MICRO-EPSILON

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/MK60/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**	**2400**	**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 60 analogue											P U I															18-19
MK 60 digital														E												20-21
MK 88 analogue													P U I				P U I		P U I							22-23
MK 120 analogue																P U I			P U I	P U I						24-25
MPM analogue	P		P	P																						26-27
MP/MPW analogue		P			P	P		P																		28-29
P60 analogue		P U I	P U I		P U I	P U I	P U I	P U I		P U I																30-31
P60 digital								E A		E A																32-33
P96 analogue											P U I				P U I											34-35
P96 digital																E A										36-37
P115 analogue																P U I		P U I	P U I	P U I	P U I	P U I				38-39
P115 digital																			E A	E A	E A	E A				40-41
P200 digital																							E A	E A	E A	42-43
Mechanics										M			M			M	M		M	M	M	M	M	M	M	44-49

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

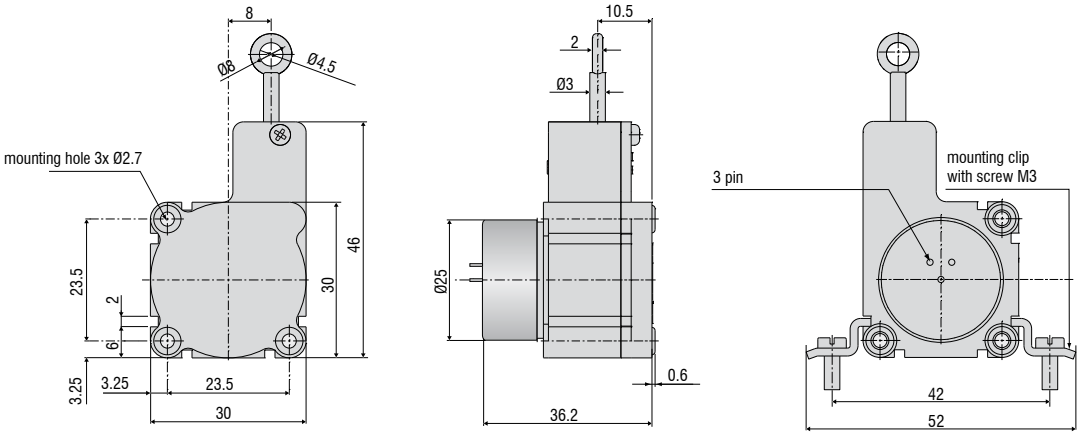
Position measurement on X-ray machines

Lift-height measurement
in fork-lift trucks

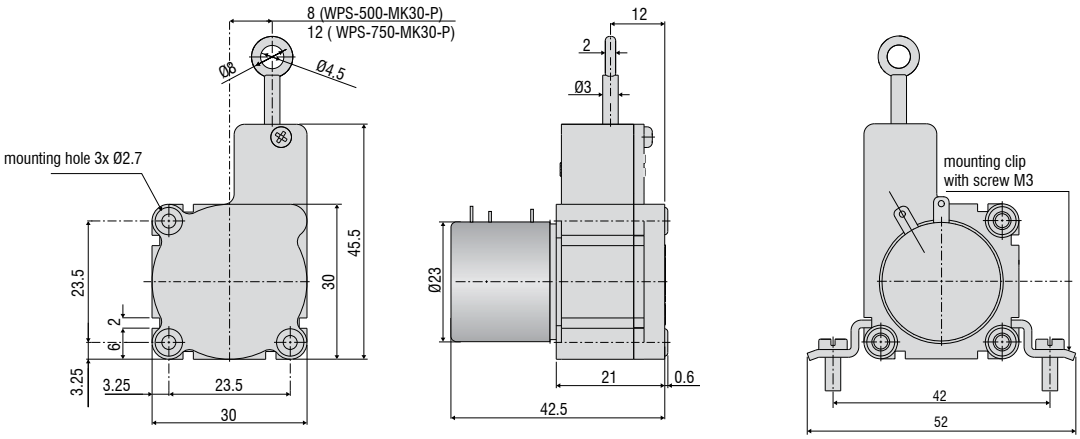
Height of lifting platforms on automobile production lines

- *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.

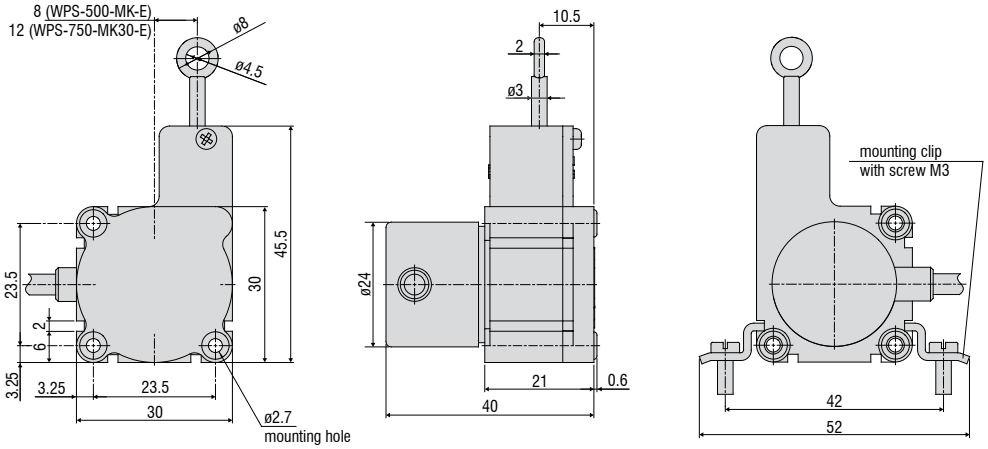
Article description

WPS - 50 - MK30 - P25

- **P25** — Output option:
  potentiometer P50 (Linearity ±0.5% FSO)
  potentiometer P25 (Linearity ±0.25% FSO)
  potentiometer P10 (Linearity ±0.1% FSO)
- **MK30** — Model MK30
- **50** — 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	±0.25mm	±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.

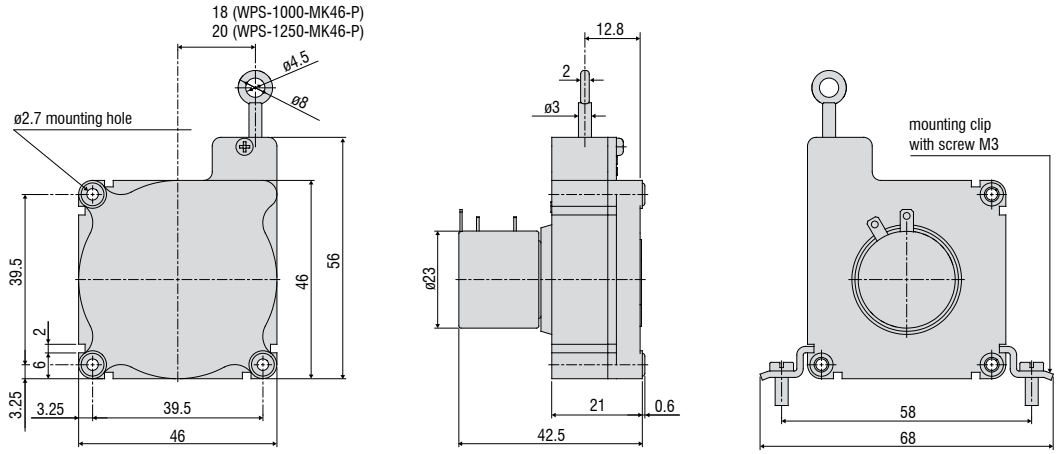
Article description

WPS - 500 - MK30 - E830

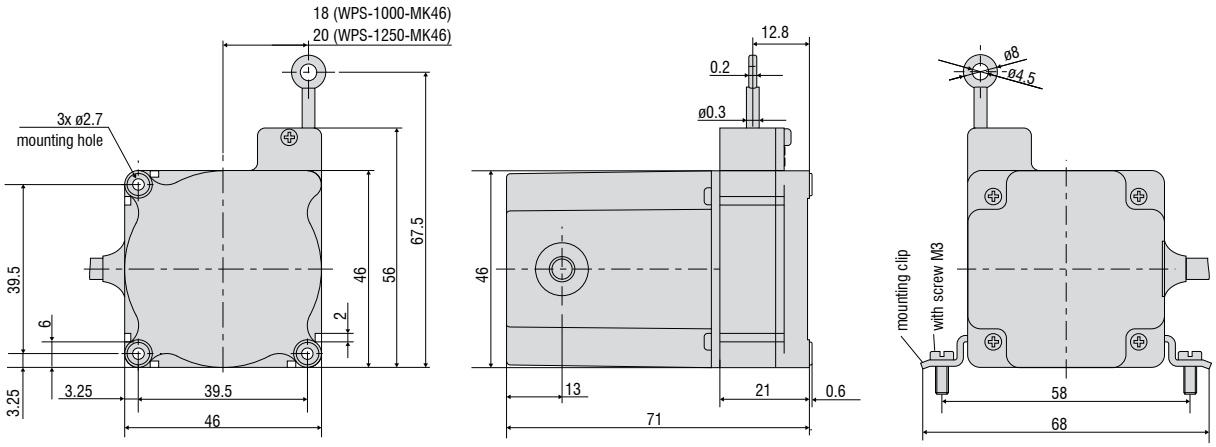
- **E830** — Output option: encoder E (5 ... 24 VDC) encoder E830 (8 ... 30 VDC)
- **MK30** — Model MK30
- **500** — Measuring range in mm

- *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 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)			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

- **P25**: Output option:
  P25: potentiometer
  P10: potentiometer
  CR-P25: potentiometer, integrated cable, radial, 1m
- **MK46**: Model MK46
- **1000**: Measuring range in mm

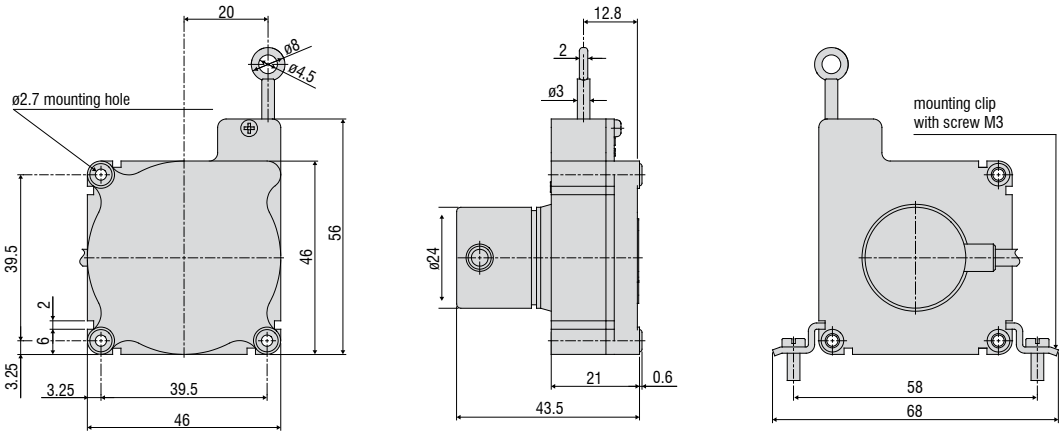
WPS - 1250 - MK46 - P25

- **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
- **MK46**: Model MK46
- **1250**: Measuring range in mm

wireSENSOR MK46 digital

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

Model MK46



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 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)			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

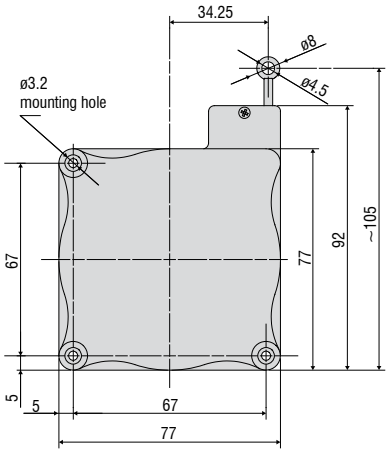
WPS - 1250 - MK46 - E

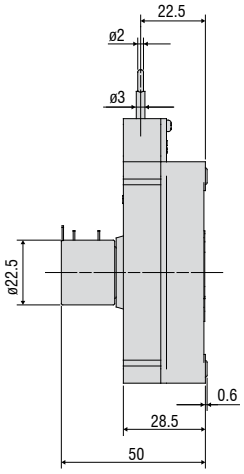
- E: Output option: encoder E (5 ... 24 VDC) encoder E830 (8 ... 30 VDC)
- MK46: Model MK46
- 1250: Measuring range in mm

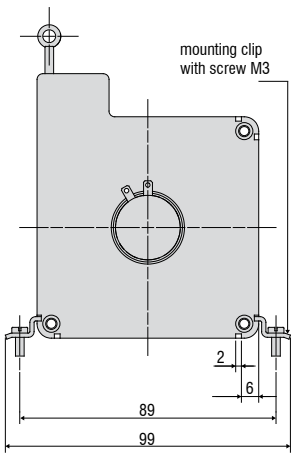
wireSENSOR MK77 analogue

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

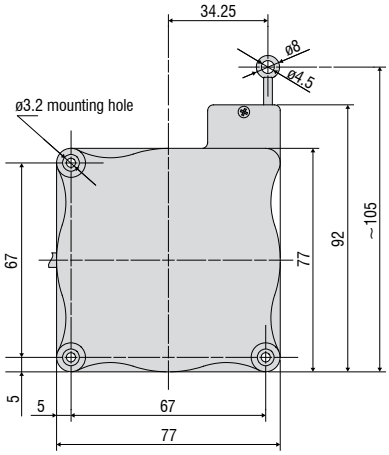
Model MK77 Output P25

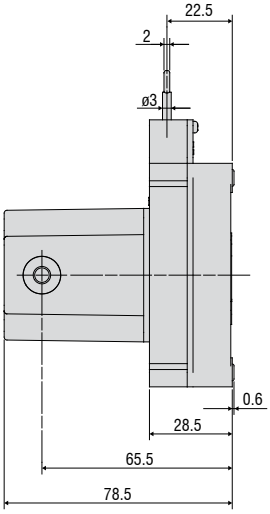


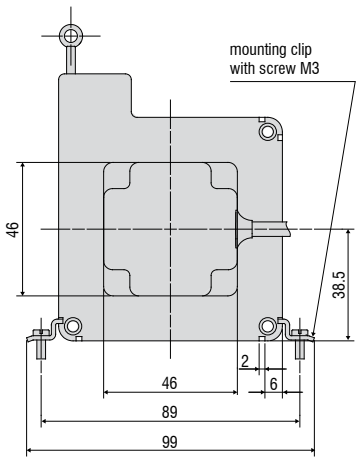




Model MK77 Output CR-P25







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

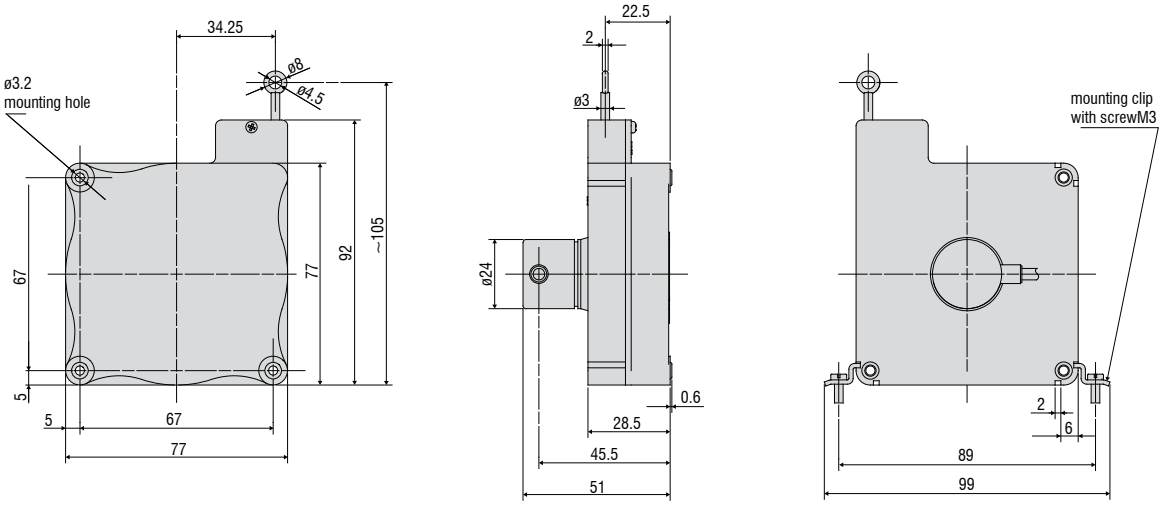
WPS - 2100 - MK77 - P25

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

wireSENSOR MK77 digital

- *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

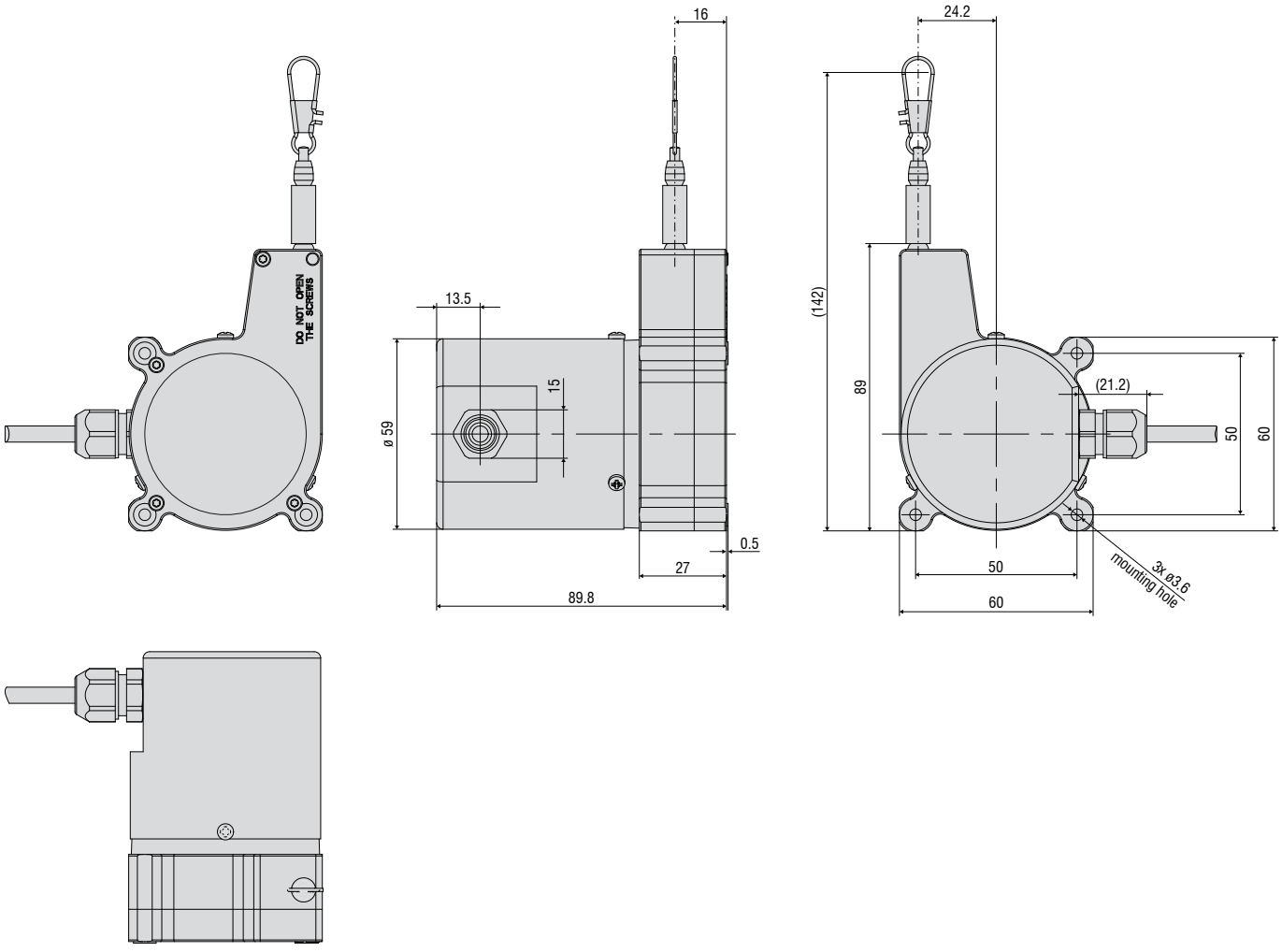
WPS - 2100 - MK77 - E

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

wireSENSOR MK60 analogue

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

Model MK60



Model		WPS-1500-MK60
Output		P/U/I
Sensor element		potentiometer
Measuring range		1500mm
Linearity		±0.15% FSO
Resolution/Sensitivity		quasi infinite
Temperature range		-20 to 80°C
Material	housing	plastic, PBT GF20
	draw wire	coated polamide stainless steel (ø 0.45mm)
	protection cap	plastic, PBT GF20
Wire mounting		wire clip
Sensor mounting		mounting holes on the sensor housing
Wire retraction force (min)		1N
Wire extension force (max)		8N
Wire acceleration (max)		5g
Protection class		IP 65
Electrical connection		cable, radial, 1m
Weight (with cable)		290g

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

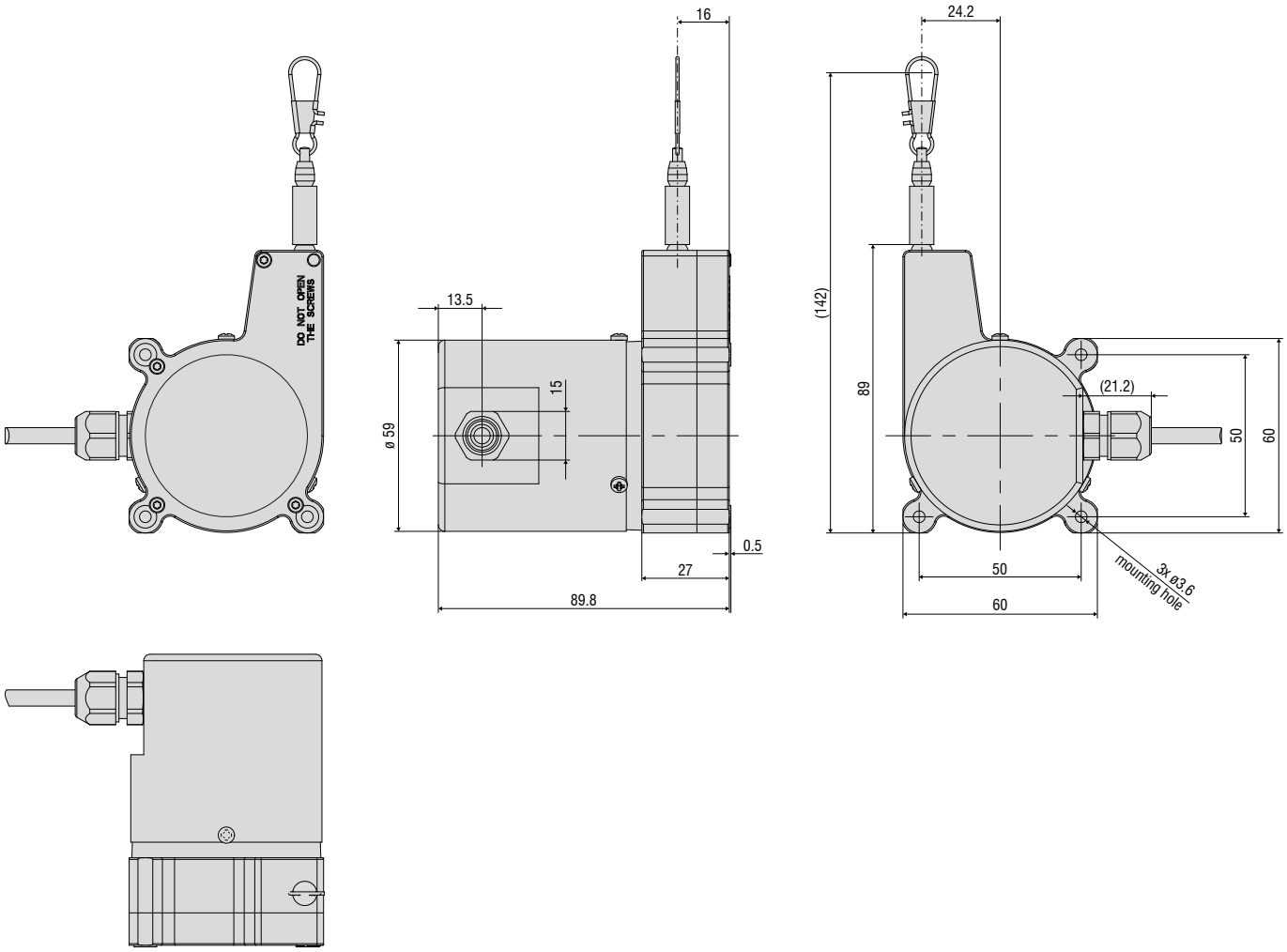
Article description

WPS - 1500 - MK60 - CR - P

- **P** — Output option: P: potentiometer, U: voltage, I: current
- **CR** — Connection CR: integrated cable, radial, 1m
- **MK60** — Model MK60
- **1500** — Measuring range in mm

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

Model MK60



Model		WPS-2400-MK60-CR	
Output		TTL01	TTL02
Signals		A, B, 0	A, $\overline{A}$, B, $\overline{B}$, O
Sensor element		incremental encoder	
Measuring range		2400mm	
Linearity		±0.05% FSO	
Resolution		6.83 pulses/mm	
Temperature range		-20 to 80°C	
Material	housing	plastic, PBT GF20	
	draw wire	coated polamide stainless steel (ø 0.45mm)	
	protection cap	plastic, PBT GF20	
Wire mounting		wire clip	
Sensor mounting		mounting holes on the sensor housing	
Wire retraction force (min)		1N	
Wire extension force (max)		8N	
Wire acceleration (max)		5g	
Protection class		IP 65	
Electrical connection		cable, radial, 1m	
Weight (with cable)		~290g	

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

Article description

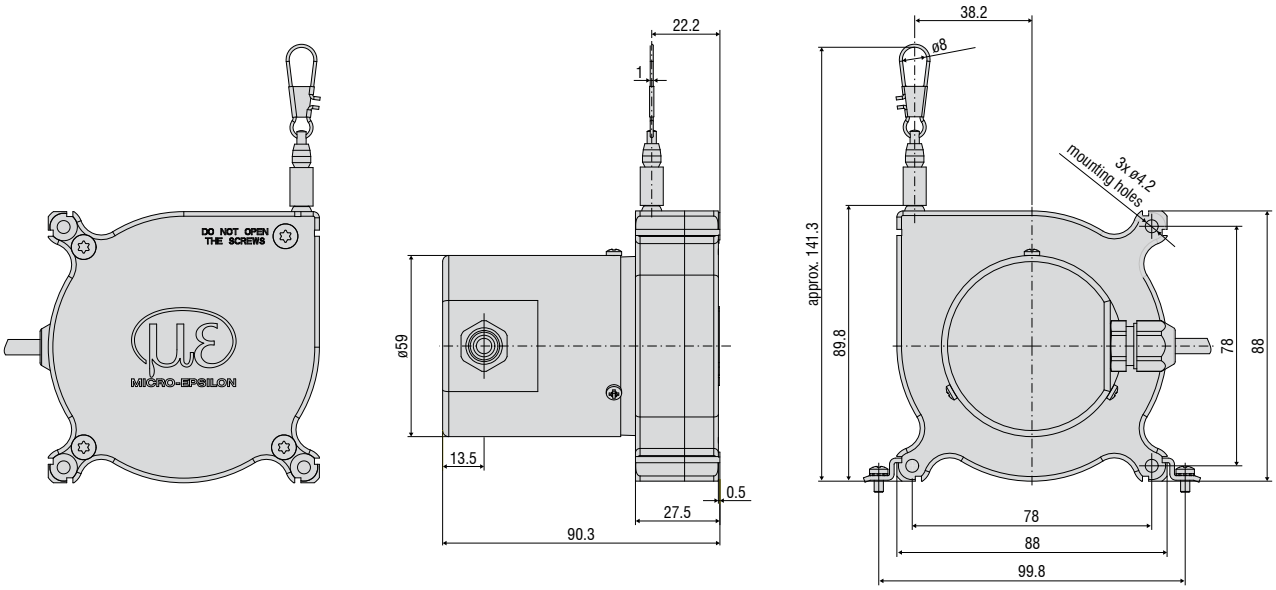
WPS - **2400** **MK60 -** **CR -** TTL01

- TTL01 — Output option: TTL01: A, B, 0; TTL02: A, $\overline{A}$, B, $\overline{B}$, O
- CR — Connection CR: integrated cable, radial, 1m
- MK60 — Model MK60
- 2400 — Measuring range in mm

wireSENSOR MK88 analogue

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

Model MK88



Model		WPS-2300-MK88	WPS-3500-MK88	WPS-5000-MK88
Output		P/U/I		
Sensor element		potentiometer		
Measuring range		2300mm	3500mm	5000mm
Linearity		±0.15% FSO	±0.3% FSO	±0.4% FSO
Resolution/Sensitivity		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	plastic, PBT GF 20		
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

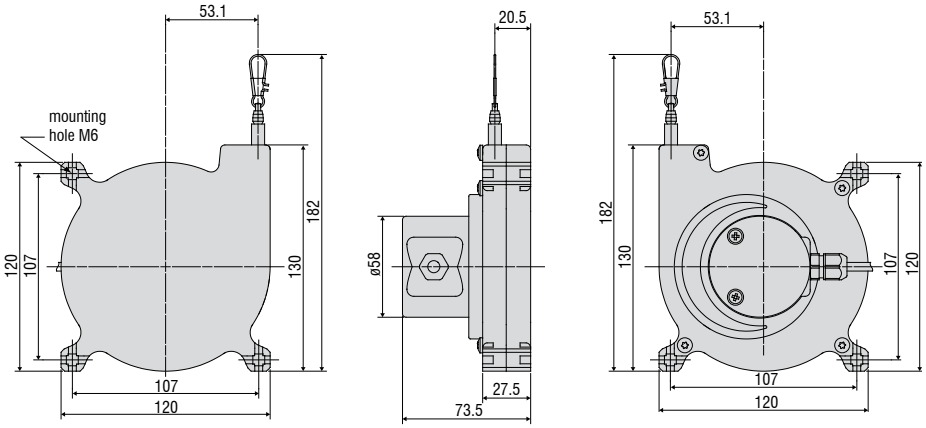
WPS - 2300 - MK88 - CR - P

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

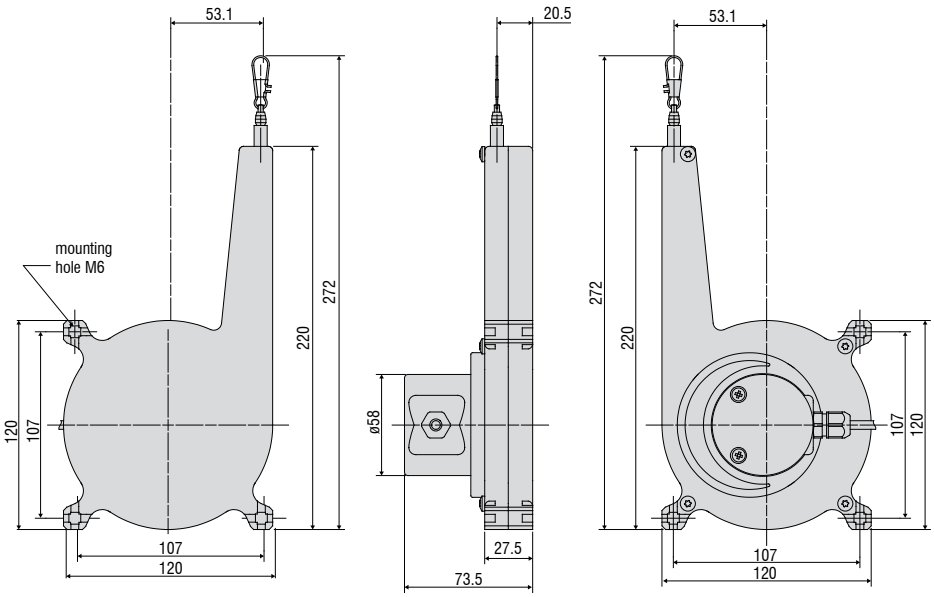
wireSENSOR MK120 analogue

- *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

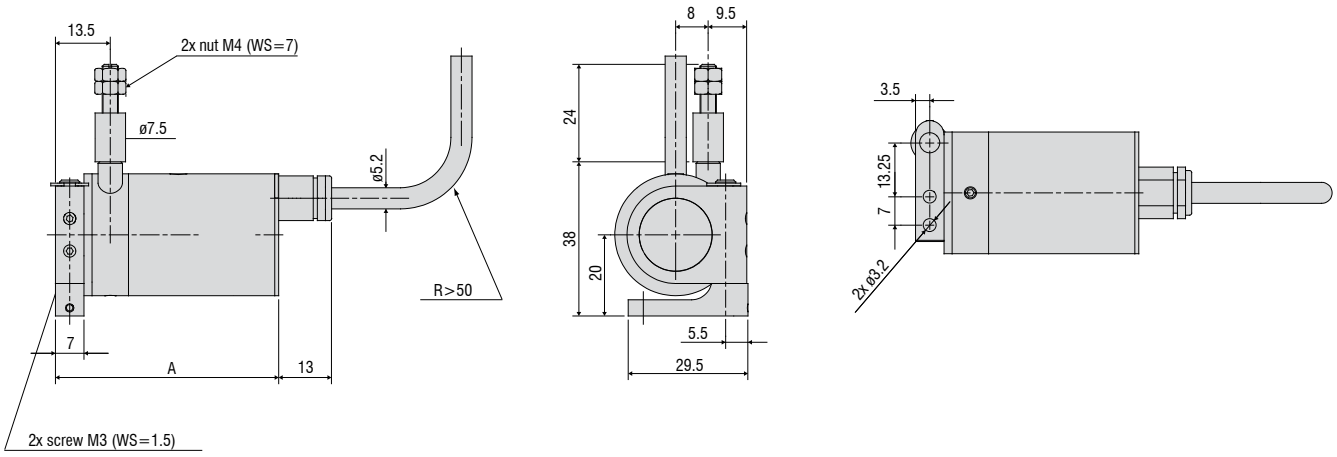
WPS - 3000 - MK120 - CR - P

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

wireSENSOR MPM analogue

- *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.

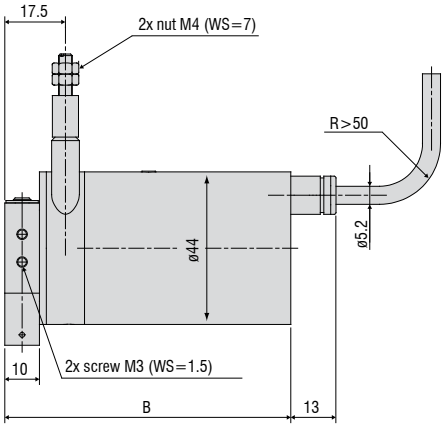
Article description

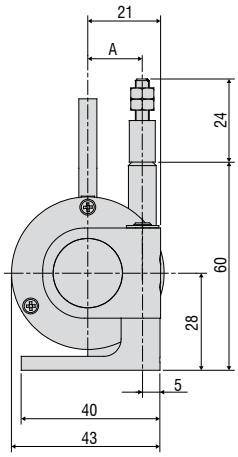
WDS - 50 - MPM - C - P - HG

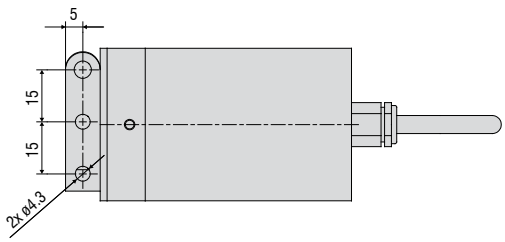
- 50 - Measuring range in mm
- MPM - Model MPM
- C - Connection: C: integrated cable, axial, 1m
- P - Output option: P: potentiometer
- HG - Option HG: wire acceleration up to 100g

- *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

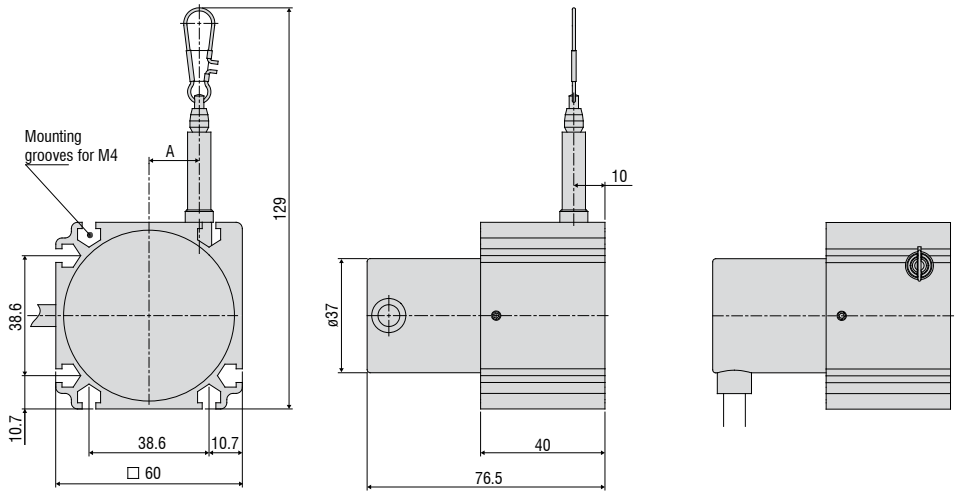
WDS - 100 - MP - C - P

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

wireSENSOR P60 analogue

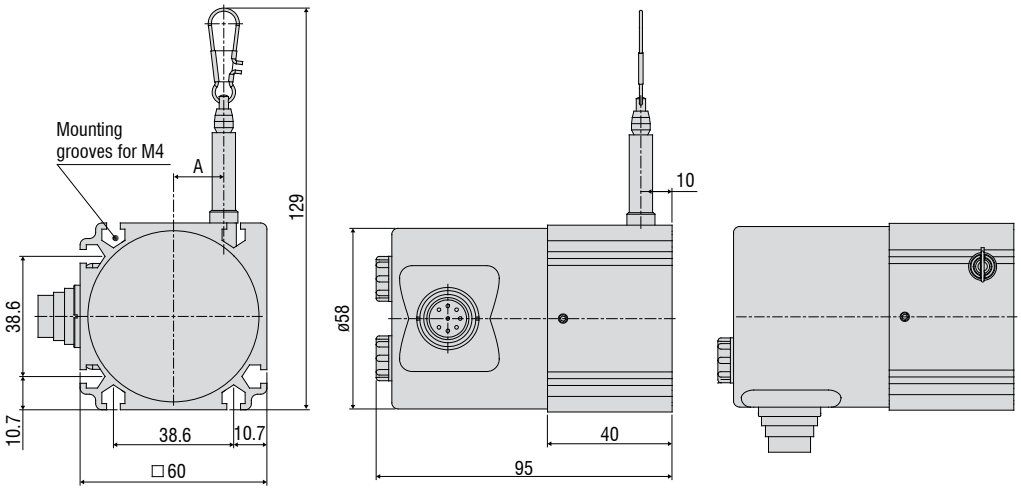
- *Robust aluminium profile housing*
- *Customised versions for OEM*
- *Potentiometer, current and voltage output*

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

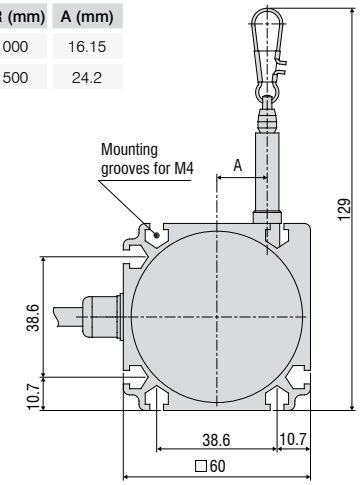
- **P**: Output option:
  P = potentiometer (with connection CR)
  U = voltage (with connection SR)
  I = current (with connection SR)
- **CR**: Connection:
  SR: radial plug
  CR: integrated cable, radial, 1m
- **P60**: Model P60
- **100**: Measuring range in mm

wireSENSOR P60 digital

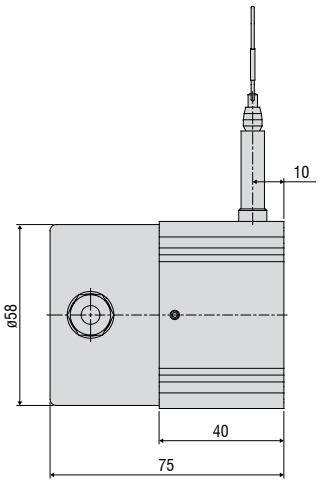
- *Robust aluminium profile housing*
- *Customised versions for OEM*
- *Incremental/absolute encoder*

Model P60

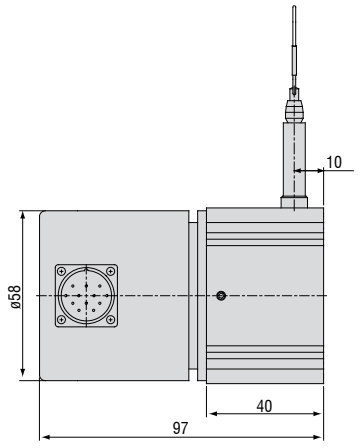
MR (mm)	A (mm)
1000	16.15
1500	24.2



Output HTL/TTL

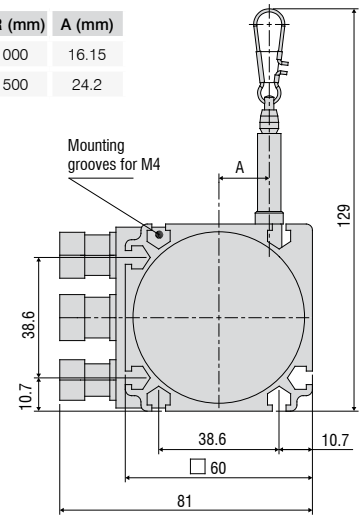


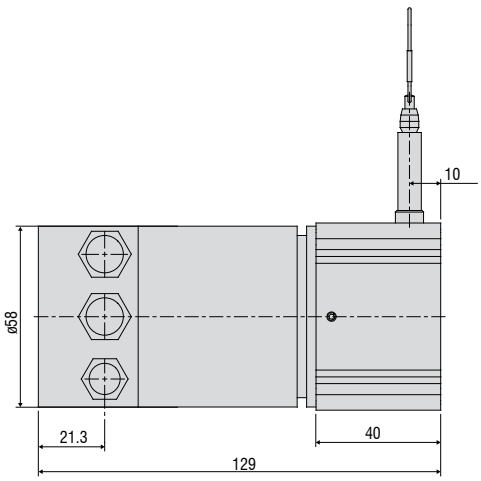
Output SSI



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.

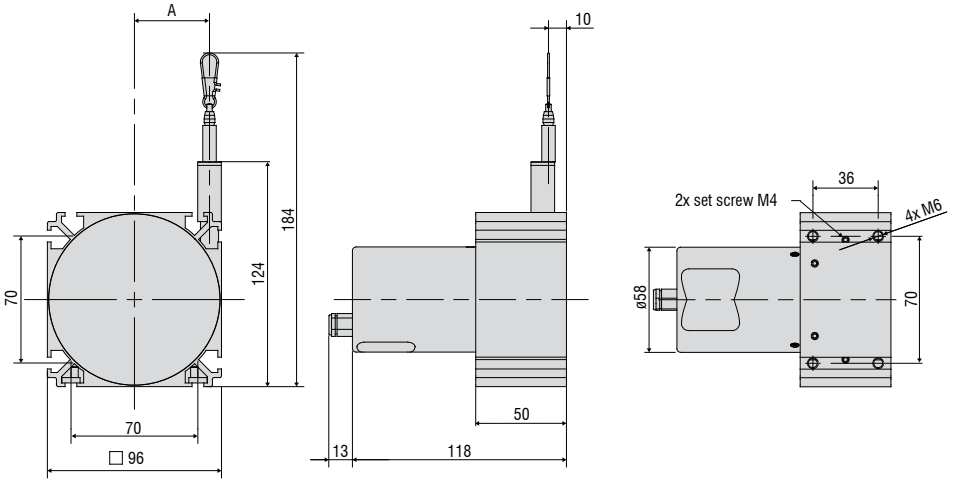
Article description

WDS - 1000 - P60 - CR - TTL

- **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
- **P60** – Model P60
- **1000** – Measuring range in mm

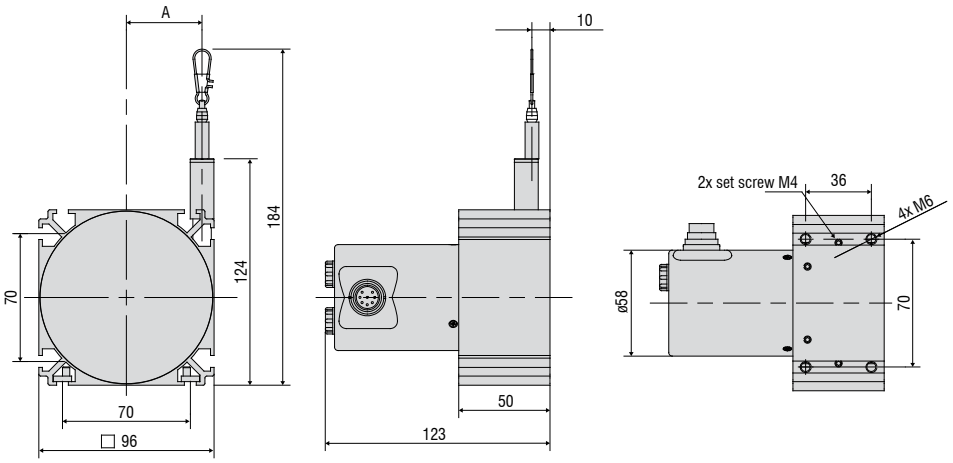
- *Robust aluminium profile housing*
- *Customised versions for OEM*
- *Potentiometer, current and voltage output*

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		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.

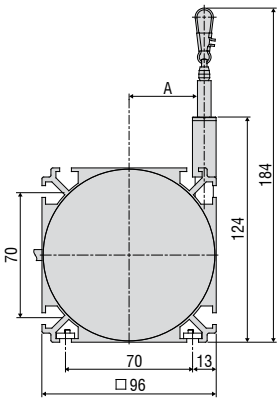
Article description

WDS - 2000 - P96 - CA - P

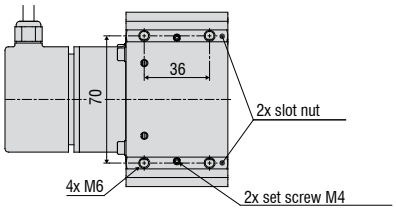
- **P** — Output option:
  P = potentiometer (with connection CA)
  U = voltage (with connection SR)
  I = current (with connection SR)
- **CA** — Connection:
  SR: radial plug
  CA: integrated cable, axial, 1m
- **P96** — Model P96
- **2000** — Measuring range in mm

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

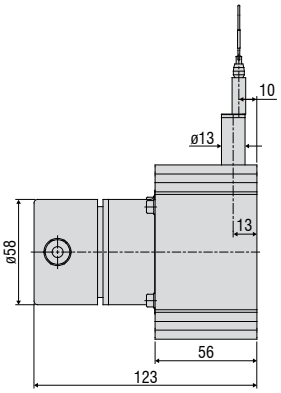
Model P96



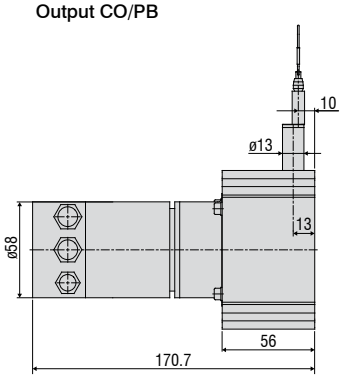
MR (mm)	A (mm)
2000	26
3000	41.4



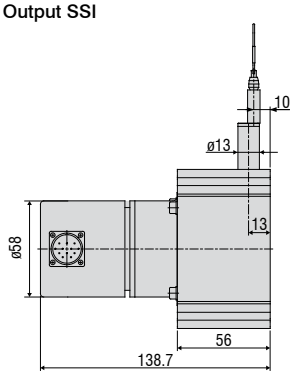
Output HTL/TTL



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 ... +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

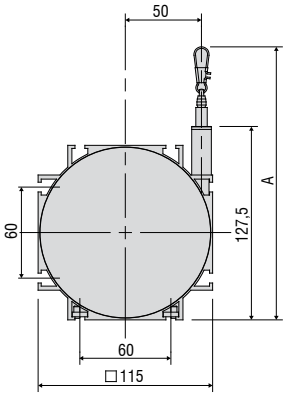
WDS - **3000 -** **P96 -** **CR -** **TTL**

- **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

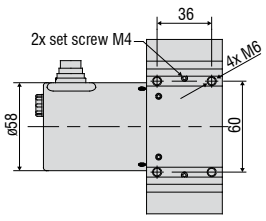
wireSENSOR P115 analogue

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

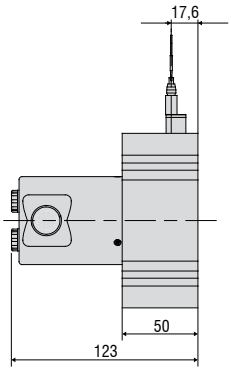
Model P115 (Measuring range 3000/4000/5000mm)



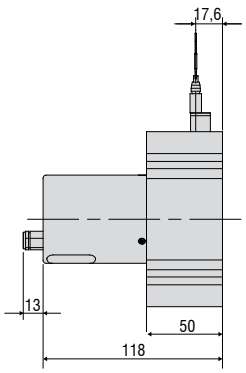
MR (mm)	A (mm)
3000	186
4000 / 5000	180



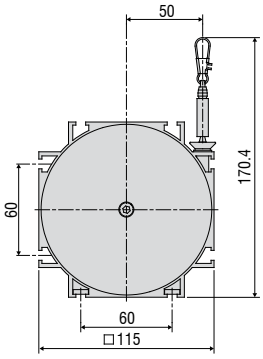
Output U/I

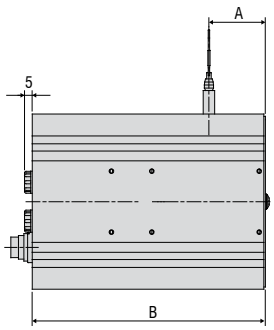


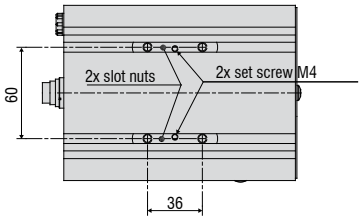
Output P



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

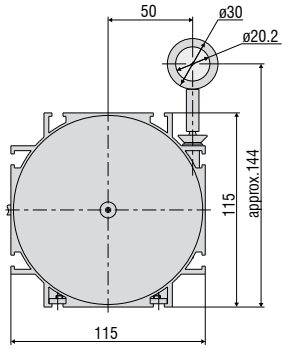
WDS - 3000 - P115 - CA - P

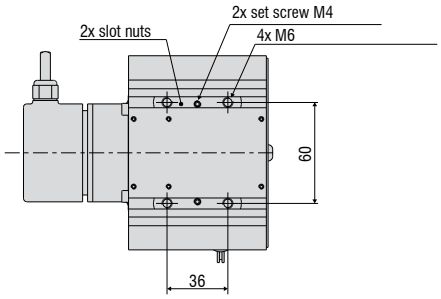
- **P**
  - P: potentiometer — connection CA: P115-3000/4000/5000; connection SA: P115-7500/10000/15000
  - U: voltage — connection SR: P115-3000/4000/5000; connection SA: P115-7500/10000/15000
  - I: current — connection SR: P115-3000/4000/5000; connection SA: P115-7500/10000/15000
- **CA** — Connection: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

wireSENSOR P115 digital

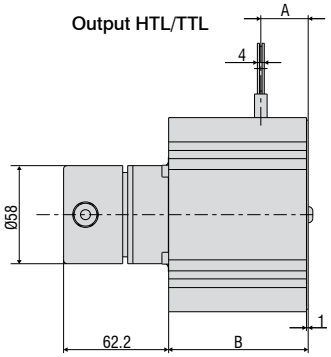
- *Robust aluminium profile housing*
- *Customised versions for OEM*
- *Incremental / absolute encoder*

Model P115

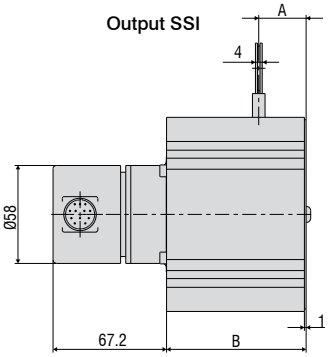




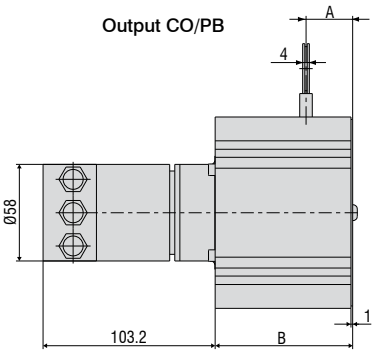
Output HTL/TTL



Output SSI



Output CO/PB



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.

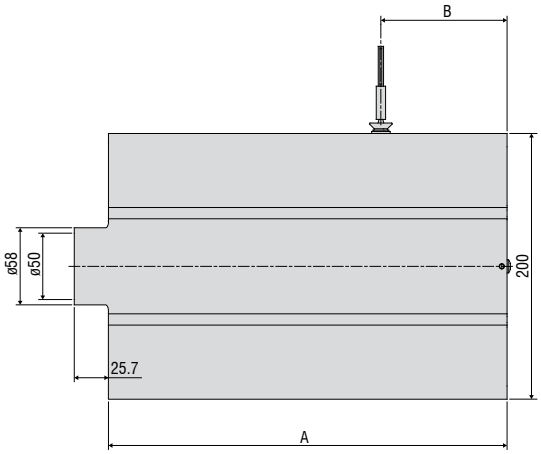
Article description

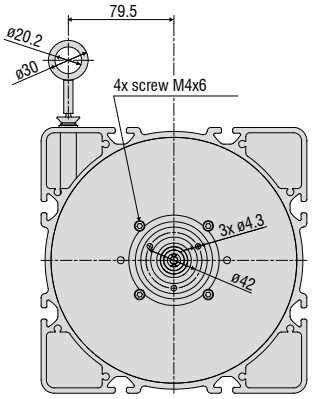
WDS - 5000 - P115 - CR - TTL

- **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
- **P115** – Model P115
- **5000** – Measuring range in mm

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

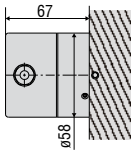
Model P200



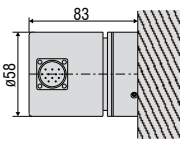


MR (mm)	A (mm)	B (mm)
30000	268	75
40000	300	95
50000	333.5	95

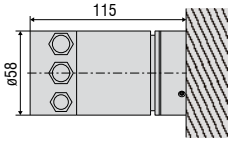
Output P200-HTL/TTL



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 polamide 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

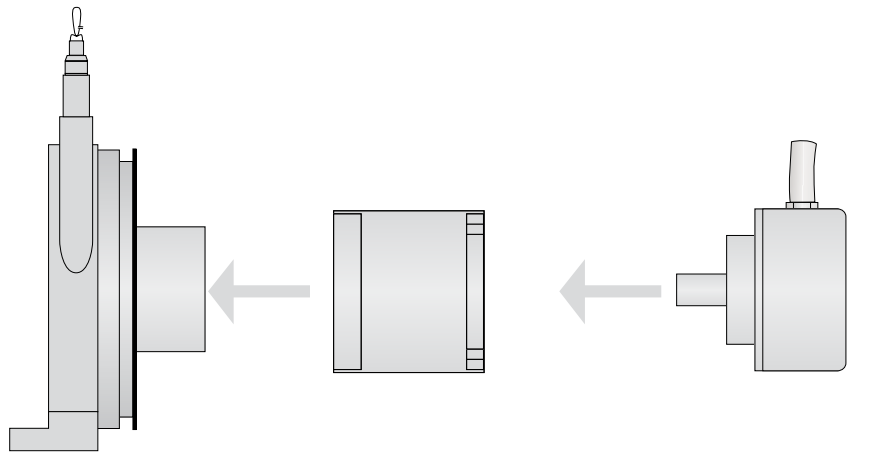
- **TTL** – Output options:
  HTL
  TTL
  CO: CANopen
  PB: Profibus DP
  SSI
- **CR** – Connection:
  SR (Output SSI): radial plug
  CR (Output HTL, TTL): integrated cable, radial, 1m
  BH (Output CO, PB): bus cover
- **P200** – Model P200
- **30000** – Measuring range in mm

- *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.



take up spool (mechanics) adapter customer-specific encoder

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

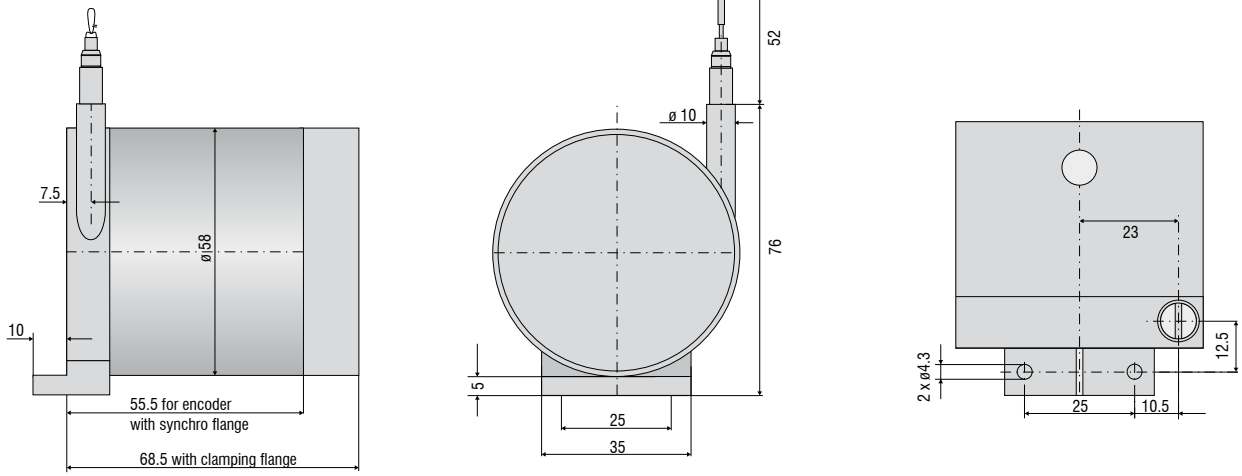
FSO = Full Scale Output

Article description

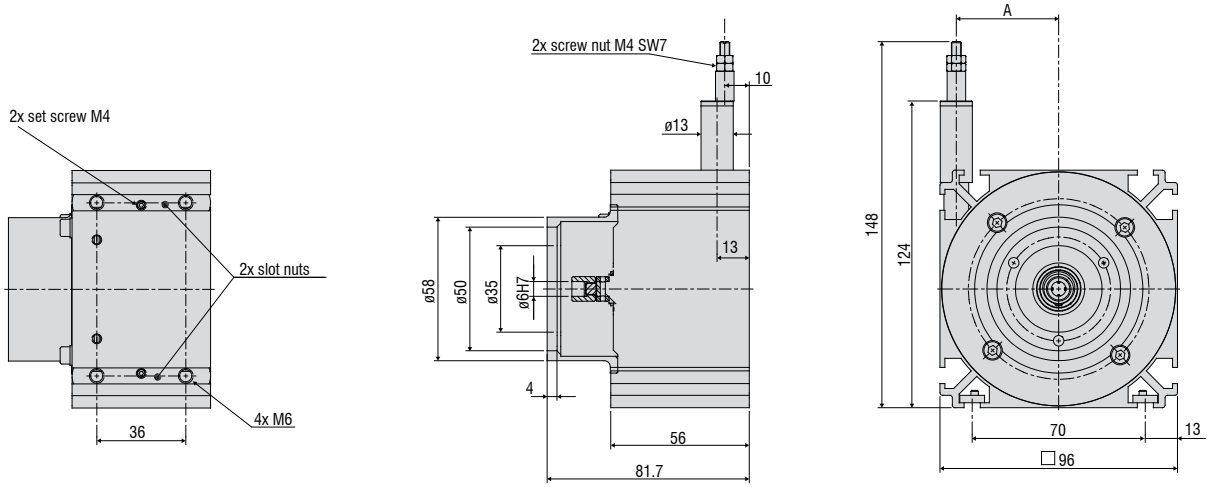
WDS - 5000 - P115 - M - SO

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

Model Z60

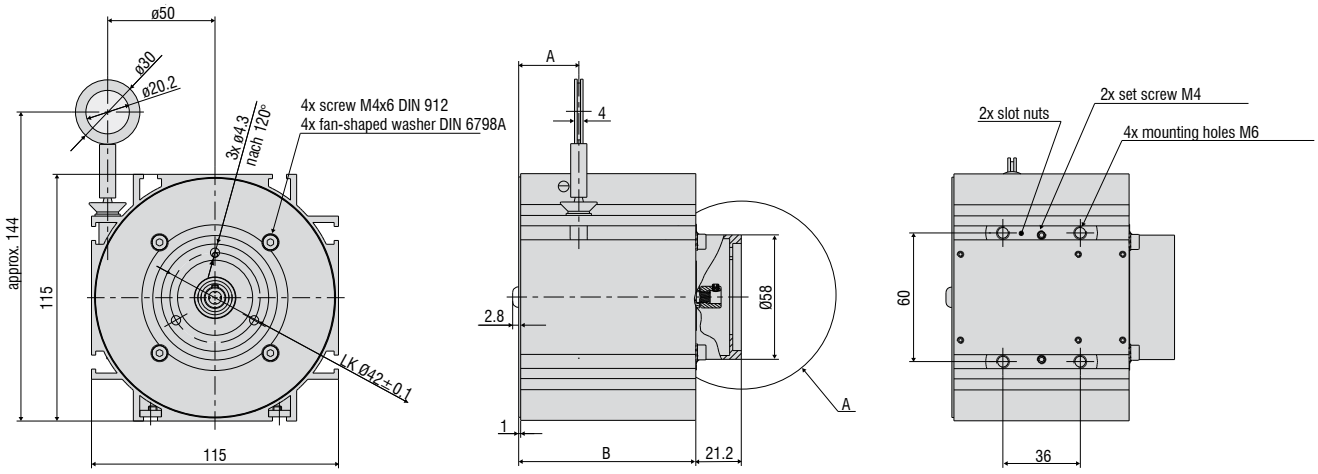


Model P96



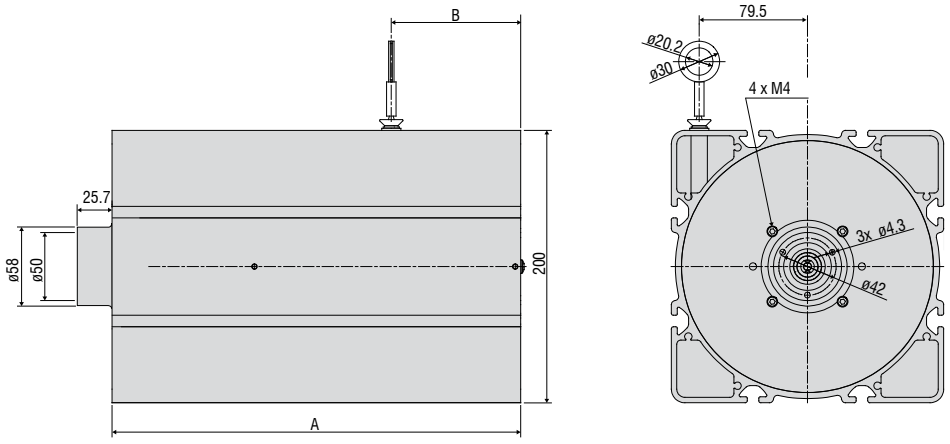
MR (mm)	A (mm)
2000	26
3000	41.5

Model P115



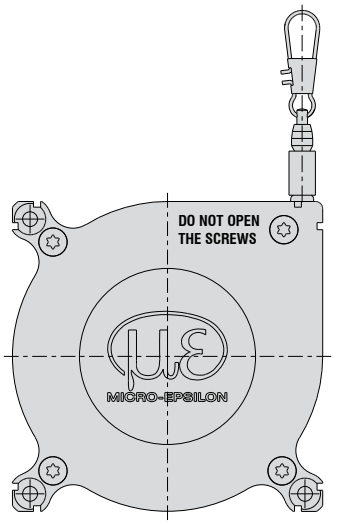
MR (mm)	A (mm)	B (mm)
5000	28	82.5
7500	37	105.5
10000	44.5	148.5
15000	61	180.5

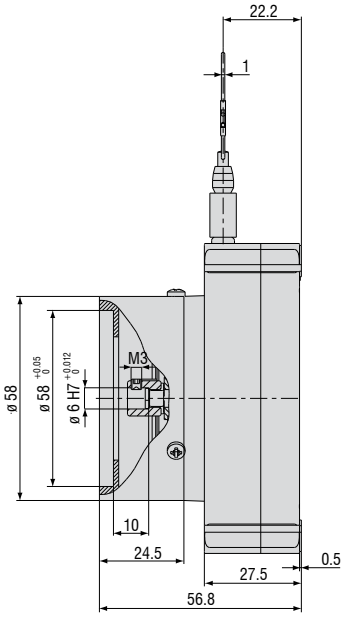
Model P200

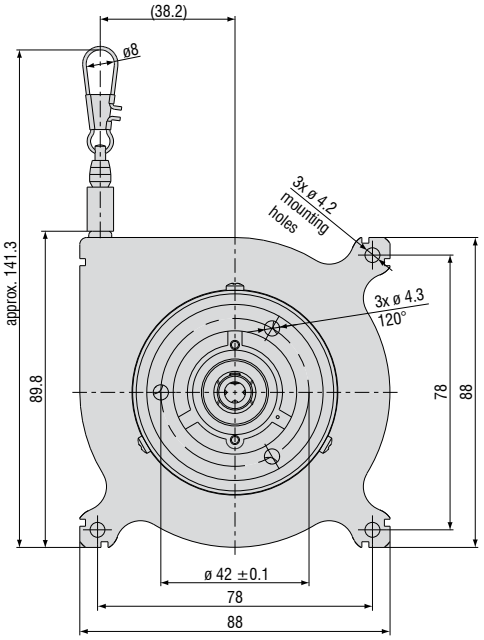


MR (mm)	A (mm)	B (mm)
30000	268	75
40000	300	95
50000	333.5	95

- *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		±0.1% FSO (±2.3mm)	±0.4% FSO (±20mm)
Resolution		dependent upon encoder	
Travel per encoder revolution		238.8mm ±0.3mm	240.0mm ±1mm
Repeatability		±1mm	±8mm
Temperature range	operation	-40...+85°C	
	storage	-40...+85°C	
Material	housing	PA 6 GF 30	
	draw wire	coated polamide stainless steel (ø 0.45mm)	
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 ø58mm; shaft ø6mm	

FSO = Full Scale Output

Article description

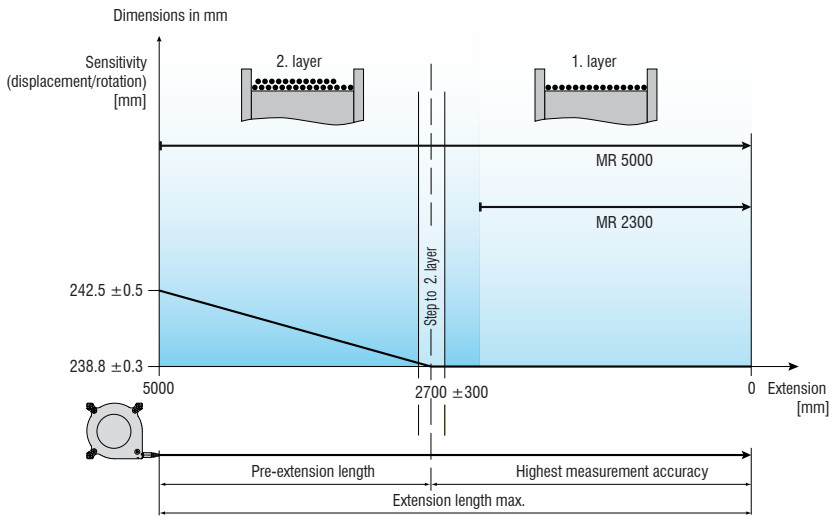
WPS - 5000 - MK88 - M

- M: Mechanics
- MK88: Model MK88
- 5000: Measuring range in mm

Sensitivity characteristics MK88

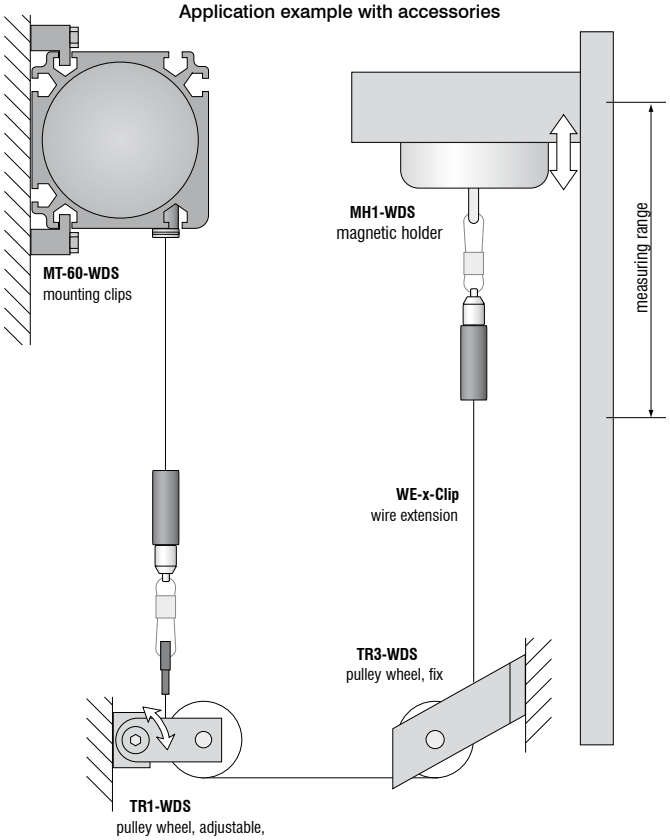
The WPS-2300-MK88-M is designed with only one wire layer which is wound onto the drum. This sensor design achieves the highest measurement accuracy.

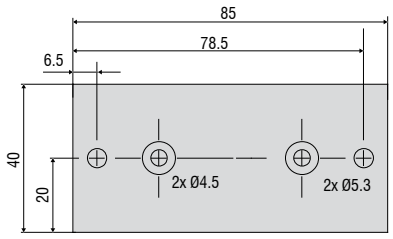
If a reduced measurement accuracy is sufficient, larger measurement ranges can be achieved with the same sensor dimensions. This can be seen by means of a sensitivity characteristics (see diagram).



Accessories:	
WE-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





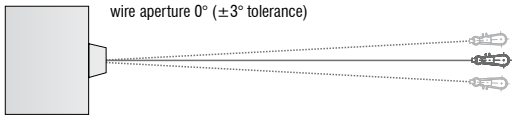
Mounting plate WDS-MP60

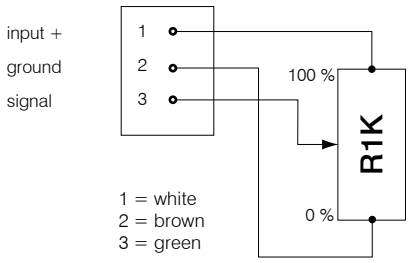
Installation information:

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

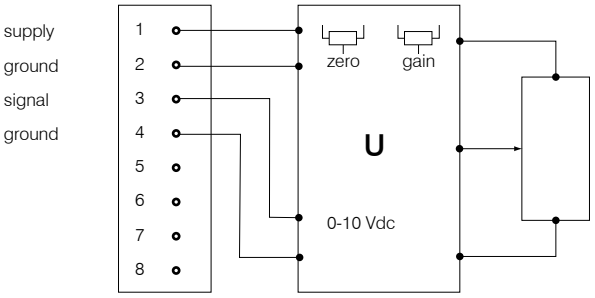
Wire exit angle:

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.

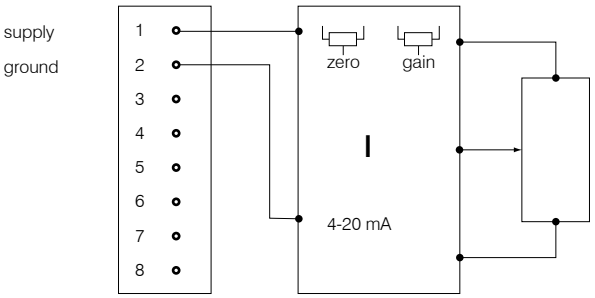




Potentiometric output (P)	
Supply voltage	max. 32VDC at 1kOhm / 1 Wmax
Resistance	1kOhm ±10% (potentiometer
Temperature coefficient	±0.0025% FSO/°C
Sensitivity	depends on measuring range individually shown on test report



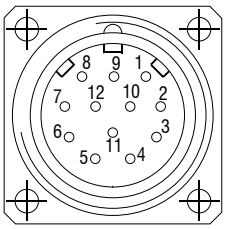
Voltage output (U)	
Supply voltage	14 ... 27VDC (non stabilised)
Current consumption	max. 30mA
Output voltage	0 ... 10VDC
	Option 0 ... 5 / ±5V
Load impedance	>5kOhm
Signal noise	0.5mV$_{eff}$
Temperature coefficient	±0.005% FSO/°C
Electromagnetic compatibility (EMC)	EN 50081-2
	EN 50082-2
Adjustment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



Current Output (I)	
Supply voltage	14 ... 27VDC (non stabilised)
Current consumption	max. 35mA
Output current	4 ... 20mA
Load	<600Ohm
Signal noise	<1.6µAeff
Temperature coefficient	±0.01% FSO/°C
Electromagnetic compatibility (EMC)	EN 50081-2
	EN 50082-2
Adjustment range	
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 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	$\overline{\text{DATAVALID}}$
9	pink	UP/ DOWN
10	black/yellow	$\overline{\text{DATAVALID}}$ $\overline{\text{MT}}$
11	-	-
12	-	-

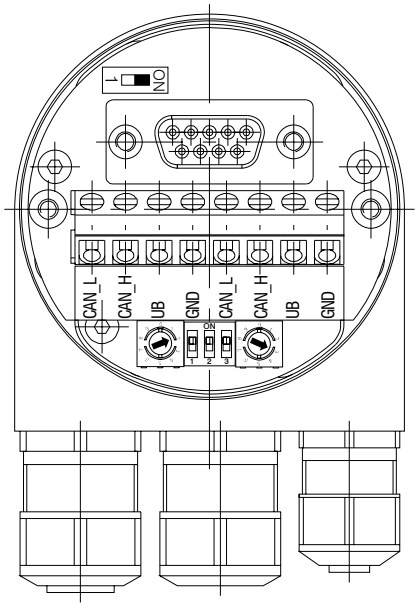


Please use leads twisted in pairs for extension cables.

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 parameterised 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 parameterised 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 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	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

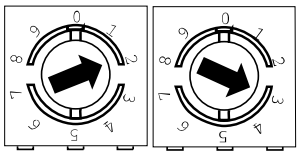
OFF = User X

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

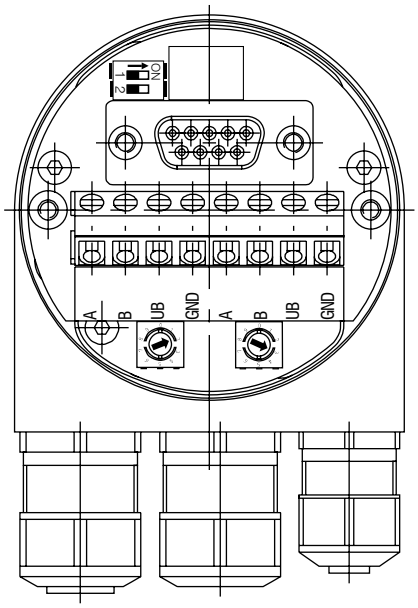
Contact description CANopen	
CAN_L	CAN Bus Signal (dominant Low)
CAN_H	CAN Bus Signal (dominant High)
UB	Supply voltage 10...30VDC
GND	Ground contact for UB
	(Terminals with the same designation are internally interconnected)

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 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

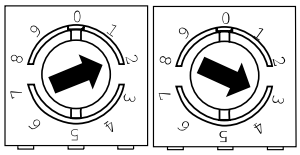


Settings of terminating resistors for Profibus-DP

ON = last user
OFF = user X

Settings of user address for Profibus-DP

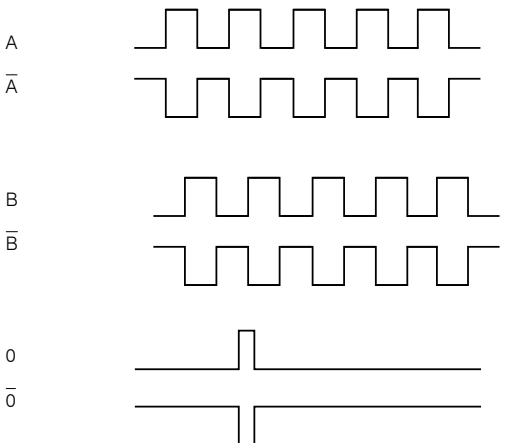
Settings of user address for Profibus-DP



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



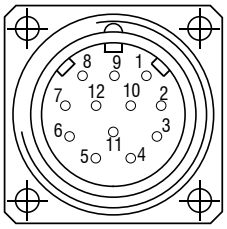
Output TTL	Linedriver (5 VDC)	
Level High	≥ 2.5V	(with I = -20mA)
Level Low	≤ 0.5V	(with I = 20mA)
Load High	≤ 20mA	
Output	A, $\overline{A}$, B, $\overline{B}$, O	

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, $\overline{B}$, O	

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

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

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



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	0

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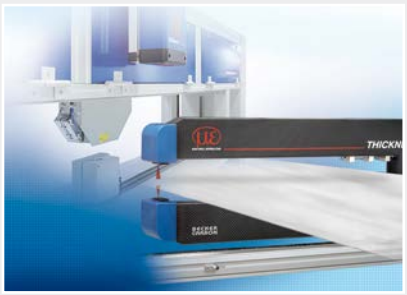

Measurement and inspection systems

Modifications reserved / Y9761111-G031056SGO

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