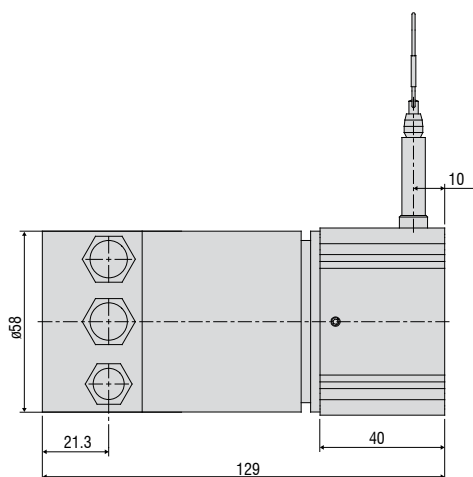
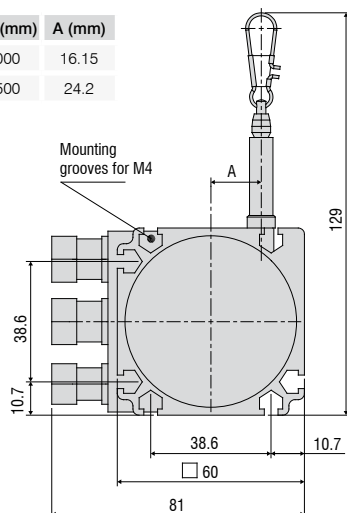


Output SSI



Model P60 Output CO/PB

MR (mm)	A (mm)
1000	16.15
1500	24.2



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)
Resolution	SSI, PB, CO	0.012mm	0.018mm
Sensor element		incremental encoder	
Temperature range		-20 ... +80 °C	
Material	housing	aluminium	
	draw wire	coated polamide stainless steel (ø 0.45mm)	
Sensor mounting		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	
	SSI	flange connector, radial, 12-pin	
	PB, CO	bus cover	
Weight		appr. 1kg	

FSO = Full Scale Output

Specifications for digital outputs on page 48.

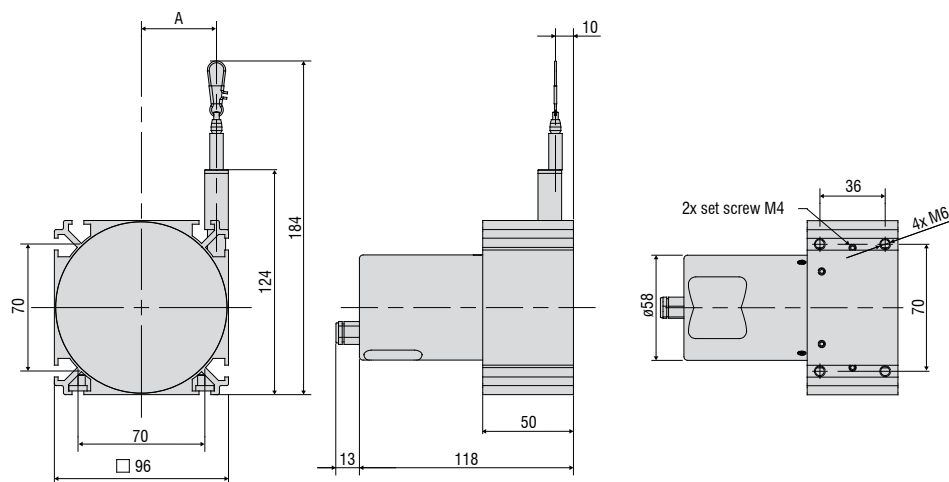
## Article description

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				

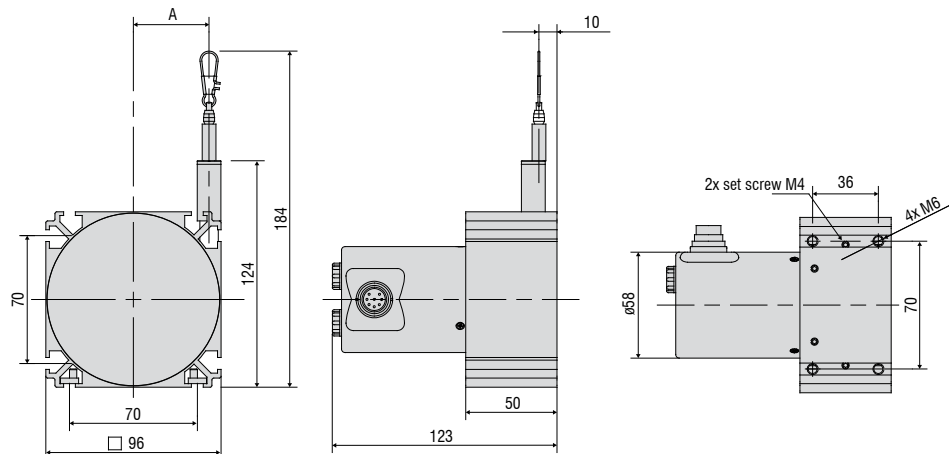


- Robust aluminium profile housing
- Customised versions for OEM
- Potentiometer, current and voltage output

Model P96 Output P



Model P96 Output U/I





Model		WDS-2000-P96	WDS-2500-P96
Output		P/U/I	
Measuring range		2000mm	2500mm
Linearity	±0.1% FSO	±2.0mm	±2.5mm
Resolution		quasi infinite	
Sensor element		hybrid potentiometer	
Temperature range		-20 ... +80 °C	
Material	housing	aluminium	
	draw wire	coated polamide 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		IP 65 (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		appr. 1.1kg	

FSO = Full Scale Output

Specifications for analogue outputs on page 47.

## 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

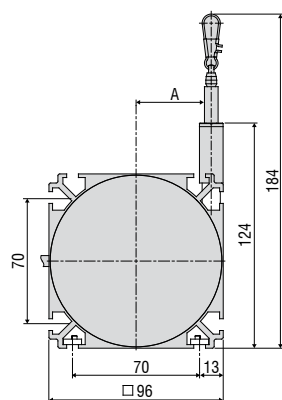


- Robust aluminium profile housing

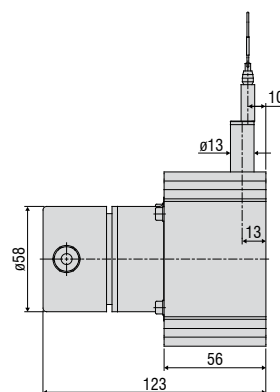
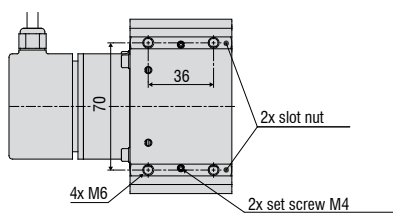
- Incremental/absolute encoder

Model P96

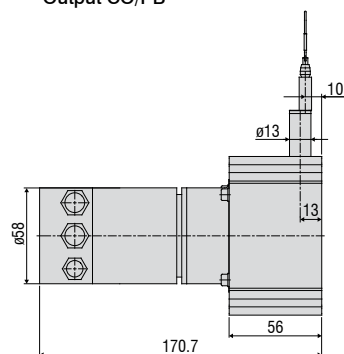
Output HTL/TTL



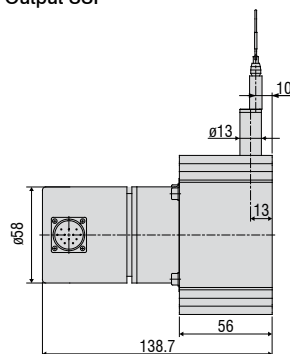
MR (mm)	A (mm)
2000	26
3000	41.4



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 polamide 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
	SSI	flange connector, radial, 12-pin
	PB, CO	bus cover
Weight		appr. 1.7kg

FSO = Full Scale Output

Specifications for digital outputs on page 48.

## 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

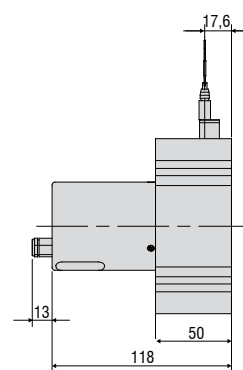
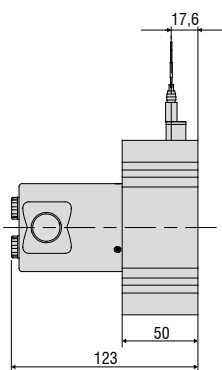
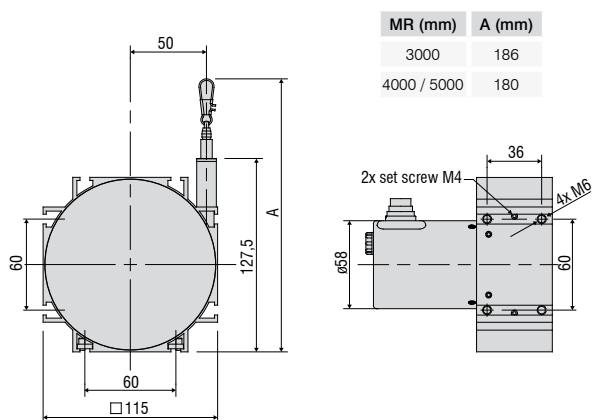


- Robust aluminium profile housing
- Customised versions for OEM
- Potentiometer, current and voltage output

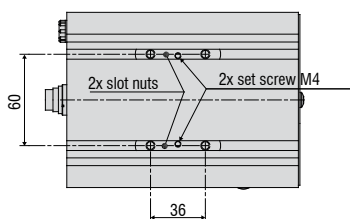
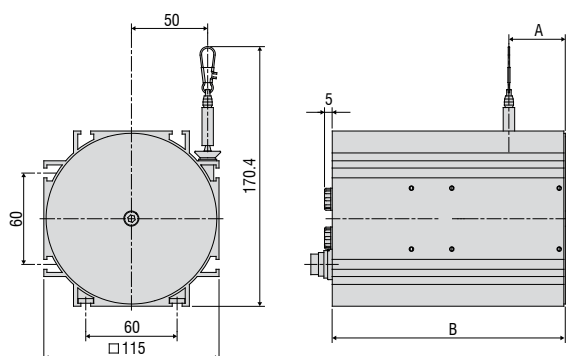
Model P115 (Measuring range 3000/4000/5000mm)

Output U/I

Output P



Model P115 (Measuring range 7500/10000/15000mm)



MR (mm)	A (mm)	B (mm)
7500	37	153
10000	44.5	198
15000	60.5	228

Model		WDS-3000-P115	WDS-4000-P115	WDS-5000-P115	WDS-7500-P115	WDS-10000-P115	WDS-15000-P115
Measuring range		3000mm	4000mm	5000mm	7500mm	10000mm	15000mm
Output		P, U, I					
Linearity	±0.1% FSO	±3mm	-	-	-	-	-
	±0.15% FSO	-	±6mm	±7.5mm	±11.3mm	±15mm	±22.5mm
Resolution		quasi infinite					
Sensor element		hybrid potentiometer					
Temperature range		-20 ... +80 °C					
Material	housing	aluminium					
	draw wire	coated polamide stainless steel (ø 0.45mm)			coated polamide stainless steel (ø 1.0mm)		
Sensor mounting		slot nut					
Wire mounting		wire clip					
Wire acceleration		appr. 6g					
Wire retraction force (min)		4.5N	4N	4N	8N	8N	8N
Wire extension force (max)		8N	8.5N	9N	24N	21N	25N
Protection class		IP 65 (only if connected)					
Vibration		20g, 20Hz - 2kHz					
Mechanical shock		50g, 20ms					
Electrical connection	P	integrated cable, axial, 1m					
	U, I	flange connector, radial, 8-pin, DIN45326					
Weight		appr. 1.1kg			2.2kg	3.2kg	3.5kg

FSO = Full Scale Output

Specifications for analogue outputs on page 47.

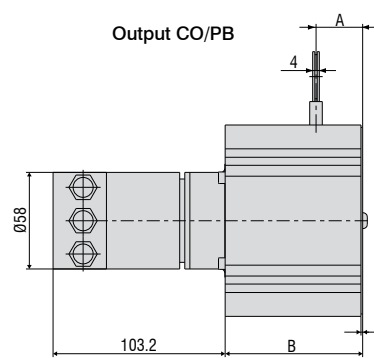
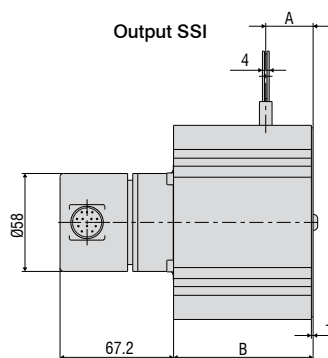
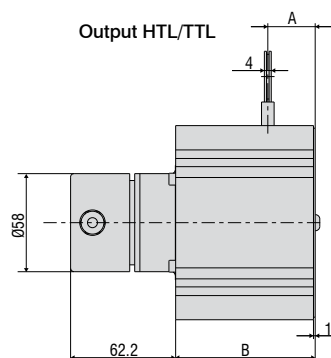
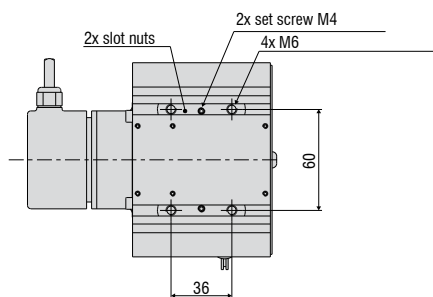
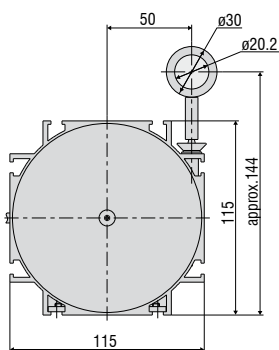
## Article description

WDS -	3000 -	P115 -	CA -	P
				P: potentiometer connection CA: P115-3000/4000/5000 connection SA: P115-7500/10000/15000 U: voltage connection SR: P115-3000/4000/5000 connection SA: P115-7500/10000/15000 I: current connection SR: P115-3000/4000/5000 connection SA: P115-7500/10000/15000
				Connection: SR: radial plug SA: axial plug CA: integrated cable, axial, 1m
				Model P115
				Measuring range in mm



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

Model P115



MR (mm)	A (mm)	B (mm)
5000	28	82.5
7500	37	105.5
10000	44.5	148.5
15000	61	180.5



Model		WDS-5000-P115	WDS-7500-P115	WDS-10000-P115	WDS-15000-P115
Measuring range		5000mm	7500mm	10000mm	15000mm
Output		HTL, TTL, SSI, PB, CO			
Linearity	±0.01% FSO	-	-	±1mm	±1.5mm
	±0.02% FSO	±1mm	±1.5mm	-	-
Resolution	HTL, TTL	0.105mm (9.52 pulses/mm)			
	SSI, PB, CO	0.038mm			
Sensor element		incremental/absolute encoder			
Temperature range		-20 ... +80°C			
Material	housing	aluminium			
	draw wire	coated polamide stainless steel (ø 1.0mm)			
Sensor mounting		slot nuts			
Wire mounting		eyelet			
Wire acceleration		5g	6g	3g	3g
Wire retraction force (min)		4N	8N	8N	8N
Wire extension force (max)		16N	24N	21N	25N
Protection class		IP 65 (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		appr. 2kg	appr. 2.5kg	appr. 3.5kg	appr. 4.5kg

FSO = Full Scale Output

Specifications for digital outputs on page 48.

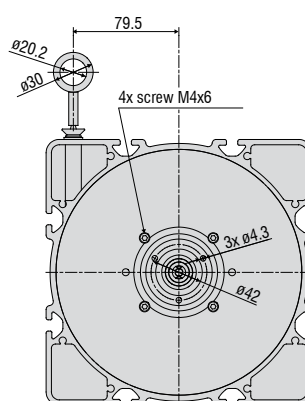
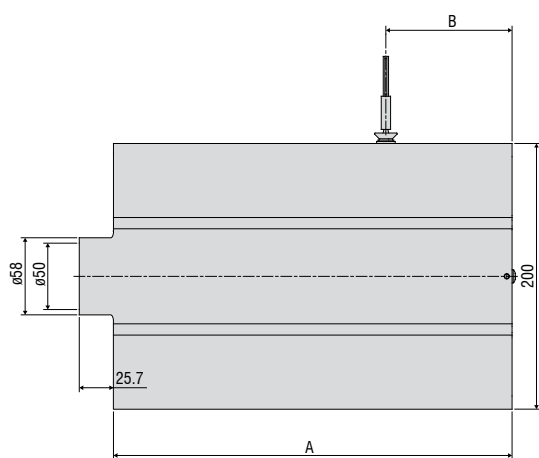
## Article description

WDS -	5000 -	P115 -	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 P115
				Measuring range in mm



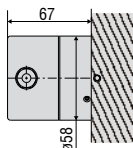
- Robust aluminium profile housing
- Customised versions for OEM
- Incremental/absolute encoder

Model P200

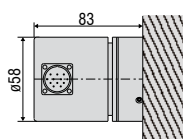


MR (mm)	A (mm)	B (mm)
30000	268	75
40000	300	95
50000	333.5	95

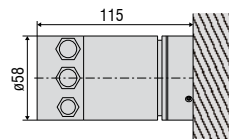
Output P200-HTL/TTL



Output P200-SSI



Output P200-CO/PB



Model		WDS-30000-P200	WDS-40000-P200	WDS-50000-P200
Measuring range		30000mm	40000mm	50000mm
Output		HTL, TTL, SSI, PB, CO		
Travel per encoder revolution		500mm		
Linearity	±0.01% FSO	±3mm	±4mm	±5mm
Resolution	HTL, TTL	0.167mm (6 pulses/mm)		
	SSI, PB, CO	0.061mm		
Temperature range		-20 ... +80 °C		
Sensor element		incremental/absolute encoder		
Material	housing	aluminium		
	draw wire	coated polyamide stainless steel (ø 0.8mm)		
Wire mounting		eyelet		
Sensor mounting		slot nuts		
Wire acceleration		2g		
Wire retraction force (min)		12N	11N	11N
Wire extension force (max)		22N	22N	24N
Protection class		IP 65		
Electrical connection	HTL, TTL	integrated cable, radial, 1m		
	SSI	flange connector, radial, 12-pin		
	PB, CO	bus cover		
Weight		appr. 10kg	appr. 11kg	appr. 12kg

FSO = des Messbereichs

Specifications for digital outputs on page 48.

## Article description

WDS -	30000 -	P200 -	CR -	TTL
				Output options: 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 P200
				Measuring range in mm

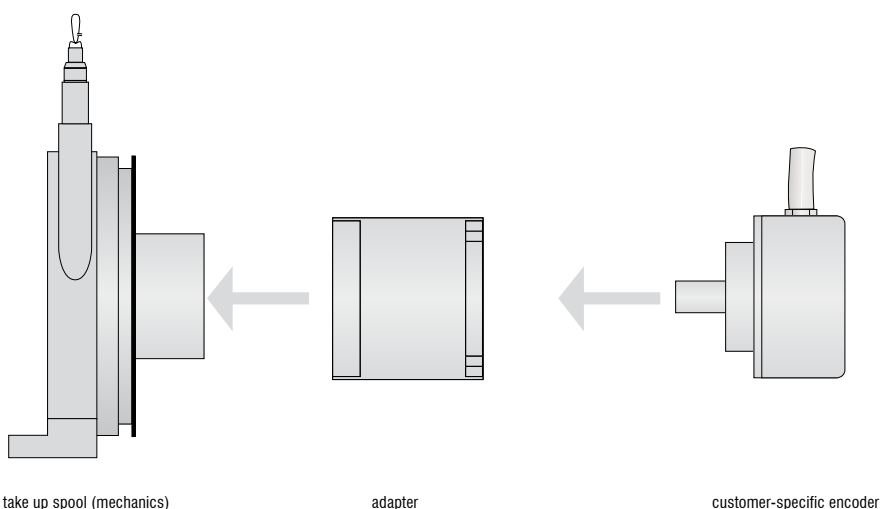


- Use almost any encoder
- Robust aluminium profile housing
- High quality sensor components

#### Rugged draw-wire mechanics for encoder mounting

The wireSENSOR mechanics of the Z60, P96, P115 and P200 series are designed for easy mounting of an incremental or absolute encoder. The selection of the interface, resolution and type of connection can therefore be individually configured. Optimum matching to the signal conditioning system is ensured. High precision components and a rugged housing offer high operational reliability and a long life time even under harsh industrial conditions.

A complete measurement unit always consists of the basic draw-wire mechanism and the adapter for the customer-specific encoder. The adapter contains all the necessary mounting accessories for fitting the encoder and is included in delivery of the P96, P115 and P200 series.



For the customer-specific encoder or potentiometer various draw-wire mechanics are available with measuring ranges up to 50m.

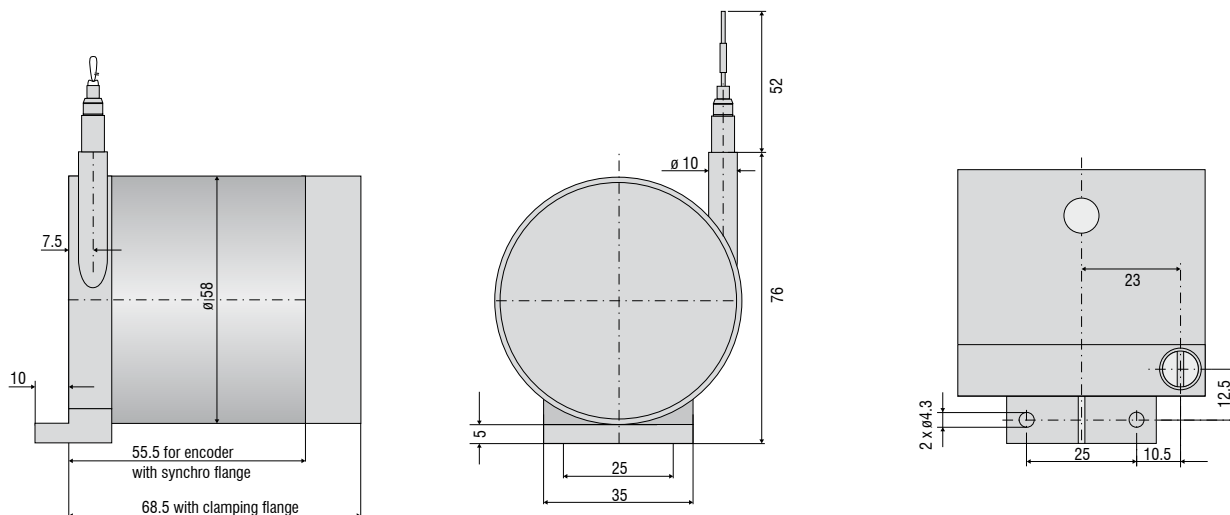
Model		WDS-1500 Z60-M	WDS-3000 P96-M	WDS-5000 P115-M	WDS-7500 P115-M	WDS-10000 P115-M	WDS-15000 P115-M	WDS-30000 P200-M	WDS-40000 P200-M	WDS-50000 P200-M
Measuring range		1500mm	3000mm	5000mm	7500mm	10000mm	15000mm	30000mm	40000mm	50000mm
Output		dependent upon encoder								
Linearity	±0.01% FSO	-	-	-	-	±1mm	±1.5mm	±3mm	±4mm	±5mm
	±0.02% FSO	±0.3mm	±0.6mm	±1mm	±1.5mm	-	-	-	-	-
Resolution		dependent upon encoder								
Travel per encoder revolution		150mm	260.09mm	315.07mm				500mm		
Suitable adapter-flange for encoder ø 58mm	clamping flange	WDS-EAC 1	WDS-EAC 96/200	WDS-EAC 115				WDS-EAC 96/200		
	synchro flange	WDS-EAS 1	included in delivery							
Temperature range	operation	-20...+80°C								
	storage	-40...+80°C								
Material	housing	aluminium								
	draw wire	coated polamide stainless steel								
		ø 0.45mm	ø 0.8mm	ø 1.0mm				ø 0.8mm		
Wire mounting		wire clip	thread M4	eyelet						
Sensor mounting		2 mounting holes	slot nuts							
Wire acceleration		10g	7g	5g	6g	3g	3g			
Wire retraction force (min)		3.5N	5N	4N	8N	8N	8N	12N	11N	11N
Wire extension force (max)		5.5N	10N	16N	24N	21N	25N	22N	22N	24N
Protection class		dependent upon encoder								
Vibration		20g, 20Hz...2kHz								
Mechanical shock		50g, 10ms								
Weight		0.3kg	1.1kg	1.4kg	1.9kg	2.8kg	3.2kg	9.5kg	10kg	11kg

FSO = Full Scale Output

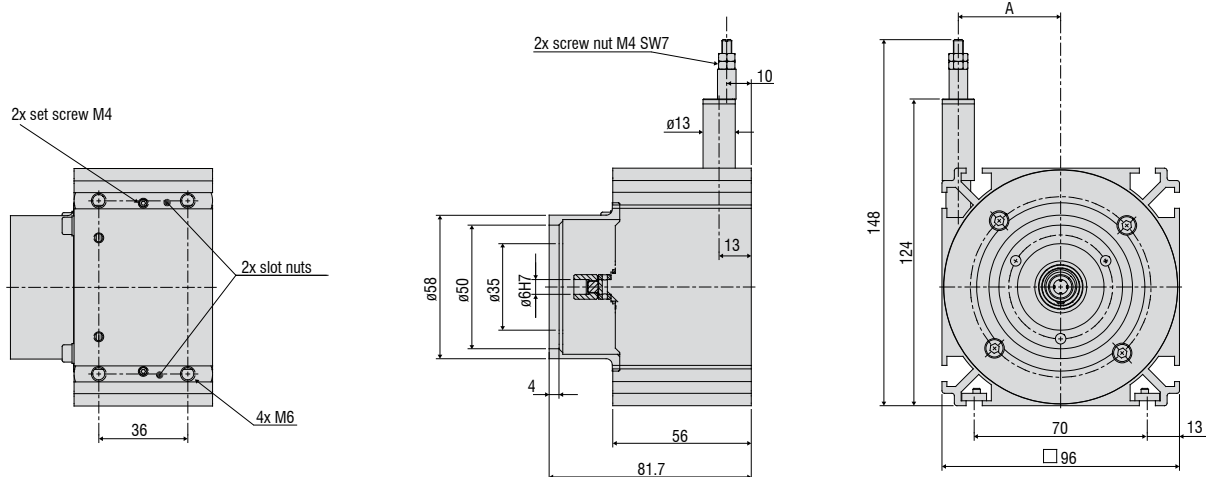
## Article description

WDS -	5000 -	P115 -	M -	SO
				Wire brush (only P115/P200)
				Mechanics
				Model Z60/P96/P115/P200
				Measuring range in mm

Model Z60



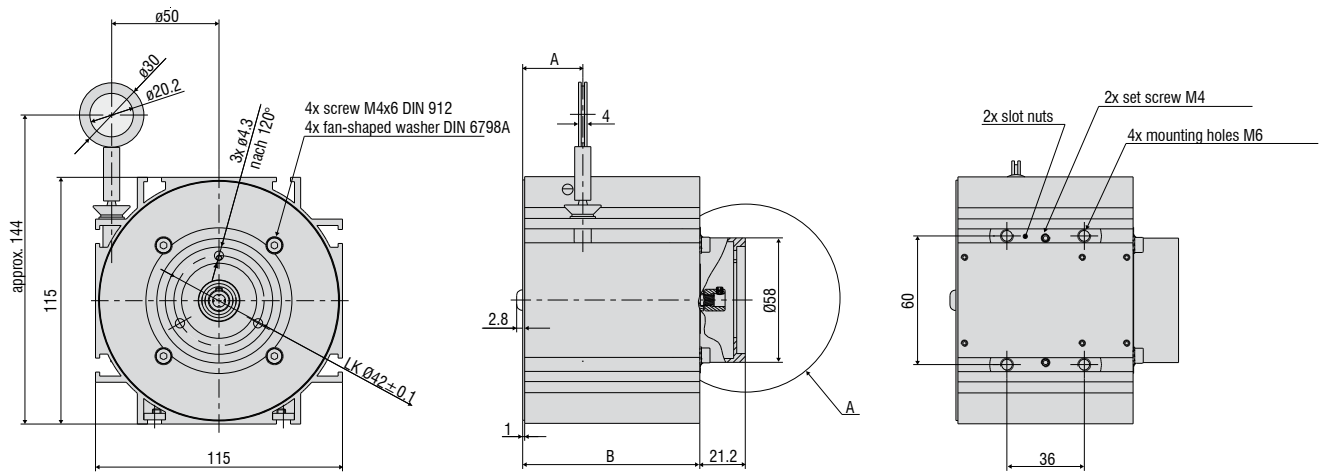
Model P96



MR (mm)	A (mm)
2000	26
3000	41.5

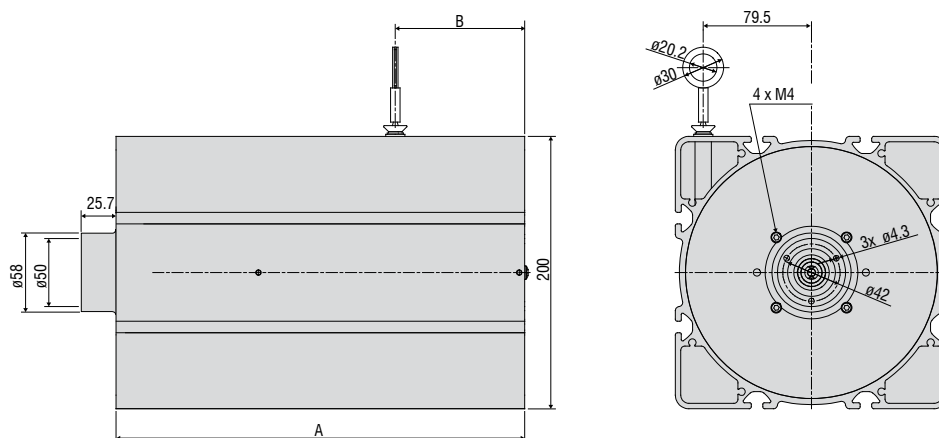


Model P115



MR (mm)	A (mm)	B (mm)
5000	28	82.5
7500	37	105.5
10000	44.5	148.5
15000	61	180.5

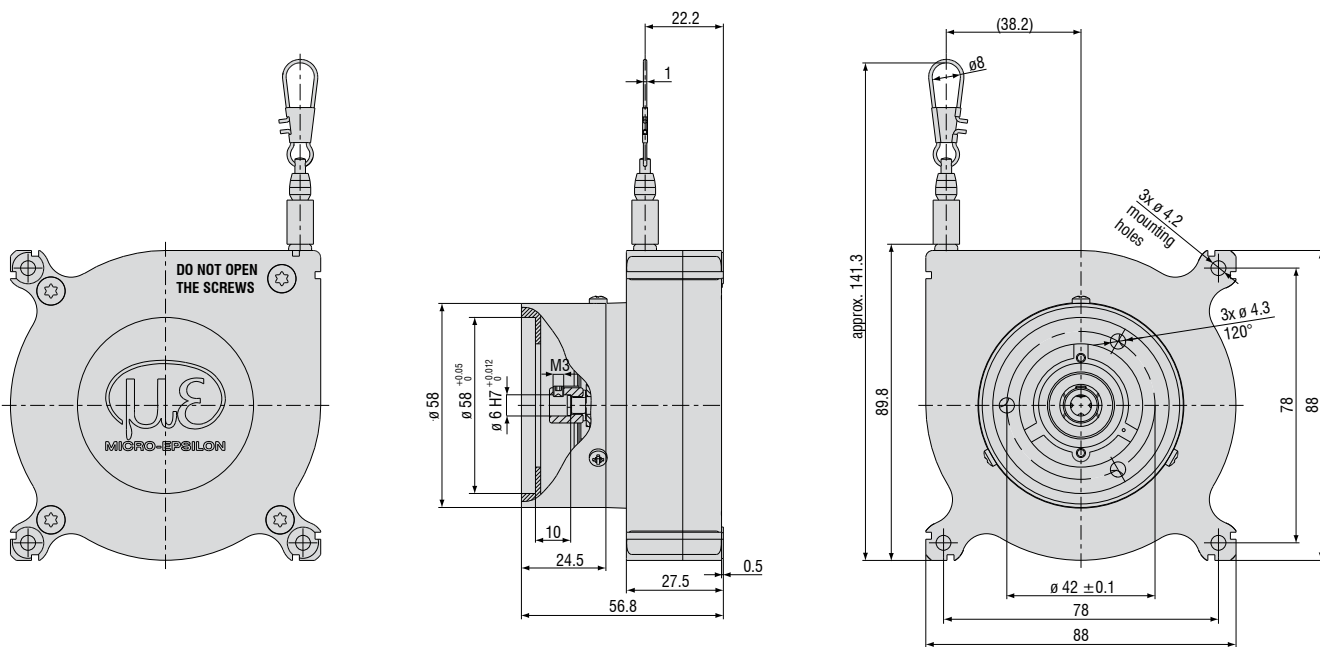
Model P200



MR (mm)	A (mm)	B (mm)
30000	268	75
40000	300	95
50000	333.5	95



- Use almost any encoder
- Robust plastic housing
- High quality sensor components



Model	WPS-2300-MK88-M	WPS-5000-MK88-M
Measuring range	2300mm	5000mm
Output	dependent upon encoder	
Linearity	$\pm 0.1\%$ FSO ( $\pm 2.3\text{mm}$ )	$\pm 0.4\%$ FSO ( $\pm 20\text{mm}$ )
Resolution	dependent upon encoder	
Travel per encoder revolution	$238.8\text{mm} \pm 0.3\text{mm}$	$240.0\text{mm} \pm 1\text{mm}$
Repeatability	$\pm 1\text{mm}$	$\pm 8\text{mm}$
Temperature range	operation	$-40\ldots +85^{\circ}\text{C}$
	storage	$-40\ldots +85^{\circ}\text{C}$
Material	housing	PA 6 GF 30
	draw wire	coated polamide stainless steel ( $\varnothing 0.45\text{mm}$ )
Wire mounting	wire clip	
Sensor mounting	mounting holes	
Wire acceleration (max)	5g	
Wire retraction force (min)	3N	
Wire extension force (max)	9N	
Vibration	20g, 20Hz...2kHz	
Mechanical shock	50g, 10ms	
Suitable encoder	synchro flange $\varnothing 58\text{mm}$ ; shaft $\varnothing 6\text{mm}$	

FSO = Full Scale Output

## Article description

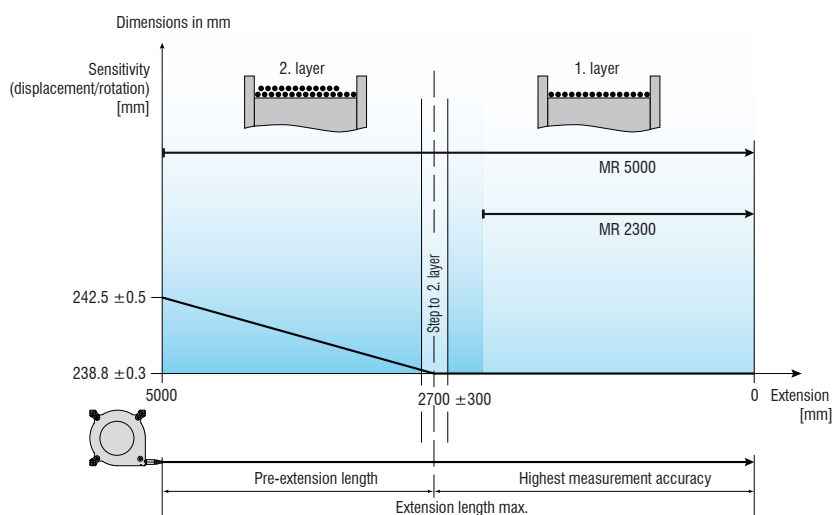
WPS - 5000 - MK88 - M

		Mechanics
	Model MK88	
Measuring range in mm		

## Sensitivity characteristics MK88

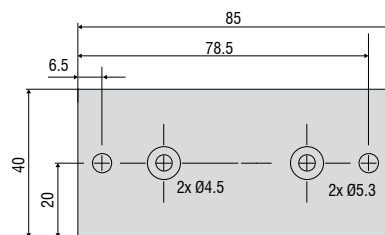
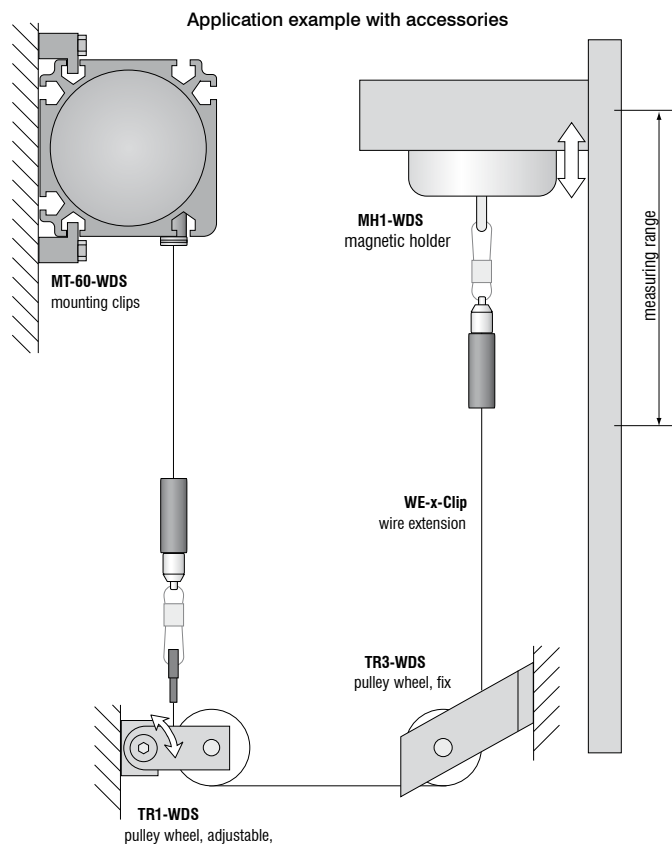
The WPS-2300-MK88-M is designed with only one wire layer which is wound onto the drum. This sensor design achieves the highest measurement accuracy.

If a reduced measurement accuracy is sufficient, larger measurement ranges can be achieved with the same sensor dimensions. This can be seen by means of a sensitivity characteristics (see diagram).



### Accessories:

WE-xxx-M4	Wire extension with M4-wire connection, x=length
WE-xxx-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



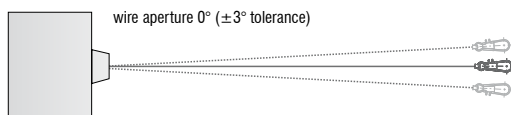
Mounting plate WDS-MP60

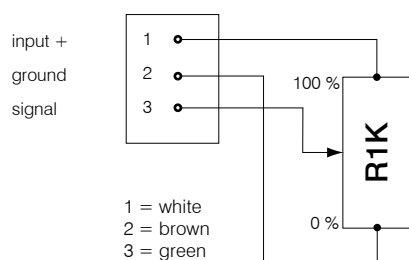
### Installation information:

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

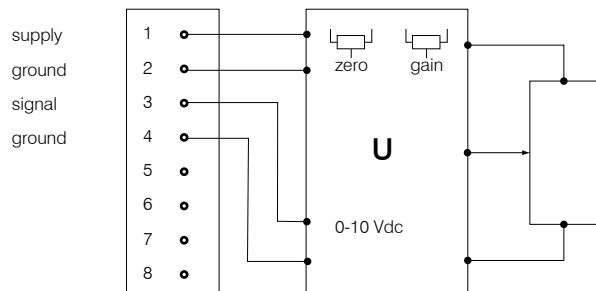
### Wire exit angle:

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)**

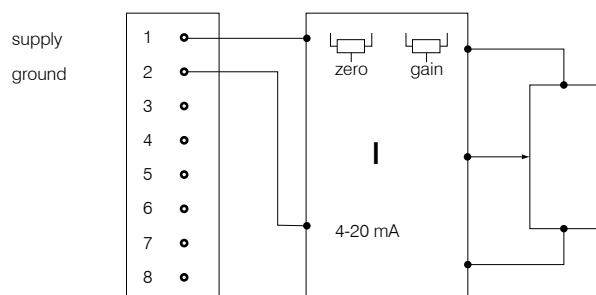
Supply voltage	max. 32VDC at 1kOhm / 1 Wmax
Resistance	1kOhm $\pm 10\%$ (potentiometer)
Temperature coefficient	$\pm 0.0025\%$ FSO/ $^{\circ}\text{C}$
Sensitivity	depends on measuring range individually shown on test report

**Voltage output (U)**

Supply voltage	14 ... 27VDC (non stabilised)
Current consumption	max. 30mA
Output voltage	0 ... 10VDC Option 0 ... 5 / $\pm 5\text{V}$
Load impedance	$> 5\text{kOhm}$
Signal noise	$0.5\text{mV}_{\text{eff}}$
Temperature coefficient	$\pm 0.005\%$ FSO/ $^{\circ}\text{C}$
Electromagnetic compatibility (EMC)	EN 50081-2 EN 50082-2

**Adjustment ranges**

Zero	$\pm 20\%$ FSO
Sensitivity	$\pm 20\%$

**Current Output (I)**

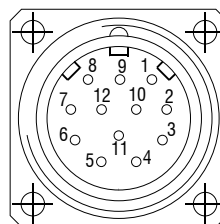
Supply voltage	14 ... 27VDC (non stabilised)
Current consumption	max. 35mA
Output current	4 ... 20mA
Load	$< 600\text{Ohm}$
Signal noise	$< 1.6\mu\text{A}_{\text{eff}}$
Temperature coefficient	$\pm 0.01\%$ FSO/ $^{\circ}\text{C}$
Electromagnetic compatibility (EMC)	EN 50081-2 EN 50082-2

**Adjustment range**

Zero	$\pm 18\%$ FSO
Sensitivity	$\pm 15\%$

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 $\geq 100$ 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 DATAVALID DATAVALID MT	Diagnosis outputs DV and 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 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/ DOWN-High means increasing output data with a clockwise shaft rotating direction when looking at the flange. UP/ 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 colour	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	DATAVALID
9	pink	UP/ DOWN
10	black/yellow	DATAVALID MT
11	-	-
12	-	-



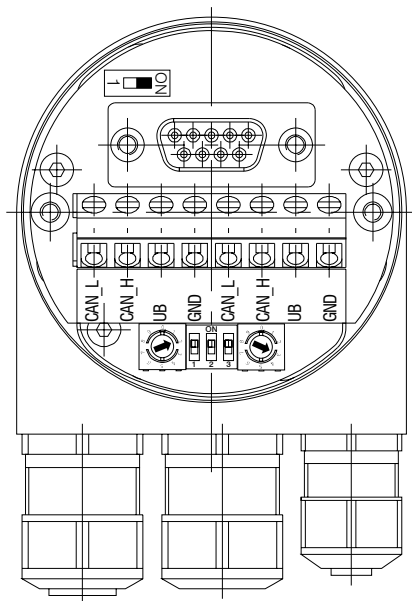
Please use leads twisted in pairs for extension cables.

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.)	<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 parameterised for values between 1 and 65535 ms.</p> <p>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 parameterised 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 parameterised. Scaling The steps per revolution and the total revolution can be parameterised.
Scaling	The steps per revolution and the total revolution can be parameterised.
Diagnose	<p>The encoder supports the following error messages:</p> <ul style="list-style-type: none"> <li>- Position and parameter error</li> <li>- Lithium cell voltage at lower limit (Multiturn)</li> </ul>
Default setting	50kbit/s, node number 1



Setting of terminating Resistor for CANopen



ON = Last user  
OFF = User X

**Setting CANopen baud rate**

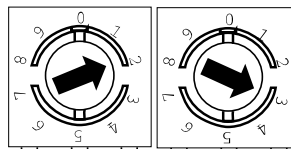
Baud rate	Setting Dip Switch		
	1	2	3
10kBit/s	OFF	OFF	OFF
20kBit/s	OFF	OFF	ON
50kBit/s	OFF	ON	OFF
125kBit/s	OFF	ON	ON
250kBit/s	ON	OFF	OFF
500kBit/s	ON	OFF	ON
800kBit/s	ON	ON	OFF
1MBit/s	ON	ON	ON

**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**

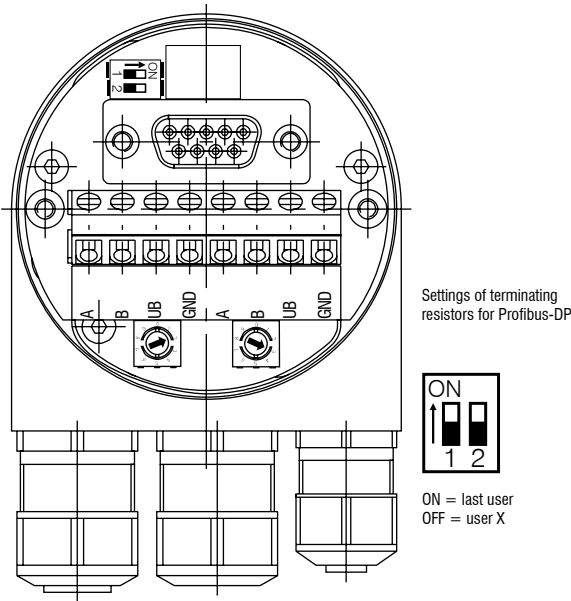
Address can be set with rotary switch. Example: User address 23





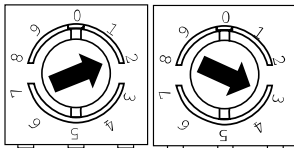
Profibus-DP features

Bus protocol	Profibus-DP
Profibus features	Device Class 1 and 2
Data exch. functions	Input: Position value Additional parameterised 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 parameterised.
Diagnose	The encoder supports the following error messages: - Position error - Lithium cell voltage at lower limit (Multiturn)
Default setting	User address 00



Settings of user address for Profibus-DP

Settings of user address for Profibus-DP



Contact description Profibus-DP

A Negative serial data line

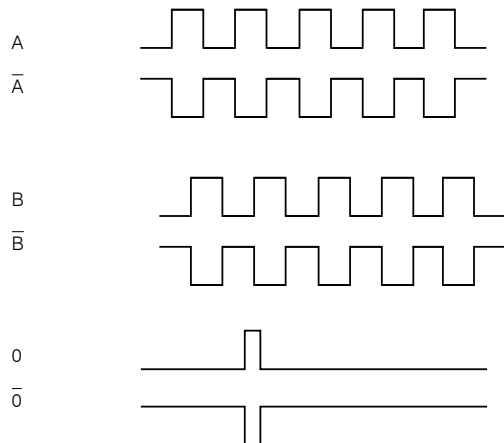
B Positive serial data line

UB Supply voltage 10...30VDC

GND Ground contact for UB

(Terminals with the same designation are internally interconnected)

## Signal output



## Pin assignment TTL, HTL

Pin	Cable colour	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	grey	B
Pin 9	-	-
Pin 10	white/green	GND
Pin 11	white	GND Sense
Pin 12	brown/green	UB

## Output TTL Linedriver (5 VDC)

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 ... 30 VDC)

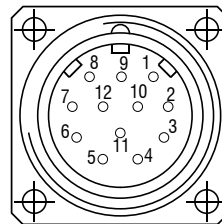
Level High	$\geq UB - 3V$	(with I = -20mA)
Level Low	$\leq 1.5V$	(with I = 20mA)
Load High	$\leq 40mA$	
Output	A, $\bar{A}$ , B, $\bar{B}$ , O	

## Output E Push-pull (5 VDC)

Level High	UB - 2.5V	
Level Low	$\leq 0.5V$	
Load High	$\leq 50mA$	
Output	A, B, O	

## Output E830 Push-pull (8 ... 30 VDC)

Level High	UB - 3V	
Level Low	$\leq 2.5V$	
Load High	$\leq 50mA$	
Output	A, B, O	



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 colour	Assignment
-	white	0V
-	brown	+UB
-	green	A
-	-	A
-	yellow	B
-	-	B
-	grey	O

## High performance sensors made by Micro-Epsilon



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