



# More Precision

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





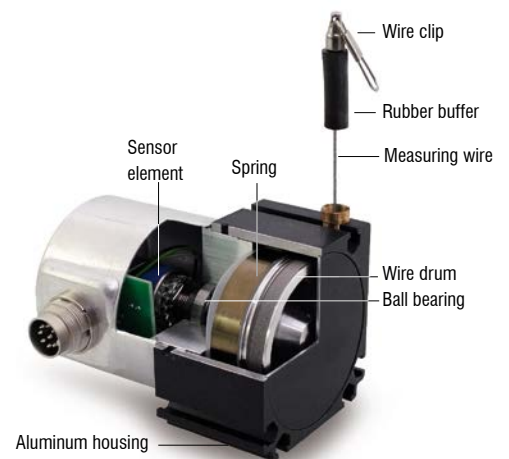
- Measuring ranges up to 50,000mm
- Resolution towards infinity
- Compact overall design
- Easy mounting for any application
- High reliability and long life cycle
- Analog and digital outputs

#### 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 large range of draw-wire displacement sensors equipped with different output signal types and

therefore the ideal sensor for any customer-specific application. We also develop and produce individual OEM models for special applications involving high volumes. The wire-SENSOR models stand out due to an optimal measuring range/size ratio as well as easy installation and handling. 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 analog                                                                                                                                                                                          | P  |             | P           | P   |             | P           | P           |             |             |             |             |             |      |      |             |             |             |             |             |             |             |             |        |        |        | 6-7   |
| MK30 digital                                                                                                                                                                                         |    |             |             |     |             | E           | E           |             |             |             |             |             |      |      |             |             |             |             |             |             |             |             |        |        |        | 8-9   |
| MK46 analog                                                                                                                                                                                          |    |             |             |     |             |             |             | P           | P<br>U<br>I |             |             |             |      |      |             |             |             |             |             |             |             |             |        |        |        | 10-11 |
| MK46 digital                                                                                                                                                                                         |    |             |             |     |             |             |             | E           |             |             |             |             |      |      |             |             |             |             |             |             |             |             |        |        |        | 12-13 |
| MK 77 analog                                                                                                                                                                                         |    |             |             |     |             |             |             |             |             |             |             | P           |      |      |             |             |             |             |             |             |             |             |        |        |        | 14-15 |
| MK 77 digital                                                                                                                                                                                        |    |             |             |     |             |             |             |             |             |             |             | E           |      |      |             |             |             |             |             |             |             |             |        |        |        | 16-17 |
| MK 60 analog                                                                                                                                                                                         |    |             |             |     |             |             |             |             |             |             | P<br>U<br>I |             |      |      |             |             |             |             |             |             |             |             |        |        |        | 18-19 |
| MK 60 digital                                                                                                                                                                                        |    |             |             |     |             |             |             |             |             |             |             |             |      | E    |             |             |             |             |             |             |             |             |        |        |        | 20-21 |
| MK 88 analog                                                                                                                                                                                         |    |             |             |     |             |             |             |             |             |             |             | P<br>U<br>I |      |      |             |             | P<br>U<br>I |             | P<br>U<br>I |             |             |             |        |        |        | 22-23 |
| MK 120 analog                                                                                                                                                                                        |    |             |             |     |             |             |             |             |             |             |             |             |      |      |             | P<br>U<br>I |             |             | P<br>U<br>I | P<br>U<br>I |             |             |        |        |        | 24-25 |
| MPM analog                                                                                                                                                                                           | P  |             | P           | P   |             |             |             |             |             |             |             |             |      |      |             |             |             |             |             |             |             |             |        |        |        | 26-27 |
| MP/MPW analog                                                                                                                                                                                        |    | P           |             |     | P           | P           |             | P           |             |             |             |             |      |      |             |             |             |             |             |             |             |             |        |        |        | 28-29 |
| P60 analog                                                                                                                                                                                           |    | P<br>U<br>I | P<br>U<br>I |     | P<br>U<br>I | P<br>U<br>I | P<br>U<br>I | P<br>U<br>I |             | P<br>U<br>I |             |             |      |      |             |             |             |             |             |             |             |             |        |        |        | 30-31 |
| P60 digital                                                                                                                                                                                          |    |             |             |     |             |             |             | E<br>A      |             | E<br>A      |             |             |      |      |             |             |             |             |             |             |             |             |        |        |        | 32-33 |
| P96 analog                                                                                                                                                                                           |    |             |             |     |             |             |             |             |             |             | P<br>U<br>I |             |      |      | P<br>U<br>I |             |             |             |             |             |             |             |        |        |        | 34-35 |
| P96 digital                                                                                                                                                                                          |    |             |             |     |             |             |             |             |             |             |             |             |      |      |             | E<br>A      |             |             |             |             |             |             |        |        |        | 36-37 |
| P115 analog                                                                                                                                                                                          |    |             |             |     |             |             |             |             |             |             |             |             |      |      |             | P<br>U<br>I |             | P<br>U<br>I | P<br>U<br>I | P<br>U<br>I | P<br>U<br>I | P<br>U<br>I |        |        |        | 38-39 |
| P115 digital                                                                                                                                                                                         |    |             |             |     |             |             |             |             |             |             |             |             |      |      |             |             |             |             | E<br>A      | E<br>A      | E<br>A      | E<br>A      |        |        |        | 40-41 |
| P200 digital                                                                                                                                                                                         |    |             |             |     |             |             |             |             |             |             |             |             |      |      |             |             |             |             |             |             |             |             | E<br>A | E<br>A | E<br>A | 42-43 |
| Mechanics                                                                                                                                                                                            |    |             |             |     |             |             |             |             |             | M           |             |             | M    |      |             | M           | M           |             | M           | M           | M           | M           | M      | M      | M      | 44-49 |
| <div><div>P</div><div>U</div><div>I</div><div>E</div><div>A</div><div>M</div><div>Voltage</div><div>Current</div><div>Incremental encoder</div><div>Absolute encoder</div><div>Mechanics</div></div> |    |             |             |     |             |             |             |             |             |             |             |             |      |      |             |             |             |             |             |             |             |             |        |        |        |       |

P

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

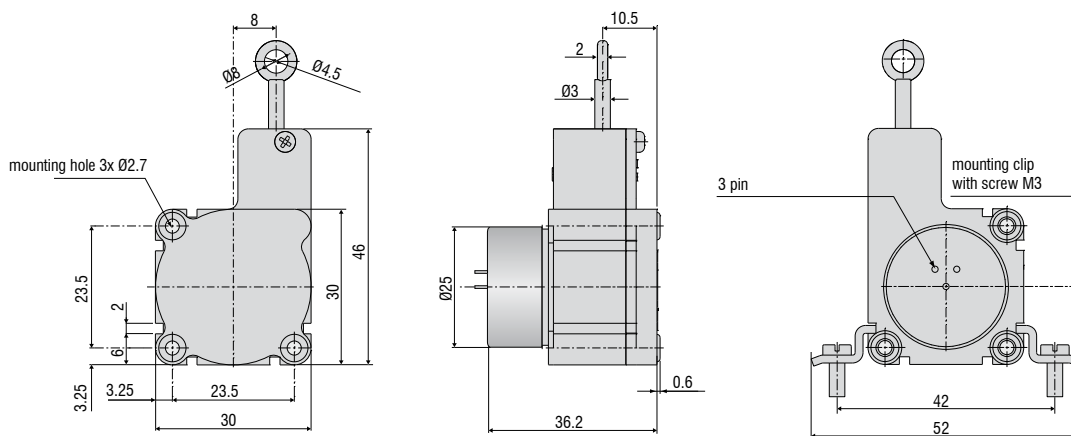


Height of lifting platforms on automobile production lines

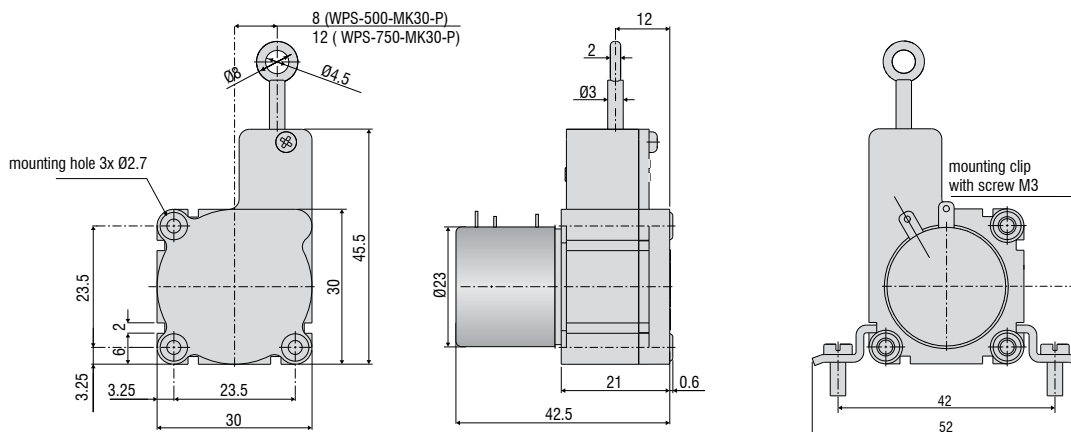


- Robust plastic housing
- Customized versions for OEM
- Conductive plastic/wire/hybrid potentiometer
- Smallest design in its class

Model MK30-P (Measuring range 50mm)



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



| 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. |            | towards infinity                             |              |              |              |              |
|                             | wire pot.               |            | -                                            | 0.1mm        | 0.1mm        | 0.15mm       | 0.2mm        |
|                             | hybrid pot.             |            | towards infinity                             |              |              |              |              |
|                             |                         |            | conductive plastic/wire/hybrid potentiometer |              |              |              |              |
| Temperature range           |                         |            | -20 °C ... +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           |                         |            | approx. 5g                                   |              |              |              |              |
| Wire retraction force (min) |                         |            | approx. 1N                                   |              |              |              |              |
| Wire extension force (max)  |                         |            | approx. 2.5N                                 |              |              |              |              |
| Protection class            |                         |            | IP20                                         |              |              |              |              |
| Electrical connection       |                         |            | soldering tag                                |              |              |              |              |
| Weight                      |                         |            | appr 45g                                     |              |              |              |              |

FSO = Full Scale Output

Specifications for analog outputs on page 51.

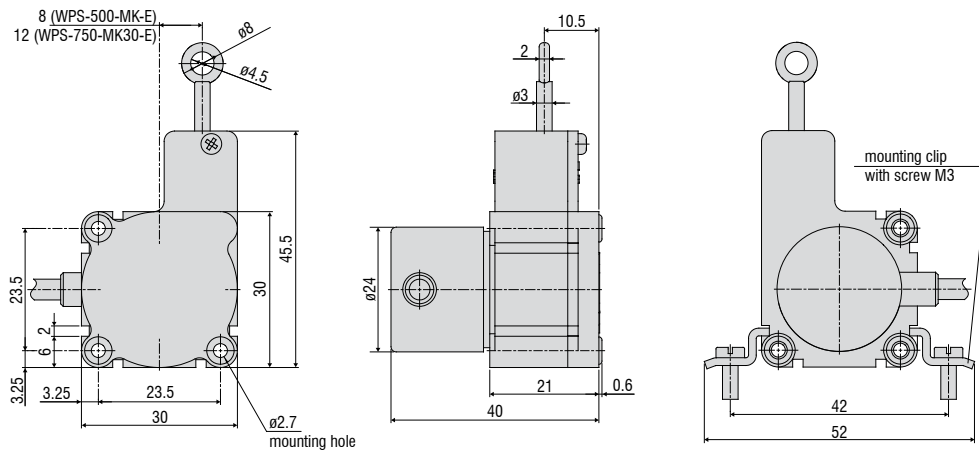
## Article description

| WPS - | 50 -                  | MK30 -     | P25                                                                                                                                                                |
|-------|-----------------------|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       |                       |            | Output option:<br>potentiometer P50 (Linearity $\pm 0.5\%$ FSO)<br>potentiometer P25 (Linearity $\pm 0.25\%$ FSO)<br>potentiometer P10 (Linearity $\pm 0.1\%$ FSO) |
|       |                       | Model MK30 |                                                                                                                                                                    |
|       | Measuring range in mm |            |                                                                                                                                                                    |



- Robust plastic housing
- Customized 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 $\pm 0.05\%$ FSO | $\pm 0.25\text{mm}$                 | $\pm 0.375\text{mm}$                                             |
| Resolution                   | 10 pulses/mm                        | 6.7 pulses/mm                                                    |
|                              | 0.1mm                               | 0.15mm                                                           |
| Sensor element               | incremental encoder                 |                                                                  |
| Temperature range            | $-20\text{ °C} \dots +80\text{ °C}$ |                                                                  |
| Material                     | housing                             | plastic                                                          |
|                              | draw-wire                           | coated polyamide stainless steel ( $\varnothing 0.36\text{mm}$ ) |
| Wire mounting                | eyelet                              |                                                                  |
| Sensor mounting              | mounting holes / mounting grooves   |                                                                  |
| Wire acceleration            | approx. 5g                          |                                                                  |
| Wire retraction force (min)  | approx. 1N                          |                                                                  |
| Wire extension force (max)   | approx. 2.5N                        |                                                                  |
| Protection class             | IP54                                |                                                                  |
| Electrical connection        | cable radial, 1m                    |                                                                  |
| Weight                       | approx. 80g                         |                                                                  |

FSO = Full Scale Output

Specifications for digital outputs on page 52.

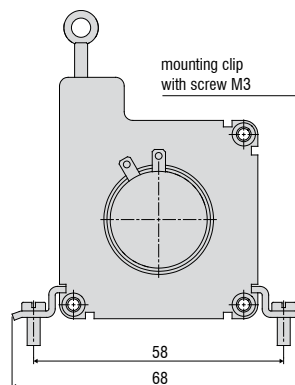
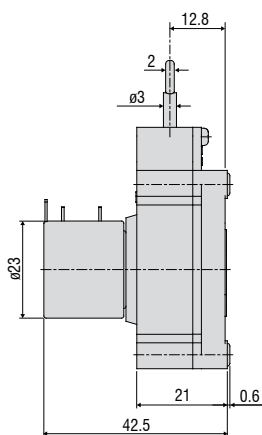
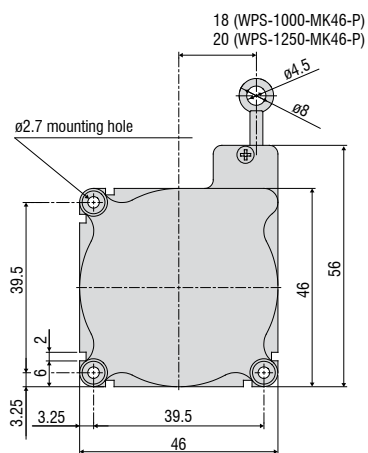
## Article description

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

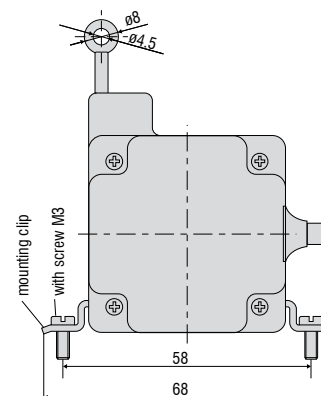
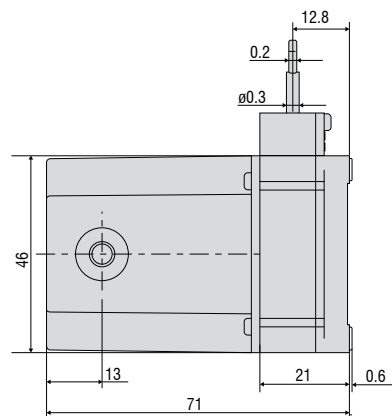
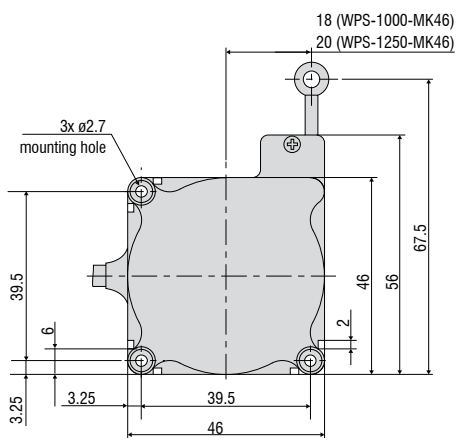


- Robust plastic housing
- Customized versions for OEM
- Wire/hybrid potentiometer

Model MK46 Output P10/P25



Model MK46 Output CR-P25/CR-U10/CR-I10



| 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 |            | towards infinity                            |               |
| Sensor element              |                        |            | wire/hybrid potentiometer                   |               |
| Temperature range           |                        |            | -20 °C ... +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           |                        |            | approx. 5g                                  |               |
| Wire retraction force (min) |                        |            | approx. 1N                                  |               |
| Wire extension force (max)  |                        |            | 1.6N                                        | 1.5N          |
| Protection class            |                        |            | IP20                                        |               |
| Electrical connection       | P10, P25               |            | soldering tag                               |               |
|                             | CR-P25/CR-U10/ CR-I10  |            | integrated cable, radial, 1m                |               |
| Weight                      |                        |            | approx. 80g                                 |               |

FSO = Full Scale Output

Specifications for analog outputs on page 51.

## 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

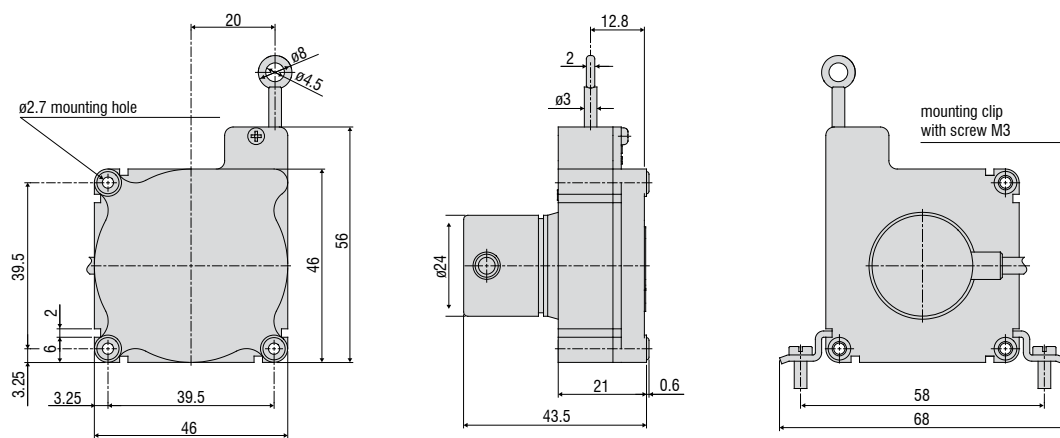
Model MK46

Measuring range in mm



- Robust plastic housing
- Customized 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 °C ... +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           |            |         | approx. 5g                                  |
| Wire retraction force (min) |            |         | approx. 1N                                  |
| Wire extension force (max)  |            |         | 1.5N                                        |
| Protection class            |            |         | IP54                                        |
| Electrical connection       |            |         | cable radial, 1m                            |
| Weight                      |            |         | approx. 120g                                |

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

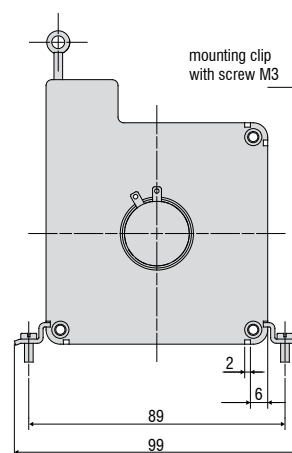
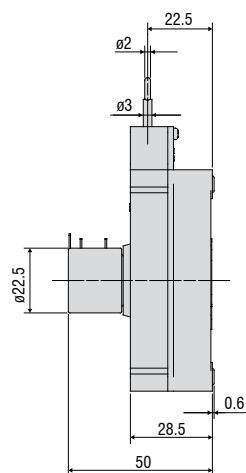
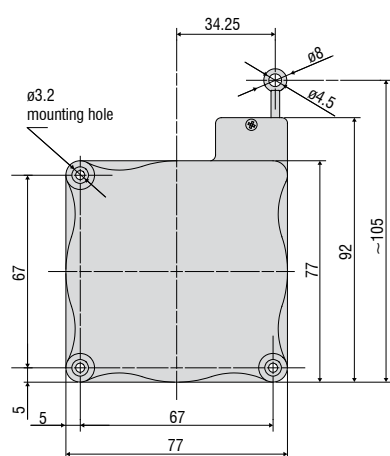
Article description

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

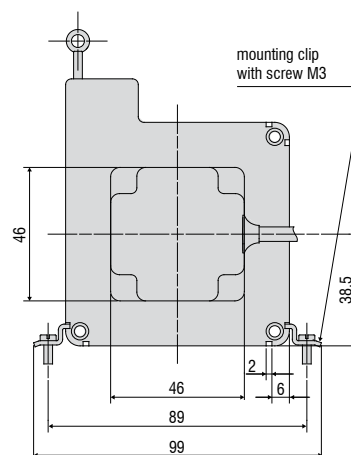
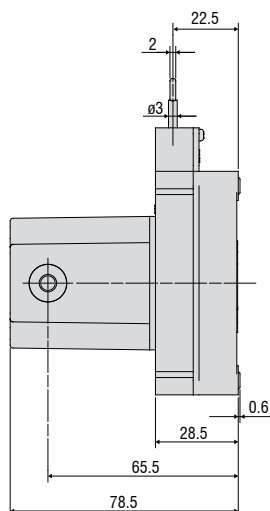
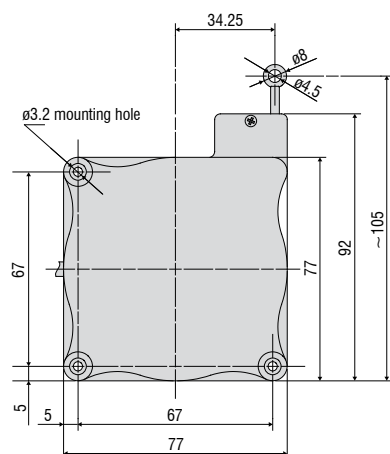


- Robust plastic housing
- Customized versions for OEM
- Wire potentiometer

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 °C ... +80 °C                           |
| Material                    | housing              | plastic                                     |
|                             | draw-wire            | coated polyamide 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            |                      | IP20                                        |
| Electrical connection       | P25                  | soldering tag                               |
|                             | CR-P25               | integrated cable radial, 1m                 |
| Weight                      | P25                  | approx. 0.2kg                               |
|                             | CR-P25               | approx. 0.25kg                              |

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

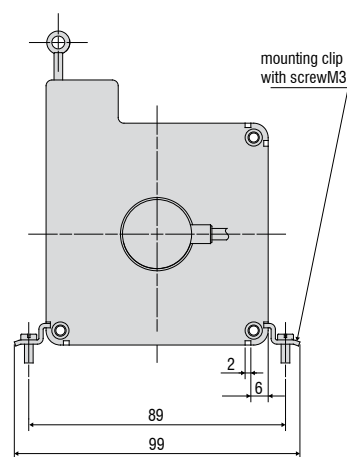
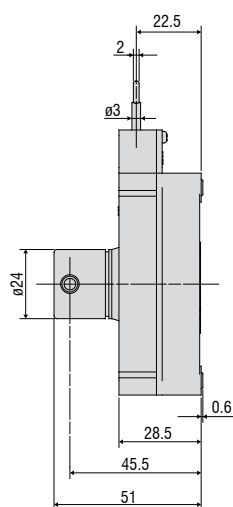
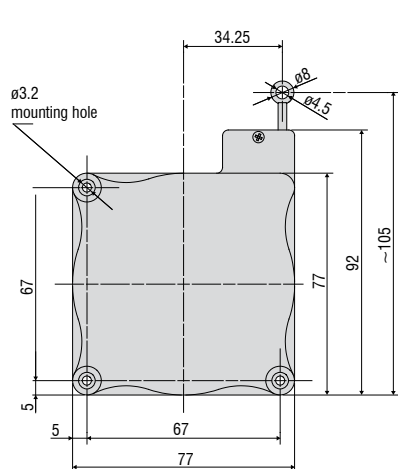
Article description

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



- Robust plastic housing
- Customized 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 °C ... +80 °C                           |
| Material                    | housing    | plastic                                     |
|                             | draw-wire  | coated polyamide 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            |            | IP54                                        |
| Electrical connection       |            | cable radial, 2m                            |
| Weight                      |            | approx. 0.27kg                              |

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

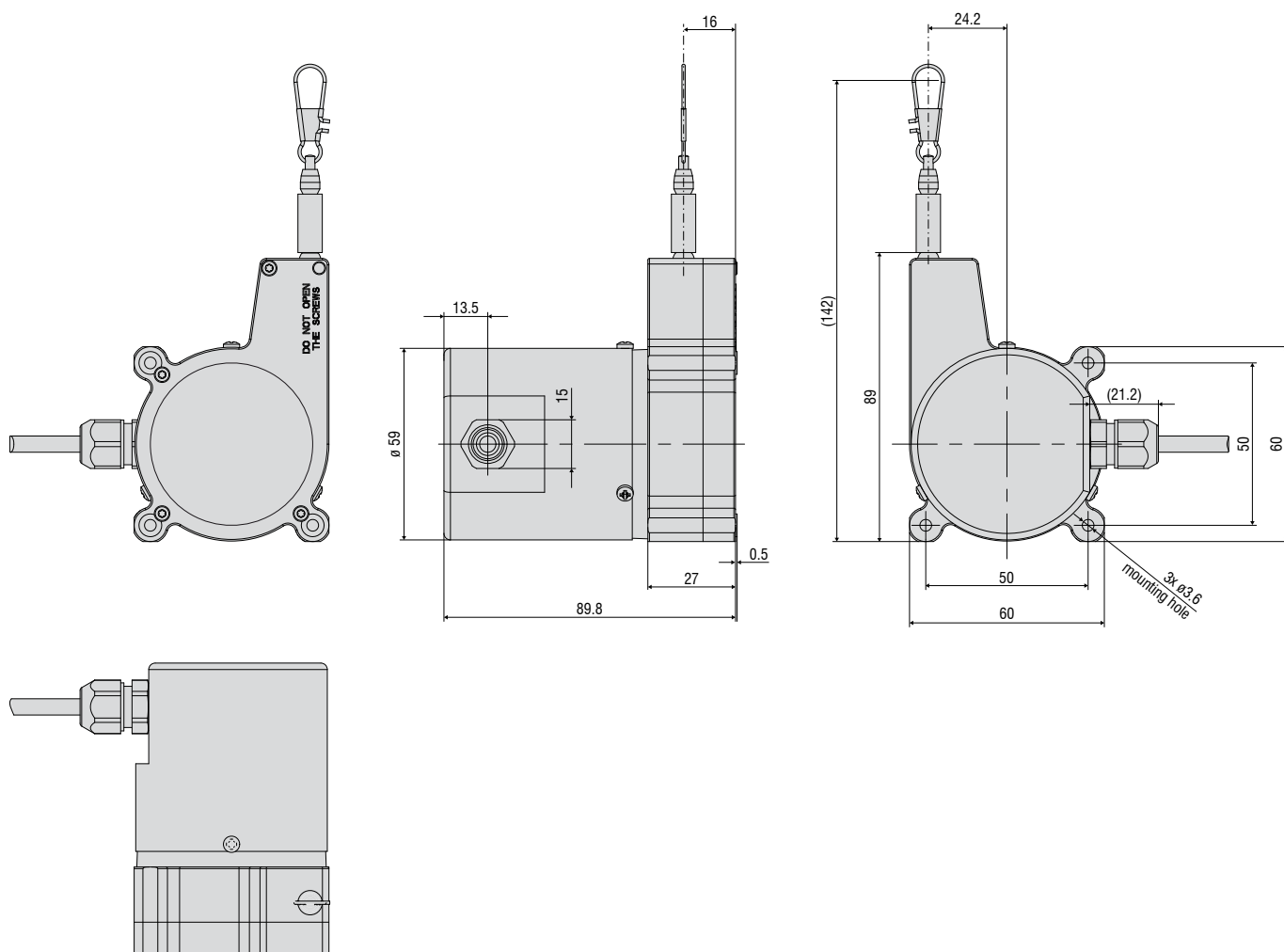
Article description

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



- Robust plastic housing
- Customized 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      |                | towards infinity                            |
| Temperature range           |                | -20 °C ... +80 °C                           |
| Material                    | housing        | plastic, PBT GF20                           |
|                             | draw-wire      | coated polyamide 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            |                | IP65                                        |
| Electrical connection       |                | cable, radial, 1m                           |
| Weight (with cable)         |                | 290g                                        |

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

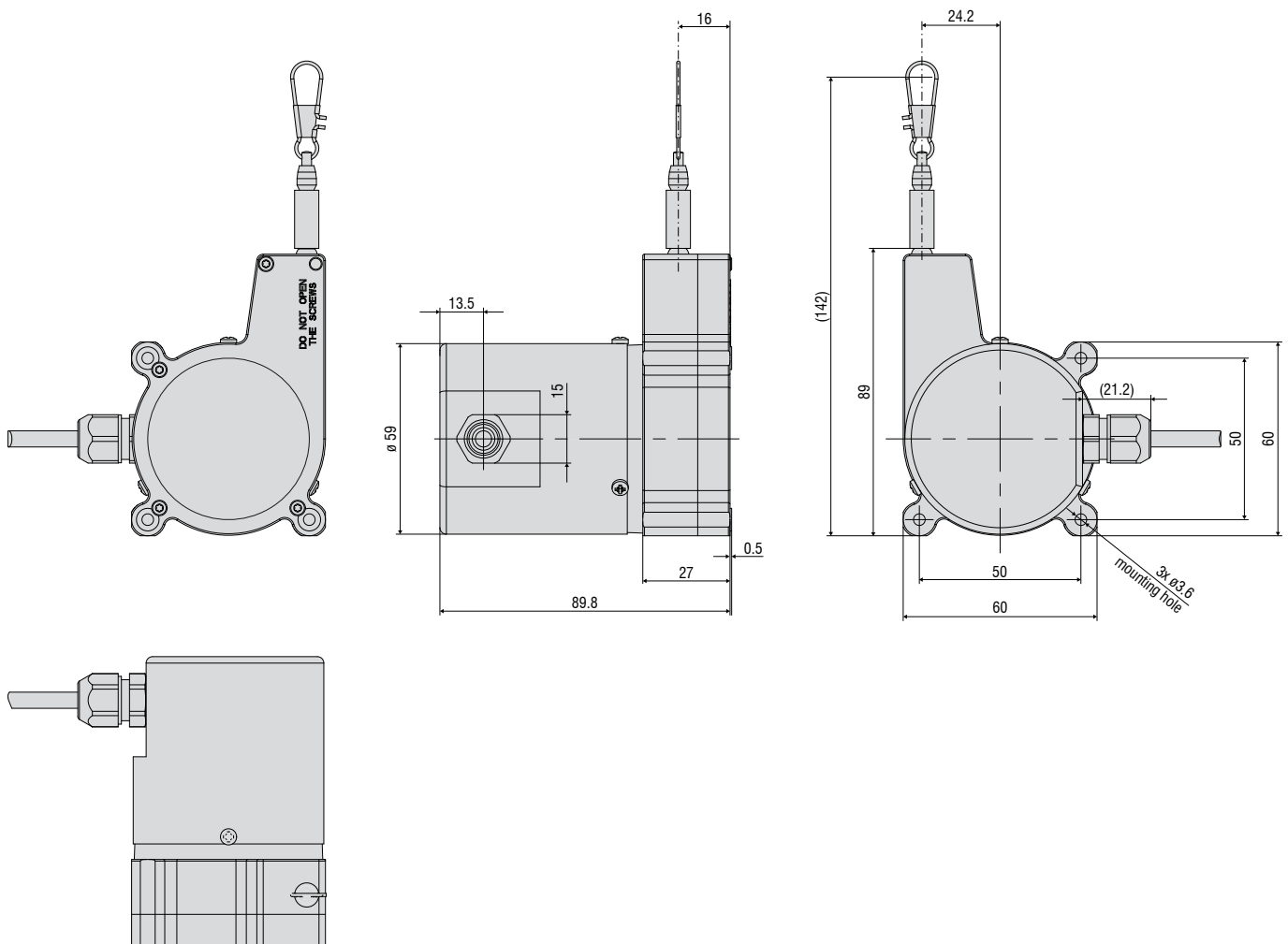
Article description

|                       |        |        |      |                                                                |
|-----------------------|--------|--------|------|----------------------------------------------------------------|
| WPS -                 | 1500 - | MK60 - | CR - | P                                                              |
|                       |        |        |      | Output option:<br>P: potentiometer<br>U: voltage<br>I: current |
|                       |        |        |      | Connection CR: integrated cable, radial, 1m                    |
|                       |        |        |      | Model MK60                                                     |
| Measuring range in mm |        |        |      |                                                                |



- Robust plastic housing
- Customized 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                   |                | $\pm 0.05\%$ FSO                                                 |                                           |
| Resolution                  |                | 6.83 pulses/mm                                                   |                                           |
| Temperature range           |                | $-20\text{ }^{\circ}\text{C} \dots +80\text{ }^{\circ}\text{C}$  |                                           |
| Material                    | housing        | plastic, PBT GF20                                                |                                           |
|                             | draw-wire      | coated polyamide stainless steel ( $\varnothing 0.45\text{mm}$ ) |                                           |
|                             | 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            |                | IP65                                                             |                                           |
| Electrical connection       |                | cable, radial, 1m                                                |                                           |
| Weight (with cable)         |                | $\sim 290\text{g}$                                               |                                           |

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

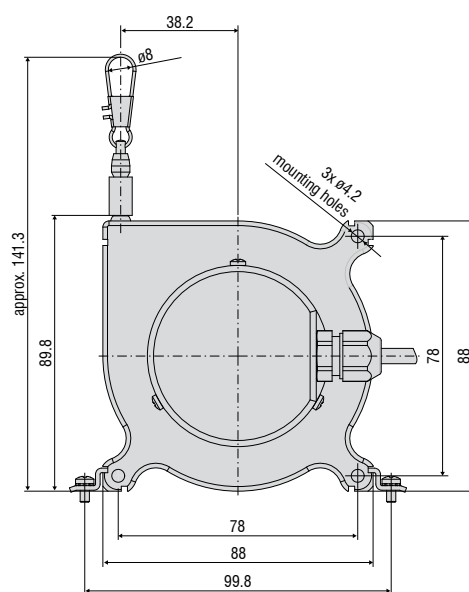
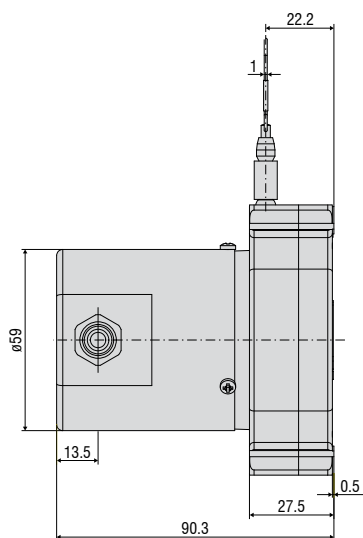
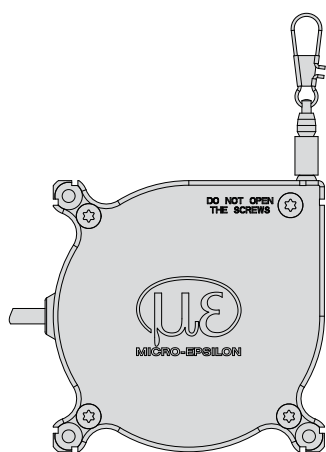
Article description

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



- Robust plastic housing
- Customized 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      |                | towards infinity                                        |               |               |
| Temperature range           |                | -20 °C ... +80 °C                                       |               |               |
| Material                    | housing        | plastic, PA 6 GF 30                                     |               |               |
|                             | draw-wire      | coated polyamide 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)     |                | approx. 7g                                              |               |               |
| Protection class            |                | IP65                                                    |               |               |
| Electrical connection       |                | cable, radial, 1m                                       |               |               |
| Weight (with cable)         |                | 400-430g                                                |               |               |

FSO = Full Scale Output

Specifications for analog outputs on page 51.

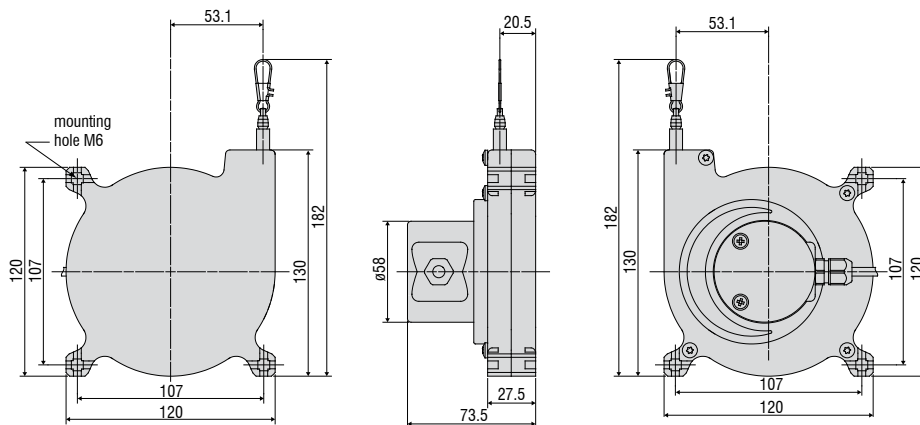
#### Article description

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

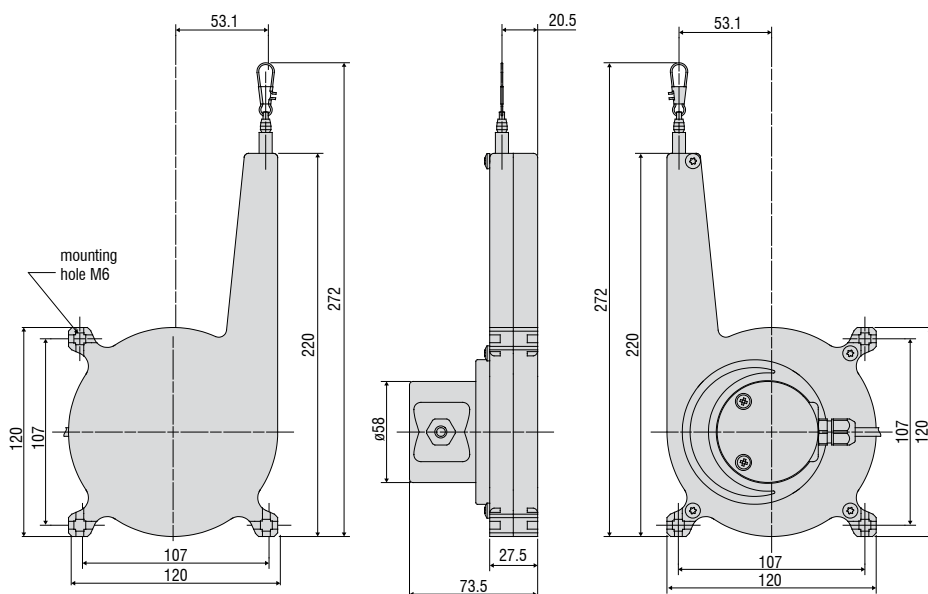


- Robust plastic housing
- Customized versions for OEM
- Potentiometer, current and voltage output

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                  |            | towards infinity                            |                |                |
| Temperature range           |            | -20 °C ... +80 °C                           |                |                |
| Material                    | housing    | plastic PA6                                 |                |                |
|                             | draw-wire  | coated polyamide 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            |            | IP65                                        |                |                |
| Weight                      |            | 0.75kg                                      |                | 0.9kg          |

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

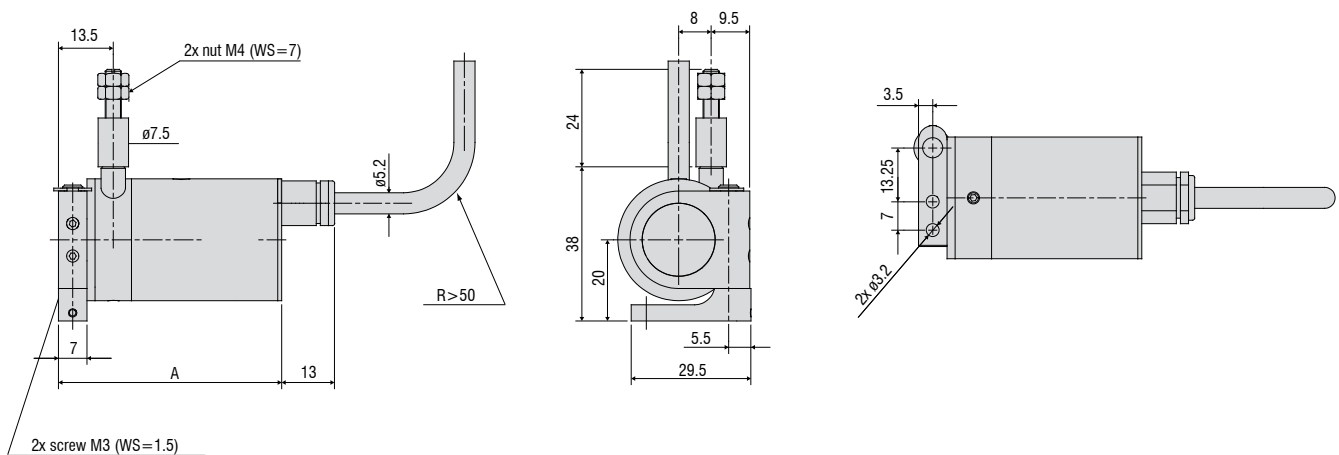
Article description

|                       |        |             |                                             |                                                                |  |  |
|-----------------------|--------|-------------|---------------------------------------------|----------------------------------------------------------------|--|--|
| WPS -                 | 3000 - | MK120 -     | CR -                                        | P                                                              |  |  |
|                       |        |             |                                             | Output option:<br>P: potentiometer<br>U: voltage<br>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                  |            | towards infinity                      |                      |             |
| Sensor element              |            | conductive plastic potentiometer      | hybrid potentiometer |             |
| Temperature range           |            | -20 °C ... +80 °C                     |                      |             |
| Material                    | housing    | aluminum                              |                      |             |
|                             | draw-wire  | stainless steel (ø 0.45mm)            |                      |             |
| Sensor mounting             |            | swivel flange in two axes 180° / 360° |                      |             |
| Wire mounting               |            | thread M4                             |                      |             |
| Wire acceleration           |            | approx. 25g (option HG: 100g)         |                      |             |
| Wire retraction force (min) |            | 1.5N (option HG: 10N)                 |                      |             |
| Wire extension force (max)  |            | 3.5N (option HG: 17N)                 |                      |             |
| Protection class            |            | IP65                                  |                      |             |
| Vibration                   |            | 20g, 20Hz - 2kHz                      |                      |             |
| Mechanical shock            |            | 50g, 20ms                             |                      |             |
| Electrical connection       |            | integrated cable, axial, 3-leads, 1m  |                      |             |
| Weight                      |            | approx. 150g                          |                      |             |

FSO = Full Scale Output

Specifications for analog outputs on page 51.

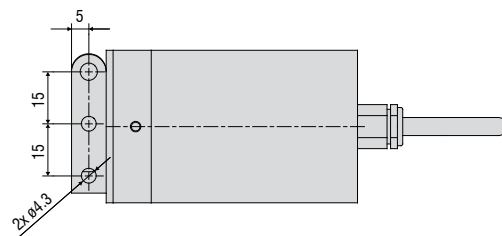
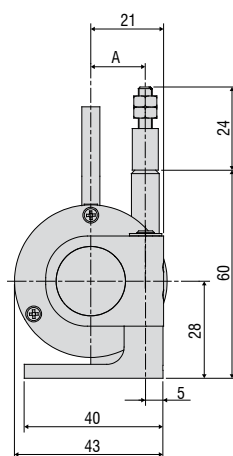
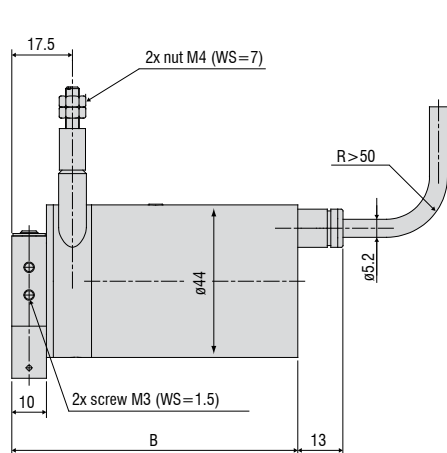
#### Article description

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



- Miniature design
- Optional IP67 (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         | towards infinity     |                |
| Sensor element              |            | wire potentiometer                    |               | hybrid potentiometer |                |
| Temperature range           |            | -20 °C ... +80 °C                     |               |                      |                |
| Material                    | housing    | aluminum                              |               |                      |                |
|                             | draw-wire  | stainless steel (ø 0.45mm)            |               |                      |                |
| Wire mounting               |            | thread M4                             |               |                      |                |
| Sensor mounting             |            | swivel flange in two axes 180° / 360° |               |                      |                |
| Wire acceleration           |            | approx. 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  | IP65                                  |               |                      |                |
|                             | series MPW | IP67                                  |               |                      |                |
| Vibration                   |            | 20g, 20Hz - 2kHz                      |               |                      |                |
| Mechanical shock            |            | 50g, 10ms                             |               |                      |                |
| Electrical connection       |            | integrated cable, axial, 3-leads, 1m  |               |                      |                |
| Weight                      |            | approx. 270g                          |               |                      |                |

FSO = Full Scale Output

Specifications for analog outputs on page 51.

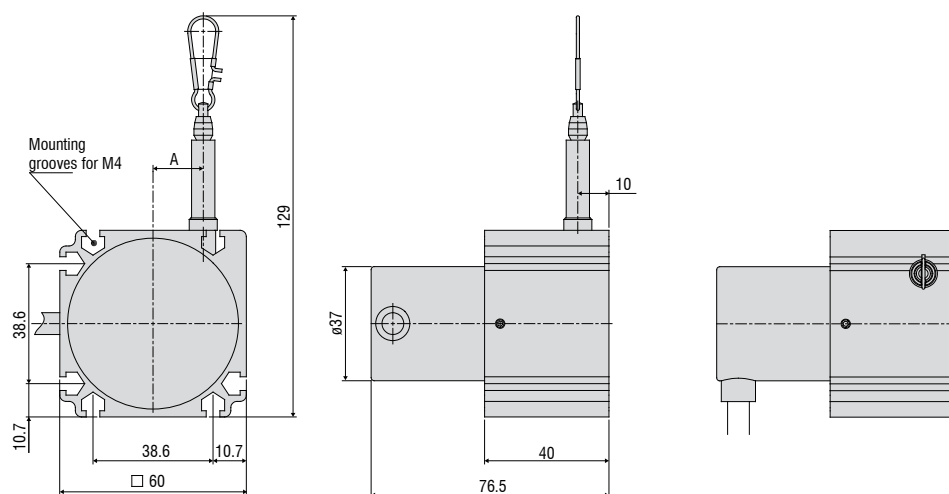
### Article description

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



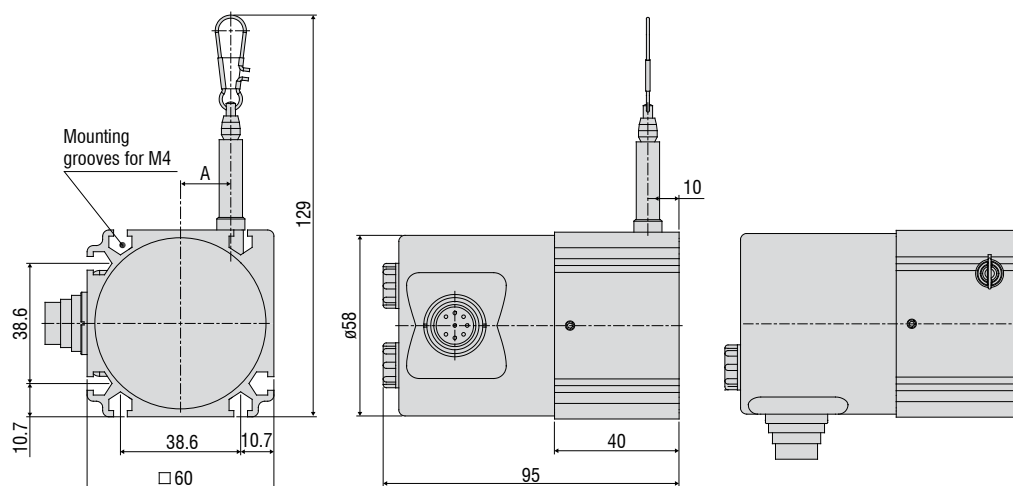
- Robust aluminum profile housing
- Customized versions for OEM
- Potentiometer, current and voltage output

Model P60 Output P



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

Model P60 Output U/I



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

| Model                       | WDS-100-P60                                   | WDS-150-P60                                 | WDS-300-P60          | WDS-500-P60 | WDS-750-P60 | WDS-1000-P60 | WDS-1500-P60 |
|-----------------------------|-----------------------------------------------|---------------------------------------------|----------------------|-------------|-------------|--------------|--------------|
| Output                      | P/U/I                                         |                                             |                      |             |             |              |              |
| Measuring range             | 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                  | towards infinity                              |                                             |                      |             |             |              |              |
| Sensor element              | conductive plastic/<br>wire potentiometer     |                                             | hybrid potentiometer |             |             |              |              |
| Temperature range           | -20 °C ... +80 °C                             |                                             |                      |             |             |              |              |
| Material                    | housing                                       | aluminum                                    |                      |             |             |              |              |
|                             | draw-wire                                     | coated polyamide stainless steel (ø 0.45mm) |                      |             |             |              |              |
| Sensor mounting             | mounting grooves in the housing               |                                             |                      |             |             |              |              |
| Wire mounting               | wire clip                                     |                                             |                      |             |             |              |              |
| Wire acceleration           | approx. 10 - 15g (depends on 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            | IP65 (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                      | approx. 370g                                  |                                             |                      |             |             |              |              |

FSO = Full Scale Output

Specifications for analog outputs on page 51.

## Article description

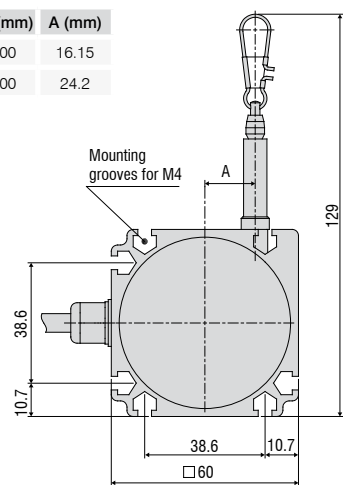
|       |       |       |      |                                                                                                                                  |
|-------|-------|-------|------|----------------------------------------------------------------------------------------------------------------------------------|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



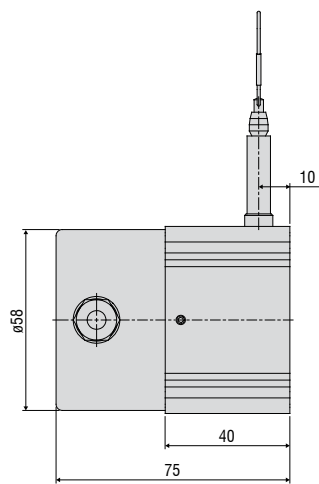
- Robust aluminum profile housing
- Customized versions for OEM
- Incremental/absolute encoder

Model P60

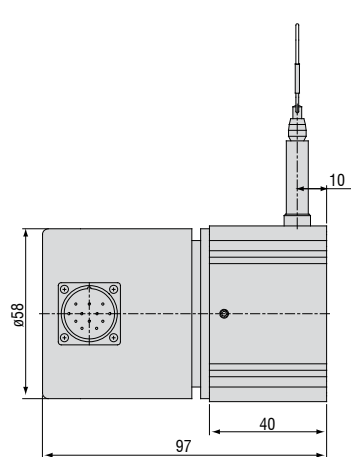
| MR (mm) | A (mm) |
|---------|--------|
| 1000    | 16.15  |
| 1500    | 24.2   |



Output HTL/TTL

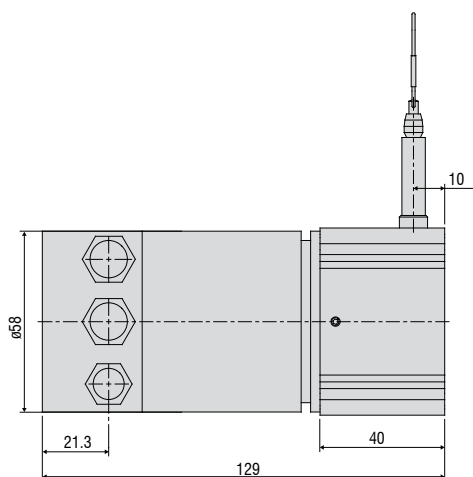
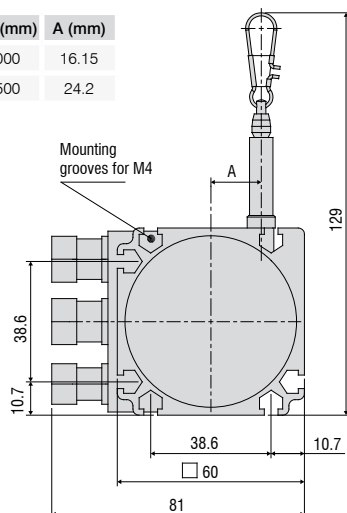


Output SSI



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

FSO = Full Scale Output

Specifications for digital outputs on page 52.

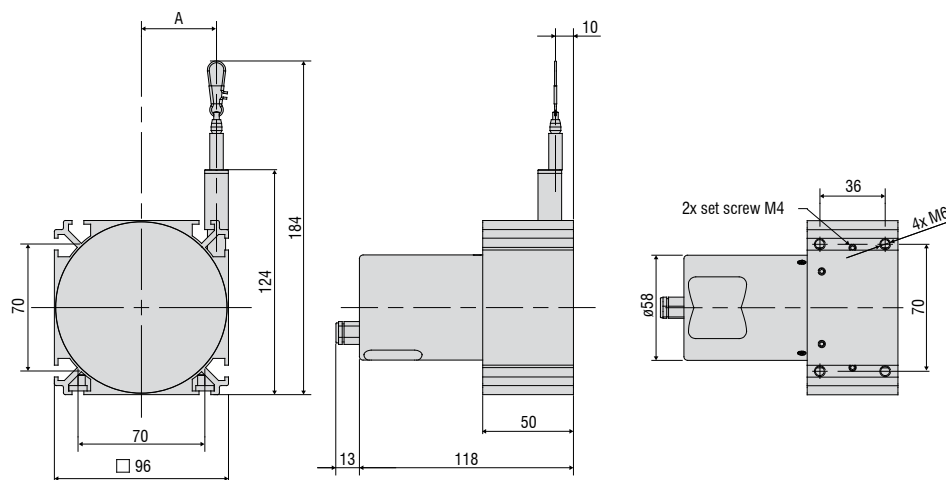
## Article description

| WDS -                 | 1000 - | P60 -     | CR -                                                                                                                               | TTL                                                                   |
|-----------------------|--------|-----------|------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
|                       |        |           |                                                                                                                                    | Output option:<br>HTL<br>TTL<br>CO: CANopen<br>PB: Profibus DP<br>SSI |
|                       |        |           | Connection:<br>SR (Output SSI): radial plug<br>CR (Output HTL, TTL): integrated cable, radial, 1m<br>BH (Output CO, PB): bus cover |                                                                       |
|                       |        | Model P60 |                                                                                                                                    |                                                                       |
| Measuring range in mm |        |           |                                                                                                                                    |                                                                       |

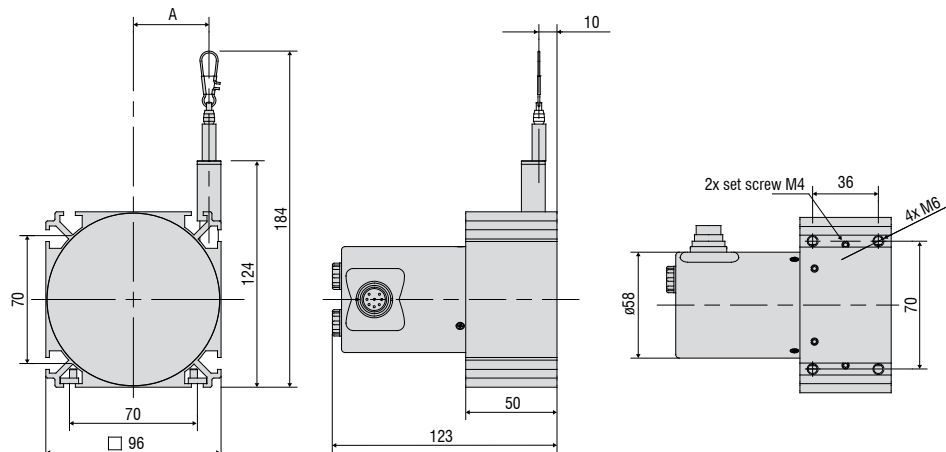


- Robust aluminum profile housing
- Customized versions for OEM
- Potentiometer, current and voltage output

Model P96 Output P



Model P96 Output U/I



| Model                       |           | WDS-2000-P96                               | WDS-2500-P96 |
|-----------------------------|-----------|--------------------------------------------|--------------|
| Output                      |           | P/U/I                                      |              |
| Measuring range             |           | 2000mm                                     | 2500mm       |
| Linearity                   | ±0.1% FSO | ±2.0mm                                     | ±2.5mm       |
| Resolution                  |           | towards infinity                           |              |
| Sensor element              |           | hybrid potentiometer                       |              |
| Temperature range           |           | -20 °C ... +80 °C                          |              |
| Material                    | housing   | aluminum                                   |              |
|                             | draw-wire | coated polyamide stainless steel (ø 0.8mm) |              |
| Sensor mounting             |           | slot nuts                                  |              |
| Wire mounting               |           | wire clip                                  |              |
| Wire acceleration           |           | 8g                                         |              |
| Wire retraction force (min) |           | 7.5N                                       | 5.5N         |
| Wire extension force (max)  |           | 11N                                        | 9N           |
| Protection class            |           | IP65 (only if connected)                   |              |
| Vibration                   |           | 20g, 20Hz - 2kHz                           |              |
| Mechanical shock            |           | 50g, 10ms                                  |              |
| Electrical connection       | P         | integrated cable, radial, 1m               |              |
|                             | U, I      | flange connector, axial, 8-pin DIN45326    |              |
| Weight                      |           | approx. 1.1kg                              |              |

FSO = Full Scale Output

Specifications for analog outputs on page 51.

## Article description

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

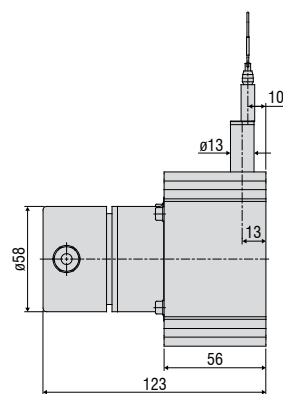
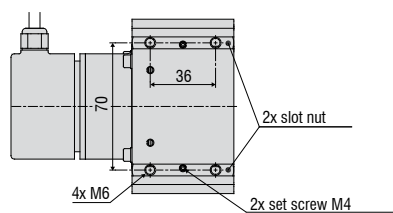
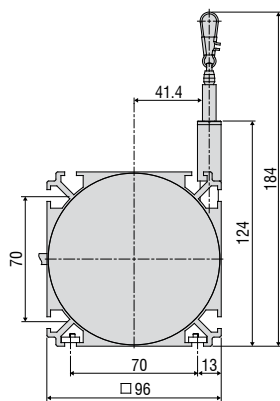


- Robust aluminum profile housing

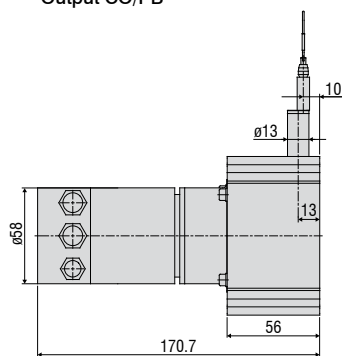
- Incremental/absolute encoder

Model P96

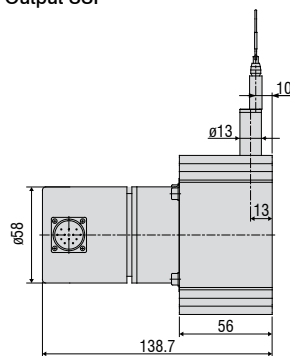
Output HTL/TTL



Output CO/PB



Output SSI



| Model                       |             | WDS-3000-P96                               |
|-----------------------------|-------------|--------------------------------------------|
| Output                      |             | HTL, TTL, SSI, PB, CO                      |
| Measuring range             |             | 3000mm                                     |
| Linearity                   | ±0.02% FSO  | ±0.6mm                                     |
| Resolution                  | HTL, TTL    | 0.087mm (11.53 pulses/mm)                  |
| Resolution                  | SSI, PB, CO | 0.032mm                                    |
| Sensor element              |             | incremental/absolute encoder               |
| Temperature range           |             | -20 °C ... +80 °C                          |
| Material                    | housing     | aluminum                                   |
|                             | draw-wire   | coated polyamide stainless steel (ø 0.8mm) |
| Sensor mounting             |             | slot nuts                                  |
| Wire mounting               |             | wire clip                                  |
| Wire acceleration           |             | 7g                                         |
| Wire retraction force (min) |             | 5.5N                                       |
| Wire extension force (max)  |             | 9N                                         |
| Protection class            |             | IP65 (only if connected)                   |
| Vibration                   |             | 20g, 20Hz - 2kHz                           |
| Mechanical shock            |             | 50g, 10ms                                  |
| Electrical connection       | HTL, TTL    | integrated cable, radial, 1m               |
|                             | SSI         | flange connector, radial, 12-pin           |
|                             | PB, CO      | bus cover                                  |
| Weight                      |             | approx. 1.7kg                              |

FSO = Full Scale Output

Specifications for digital outputs on page 52.

## Article description

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

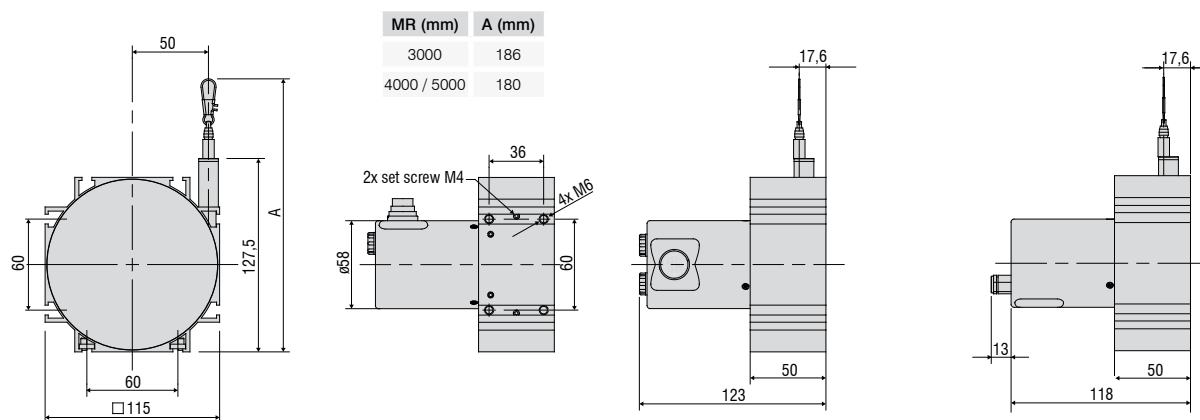


- Robust aluminum profile housing
- Customized versions for OEM
- Potentiometer, current and voltage output

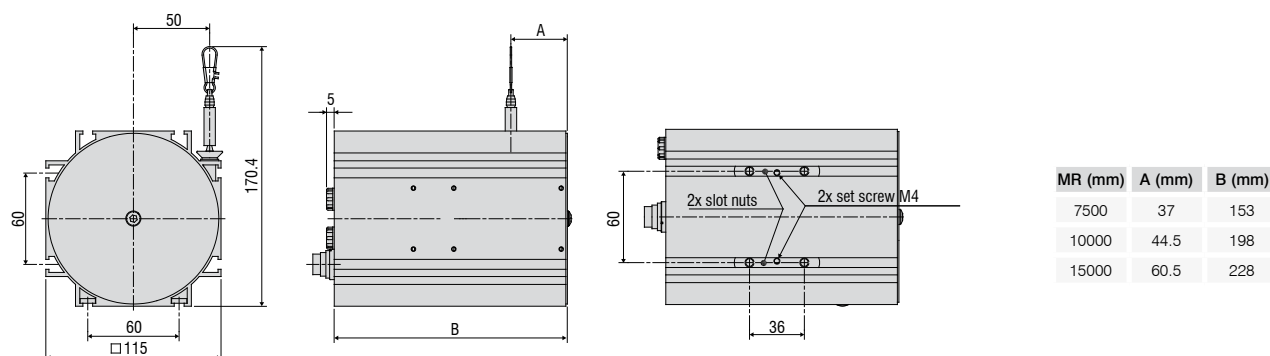
Model P115 (Measuring range 3000/4000/5000mm)

Output U/I

Output P



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



| 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                  |            | towards infinity                            |               |               |                                            |                |                |
| Sensor element              |            | hybrid potentiometer                        |               |               |                                            |                |                |
| Temperature range           |            | -20 °C ... +80 °C                           |               |               |                                            |                |                |
| Material                    | housing    | aluminum                                    |               |               |                                            |                |                |
|                             | draw-wire  | coated polyamide stainless steel (ø 0.45mm) |               |               | coated polyamide stainless steel (ø 1.0mm) |                |                |
| Sensor mounting             |            | slot nut                                    |               |               |                                            |                |                |
| Wire mounting               |            | wire clip                                   |               |               |                                            |                |                |
| Wire acceleration           |            | approx. 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            |            | IP65 (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                      |            | approx. 1.1kg                               |               |               | 2.2kg                                      | 3.2kg          | 3.5kg          |

FSO = Full Scale Output

Specifications for analog outputs on page 51.

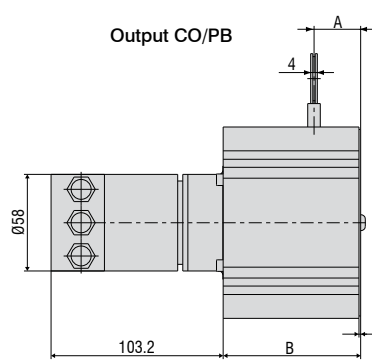
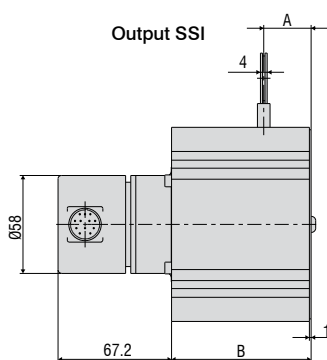
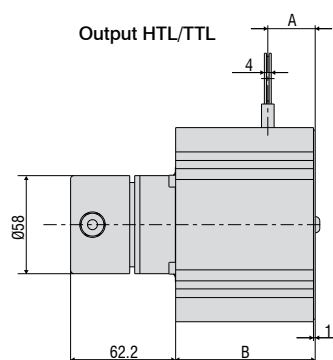
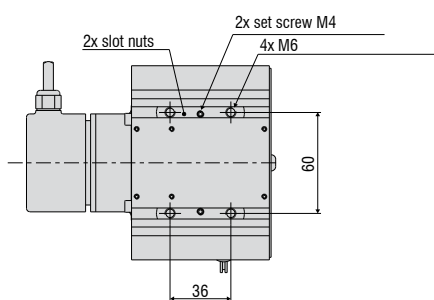
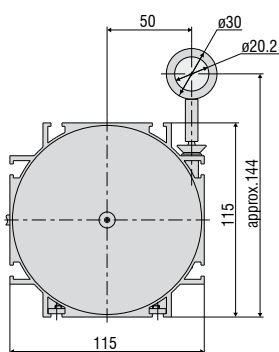
## Article description

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



- Robust aluminum profile housing
- Customized 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 °C ... +80 °C                          |               |                |                |
| Material                    | housing     | aluminum                                   |               |                |                |
|                             | draw-wire   | coated polyamide 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            |             | IP65 (only if connected)                   |               |                |                |
| Vibration                   |             | 20g, 20Hz - 2kHz                           |               |                |                |
| Mechanical shock            |             | 50g, 10ms                                  |               |                |                |
| Electrical connection       | HTL, TTL    | integrated cable, radial, 1m               |               |                |                |
|                             | SSI         | flange connector, radial, 12-pin           |               |                |                |
|                             | PB, CO      | bus cover                                  |               |                |                |
| Weight                      |             | approx. 2kg                                | approx. 2.5kg | approx. 3.5kg  | approx. 4.5kg  |

FSO = Full Scale Output

Specifications for digital outputs on page 52.

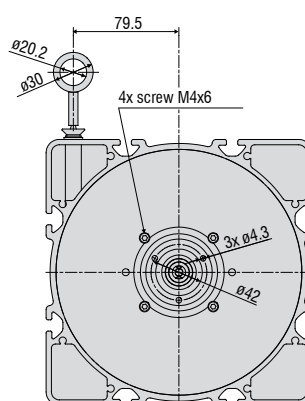
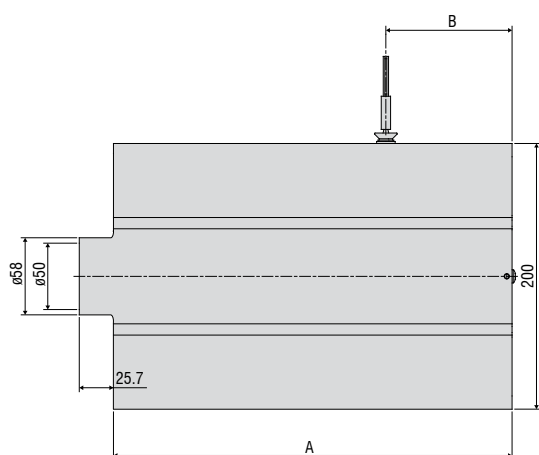
## Article description

| WDS - | 5000 - | P115 - | CR - | TTL                                                                                                                                |
|-------|--------|--------|------|------------------------------------------------------------------------------------------------------------------------------------|
|       |        |        |      | Output option:<br>HTL<br>TTL<br>CO: CANopen<br>PB: Profibus DP<br>SSI                                                              |
|       |        |        |      | Connection:<br>SR (Output SSI): radial plug<br>CR (Output HTL, TTL): integrated cable, radial, 1m<br>BH (Output CO, PB): bus cover |
|       |        |        |      | Model P115                                                                                                                         |
|       |        |        |      | Measuring range in mm                                                                                                              |



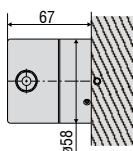
- Robust aluminum profile housing
- Customized versions for OEM
- Incremental/absolute encoder

Model P200

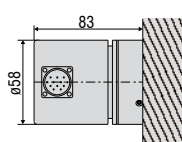


| MR (mm) | A (mm) | B (mm) |
|---------|--------|--------|
| 30000   | 268    | 75     |
| 40000   | 300    | 95     |
| 50000   | 333.5  | 95     |

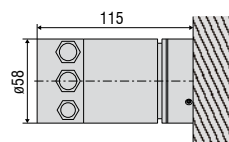
Output P200-HTL/TTL



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 °C ... +80 °C                          |                |                |
| Sensor element                |             | incremental/absolute encoder               |                |                |
| Material                      | housing     | aluminum                                   |                |                |
|                               | 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              |             | IP65                                       |                |                |
| Electrical connection         | HTL, TTL    | integrated cable, radial, 1m               |                |                |
|                               | SSI         | flange connector, radial, 12-pin           |                |                |
|                               | PB, CO      | bus cover                                  |                |                |
| Weight                        |             | approx. 10kg                               | approx. 11kg   | approx. 12kg   |

FSO = des Messbereichs

Specifications for digital outputs on page 52.

## Article description

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

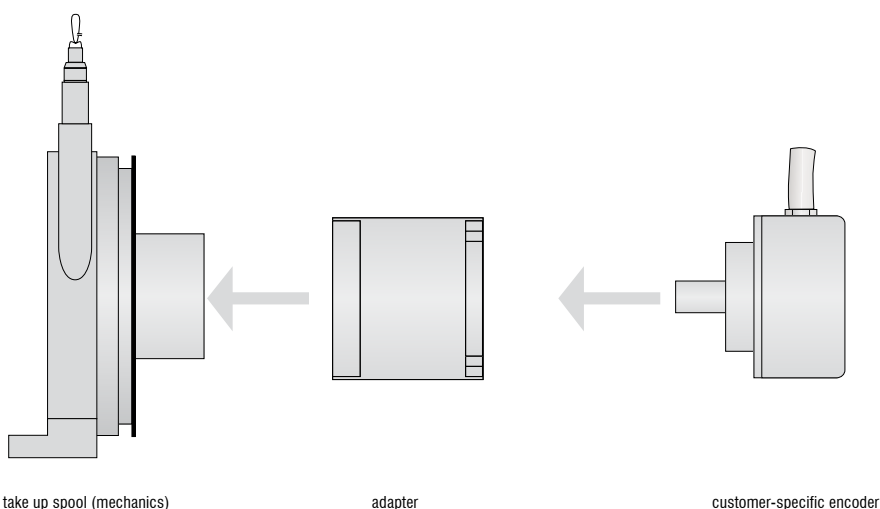


- Use almost any encoder
- Robust aluminum profile housing
- High quality sensor components

#### 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.

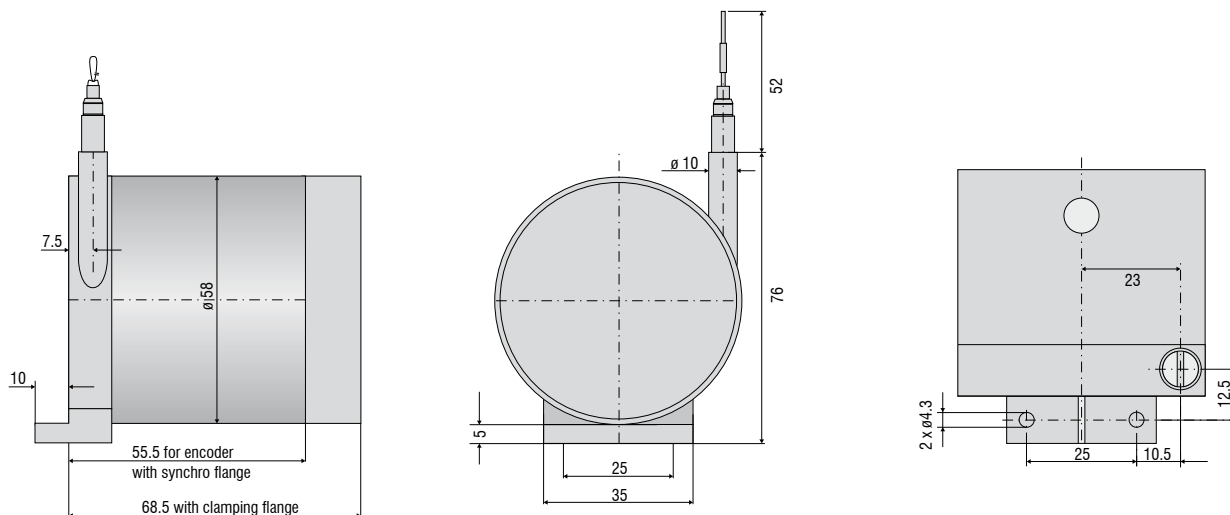
| Model                                               |                 | WDS-1500<br>Z60-M                | WDS-3000<br>P96-M    | WDS-5000<br>P115-M | WDS-7500<br>P115-M | WDS-10000<br>P115-M | WDS-15000<br>P115-M | WDS-30000<br>P200-M | WDS-40000<br>P200-M | WDS-50000<br>P200-M |
|-----------------------------------------------------|-----------------|----------------------------------|----------------------|--------------------|--------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Measuring range                                     |                 | 1500mm                           | 3000mm               | 5000mm             | 7500mm             | 10000mm             | 15000mm             | 30000mm             | 40000mm             | 50000mm             |
| Output                                              |                 | depends on encoder               |                      |                    |                    |                     |                     |                     |                     |                     |
| Linearity                                           | ±0.01% FSO      | -                                | -                    | -                  | -                  | ±1mm                | ±1.5mm              | ±3mm                | ±4mm                | ±5mm                |
|                                                     | ±0.02% FSO      | ±0.3mm                           | ±0.6mm               | ±1mm               | ±1.5mm             | -                   | -                   | -                   | -                   | -                   |
| Resolution                                          |                 | depends on encoder               |                      |                    |                    |                     |                     |                     |                     |                     |
| Travel per encoder revolution                       |                 | 150mm                            | 260.09mm             | 315.07mm           |                    |                     |                     | 500mm               |                     |                     |
| Suitable<br>adapter-flange<br>for encoder<br>ø 58mm | clamping flange | WDS-EAC 1                        | WDS-EAC<br>96/200    | WDS-EAC 115        |                    |                     |                     | WDS-EAC 96/200      |                     |                     |
|                                                     | synchro flange  | WDS-EAS 1                        | included in delivery |                    |                    |                     |                     |                     |                     |                     |
| Temperature<br>range                                | operation       | -20...+80 °C                     |                      |                    |                    |                     |                     |                     |                     |                     |
|                                                     | storage         | -40...+80 °C                     |                      |                    |                    |                     |                     |                     |                     |                     |
| Material                                            | housing         | aluminum                         |                      |                    |                    |                     |                     |                     |                     |                     |
|                                                     | draw-wire       | coated polyamide 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<br>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                                    |                 | depends on 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

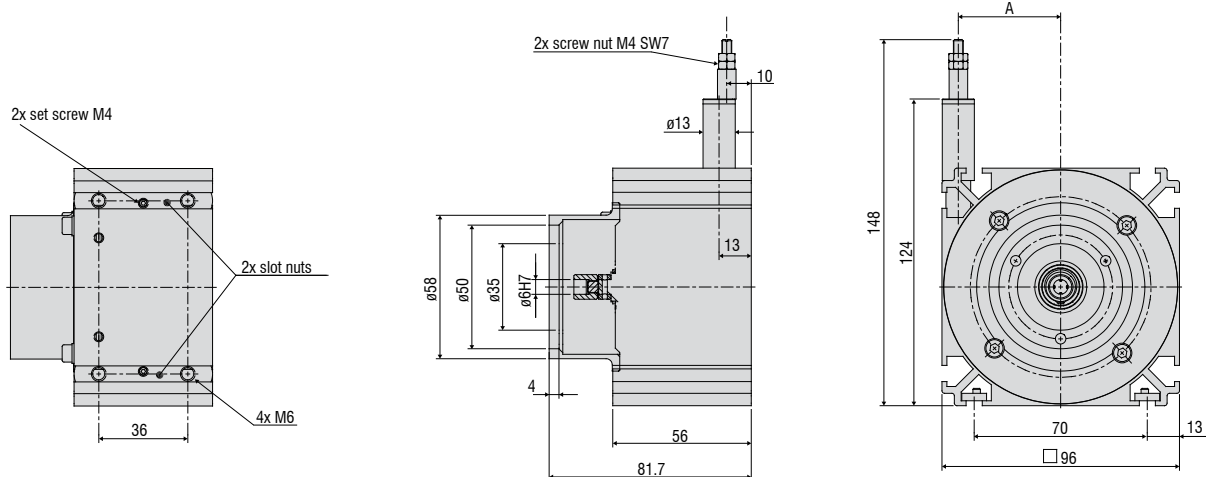
## Article description

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

Model Z60

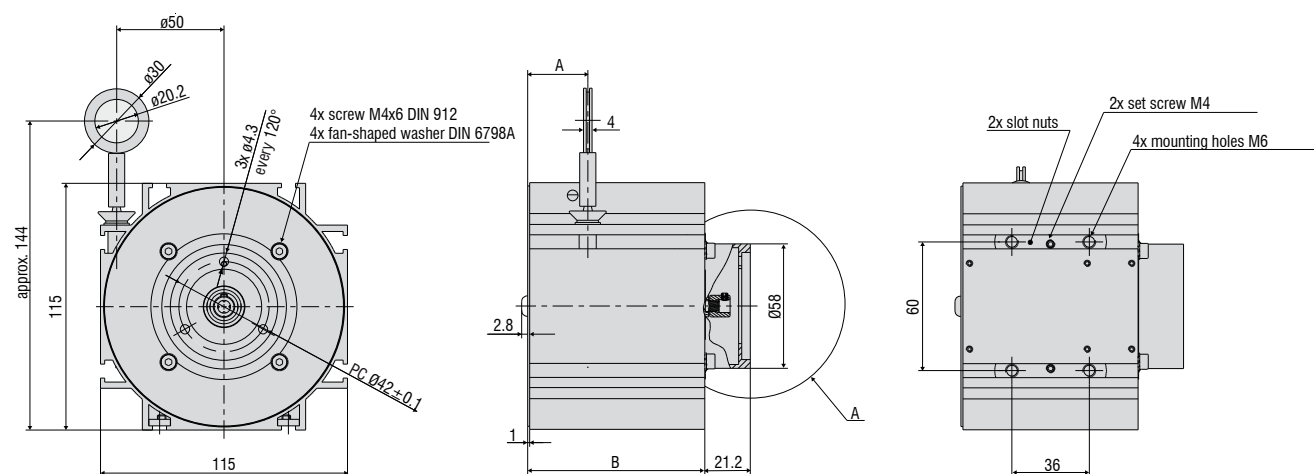


Model P96



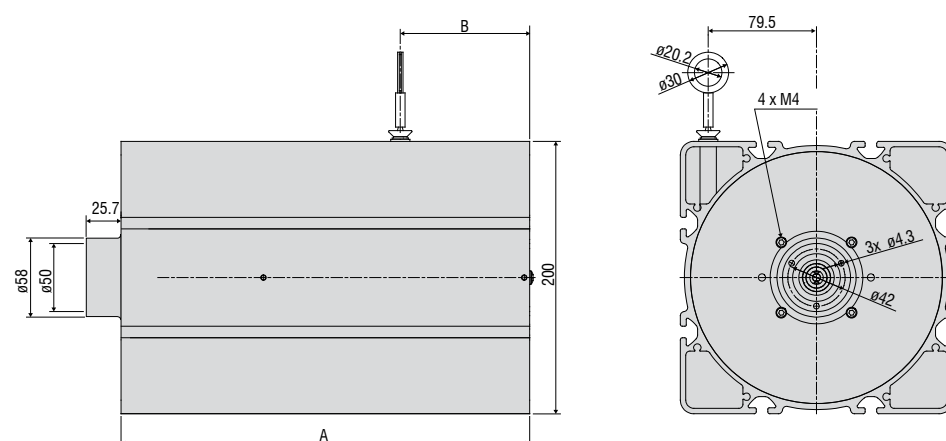
| MR (mm) | A (mm) |
|---------|--------|
| 2000    | 26     |
| 3000    | 41.5   |

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  |

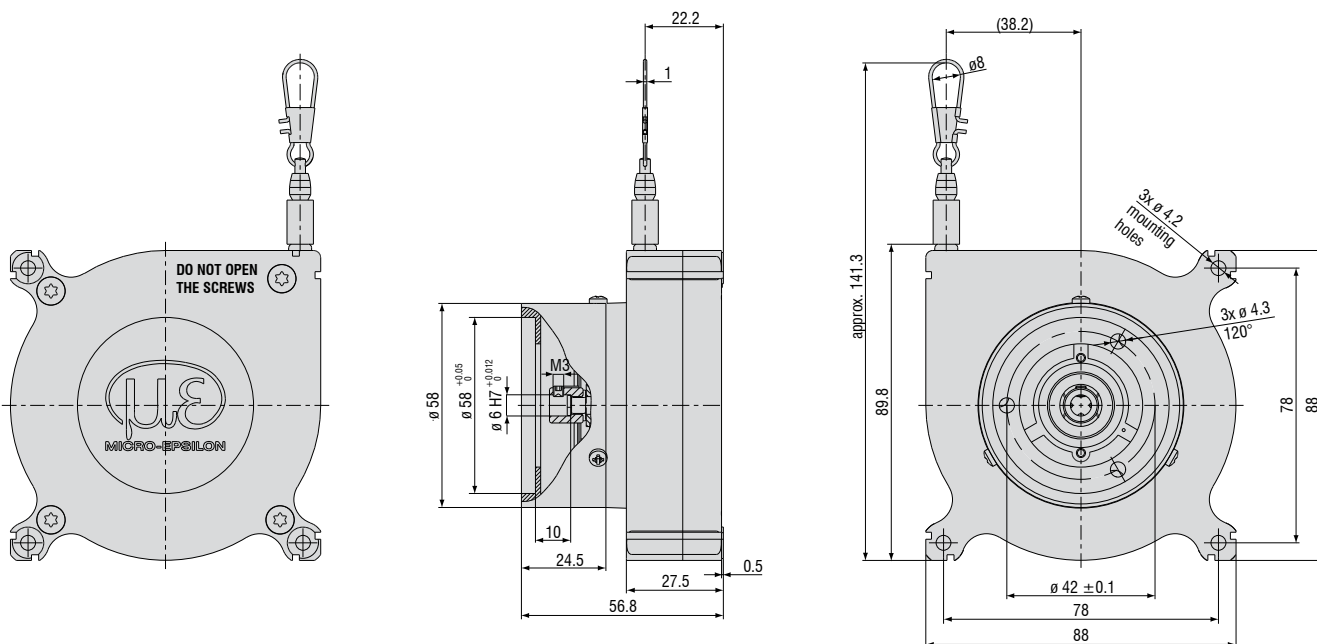
Model P200



| 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                        |           | depends on encoder                                                        |                                       |
| Linearity                     |           | $\pm 0.1\%$ FSO ( $\pm 2.3\text{mm}$ )                                    | $\pm 0.4\%$ FSO ( $\pm 20\text{mm}$ ) |
| Resolution                    |           | depends on 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 | $-40\text{ }^{\circ}\text{C} \dots +85\text{ }^{\circ}\text{C}$           |                                       |
|                               | storage   | $-40\text{ }^{\circ}\text{C} \dots +85\text{ }^{\circ}\text{C}$           |                                       |
|                               | housing   | PA 6 GF 30                                                                |                                       |
| Material                      |           | draw-wire                                                                 |                                       |
|                               |           | coated polyamide 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

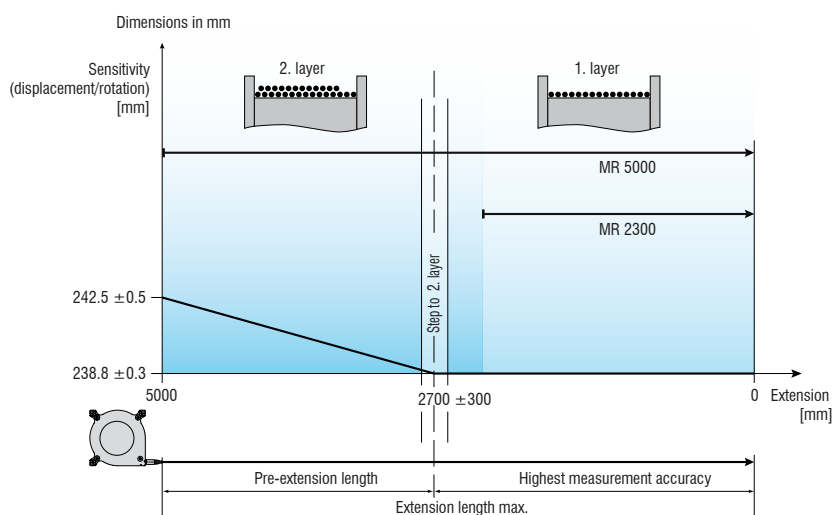
WPS - 5000 - MK88 - M

|                       |            |           |
|-----------------------|------------|-----------|
|                       |            | Mechanics |
|                       | Model MK88 |           |
| Measuring range in mm |            |           |

## Sensitivity characteristics MK88

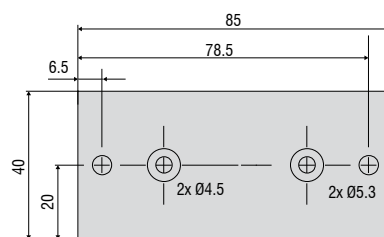
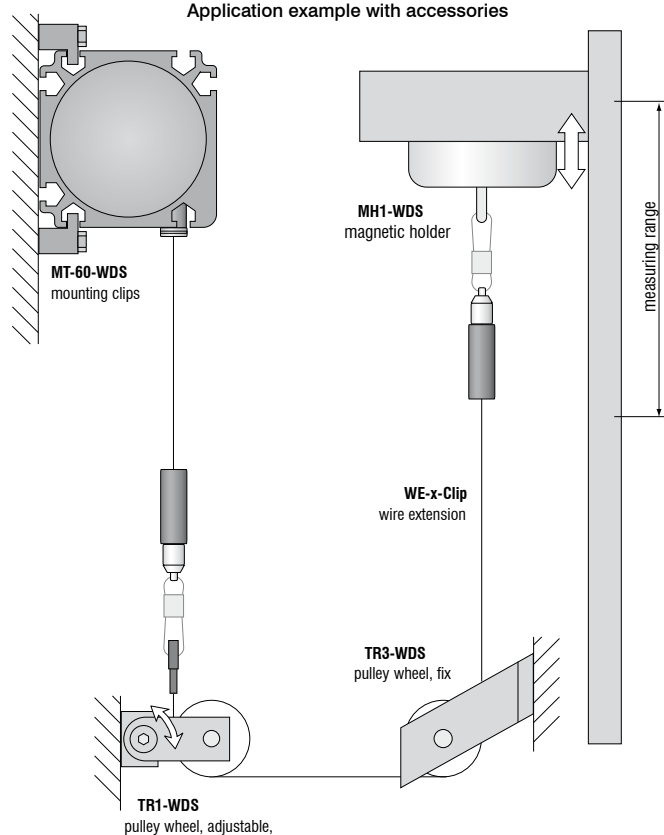
The WPS-2300-MK88-M is designed with only one wire layer which is wound onto the drum. This sensor design achieves the highest measurement accuracy.

If a reduced measurement accuracy is sufficient, larger measuring 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                                                                                  |

**Application example with accessories**

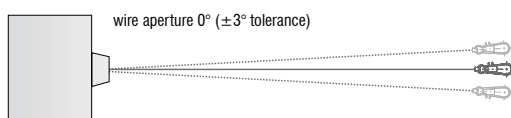
Mounting plate WDS-MP60

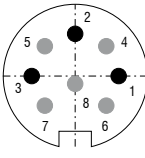
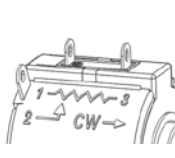
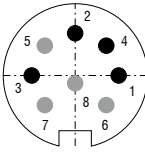
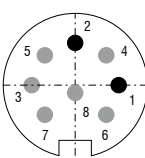
**Installation information:**

**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:**

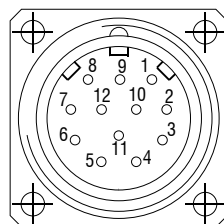
When mounting a draw-wire displacement sensor, a straight wire exit ( $\pm 3^\circ$  tolerance) must be taken into account. If this tolerance is exceeded, increased material wear on the wire and at the wire aperture must be expected.



| Output                                               |                                                 | Plug M16<br>-SA / -SR                                                                                                                                                   | Integrated cable<br>-CA / -CR                                                      | Open contacts                                                                                                                                                                                                               |
|------------------------------------------------------|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Potentiometric output (P)</b>                     |                                                 |  <p>sensor side</p> <p>1 = input +<br/>2 = grounding<br/>3 = signal</p>                | <p>white = input +<br/>brown = grounding<br/>green = signal</p>                    |   <p>1 = input +<br/>2 = signal<br/>3 = grounding</p> |
| Supply voltage                                       | max. 32VDC at 1kOhm / 1 Wmax                    |                                                                                                                                                                         |                                                                                    |                                                                                                                                                                                                                             |
| Resistance                                           | 1kOhm $\pm 10\%$ (potentiometer)                |                                                                                                                                                                         |                                                                                    |                                                                                                                                                                                                                             |
| Temperature coefficient                              | $\pm 0.0025\%$ FSO/ $^{\circ}\text{C}$          |                                                                                                                                                                         |                                                                                    |                                                                                                                                                                                                                             |
| <b>Voltage output (U)</b>                            |                                                 |  <p>sensor side</p> <p>1 = supply<br/>2 = grounding<br/>3 = signal<br/>4 = ground</p> | <p>white = supply<br/>brown = grounding<br/>green = signal<br/>yellow = ground</p> |                                                                                                                                                                                                                             |
| Supply voltage                                       | 14 ... 27VDC (non stabilized)                   |                                                                                                                                                                         |                                                                                    |                                                                                                                                                                                                                             |
| Current consumption                                  | max. 30mA                                       |                                                                                                                                                                         |                                                                                    |                                                                                                                                                                                                                             |
| Output voltage                                       | 0 ... 10VDC<br>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 61000-6-4<br>EN 61000-6-2                    |                                                                                                                                                                         |                                                                                    |                                                                                                                                                                                                                             |
| <b>Adjustment ranges</b> (if supported by the model) |                                                 |                                                                                                                                                                         |                                                                                    |                                                                                                                                                                                                                             |
| Zero                                                 | $\pm 20\%$ FSO                                  |                                                                                                                                                                         |                                                                                    |                                                                                                                                                                                                                             |
| Sensitivity                                          | $\pm 20\%$                                      |                                                                                                                                                                         |                                                                                    |                                                                                                                                                                                                                             |
| <b>Current Output (I)</b>                            |                                                 |  <p>sensor side</p> <p>1 = supply<br/>2 = grounding</p>                              | <p>white = supply<br/>brown = grounding</p>                                        |                                                                                                                                                                                                                             |
| Supply voltage                                       | 14 ... 27VDC (non stabilized)                   |                                                                                                                                                                         |                                                                                    |                                                                                                                                                                                                                             |
| Current consumption                                  | max. 35mA                                       |                                                                                                                                                                         |                                                                                    |                                                                                                                                                                                                                             |
| Output current                                       | 4 ... 20mA                                      |                                                                                                                                                                         |                                                                                    |                                                                                                                                                                                                                             |
| Load                                                 | $< 600\text{Ohm}$                               |                                                                                                                                                                         |                                                                                    |                                                                                                                                                                                                                             |
| Signal noise                                         | $< 1,6\text{ }\mu\text{A}_{\text{eff}}$         |                                                                                                                                                                         |                                                                                    |                                                                                                                                                                                                                             |
| Temperature coefficient                              | $\pm 0.01\%$ FSO/ $^{\circ}\text{C}$            |                                                                                                                                                                         |                                                                                    |                                                                                                                                                                                                                             |
| Electromagnetic compatibility (EMC)                  | EN 61000-6-4<br>EN 61000-6-2                    |                                                                                                                                                                         |                                                                                    |                                                                                                                                                                                                                             |
| <b>Adjustment range</b> (if supported by the model)  |                                                 |                                                                                                                                                                         |                                                                                    |                                                                                                                                                                                                                             |
| Zero                                                 | $\pm 18\%$ FSO                                  |                                                                                                                                                                         |                                                                                    |                                                                                                                                                                                                                             |
| Sensitivity                                          | $\pm 15\%$                                      |                                                                                                                                                                         |                                                                                    |                                                                                                                                                                                                                             |

| Contact description                 |                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 UB                                | Encoder power supply connection                                                                                                                                                                                                                                                                                                                                             |
| 2 GND                               | Encoder ground connection.<br>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<br>DATAVALID<br>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 color  | Assignment   |
| 1              | brown        | UB           |
| 2              | black        | GND          |
| 3              | blue         | Pulses +     |
| 4              | beige        | Data +       |
| 5              | green        | ZERO         |
| 6              | yellow       | Data -       |
| 7              | violet       | Pulses -     |
| 8              | brown/yellow | DATAVALID    |
| 9              | pink         | UP/ DOWN     |
| 10             | black/yellow | DATAVALID MT |
| 11             | -            | -            |
| 12             | -            | -            |



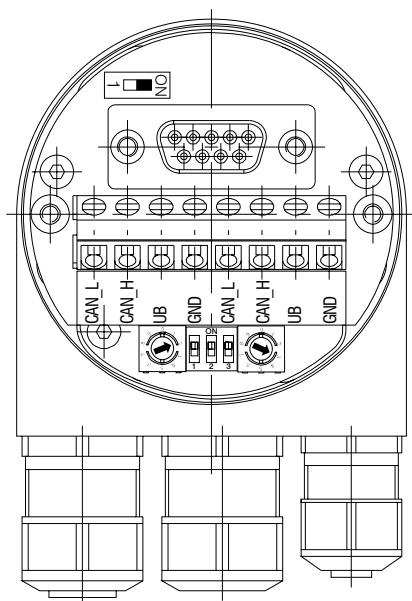
Please use leads twisted in pairs for extension cables.

| Inputs                                      |                                                                      |
|---------------------------------------------|----------------------------------------------------------------------|
| Control signals UP/DOWN and Zero            |                                                                      |
| Level High                                  | $> 0.7 \text{ UB}$                                                   |
| Level Low                                   | $< 0.3 \text{ UB}$                                                   |
| 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<br>(with SDO progr.) | <p>Polling Mode (asynch, via SDO)</p> <p>Cyclic Mode (asynch-cyclic) The encoder cyclically sends the current process actual value without a request by a master. The cycle time can be parameterized for values between 1 and 65535 ms.</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 parameterized so that the position value is not sent until after a defined number of synch telegrams.</p> <p>Acyclic Mode (synch-acyclic)</p> |
| Preset value                         | With the "Preset" parameter the encoder can be set to a desired actual process value that corresponds to the defined axis position of the system. The offset value between the encoder zero point and the mechanical zero point of the system is saved in the encoder.                                                                                                                                                                                                                                                                                                |
| Rotating direction                   | With the operating parameter the rotating direction in which the output code is to increase or decrease can be parameterized. Scaling The steps per revolution and the total revolution can be parameterized.                                                                                                                                                                                                                                                                                                                                                         |
| Scaling                              | The steps per revolution and the total revolution can be parameterized.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Diagnose                             | <p>The encoder supports the following error messages:</p> <ul style="list-style-type: none"> <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**

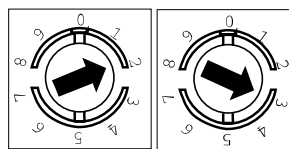
| Baud rate | Setting Dip Switch |     |     |
|-----------|--------------------|-----|-----|
|           | 1                  | 2   | 3   |
| 10kBit/s  | OFF                | OFF | OFF |
| 20kBit/s  | OFF                | OFF | ON  |
| 50kBit/s  | OFF                | ON  | OFF |
| 125kBit/s | OFF                | 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) |                                |

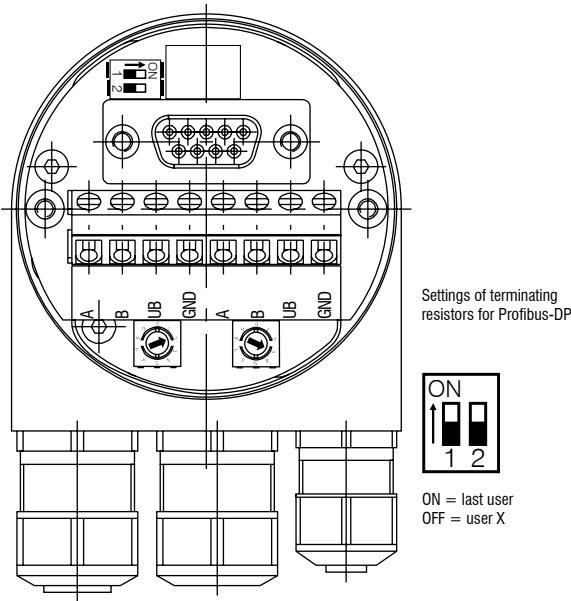
**Settings of user address for CANopen**

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



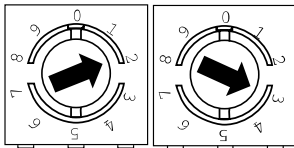
Profibus-DP features

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

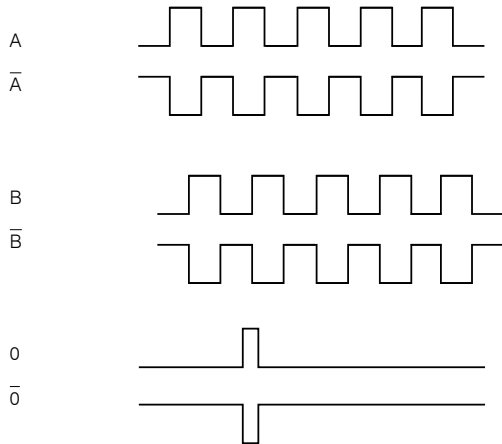
B Positive serial data line

UB Supply voltage 10...30VDC

GND Ground contact for UB

(Terminals with the same designation are internally interconnected)

## Signal output



| Output TTL | Linedriver (5 VDC)              |                  |
|------------|---------------------------------|------------------|
| Level High | $\geq 2.5V$                     | (with I = -20mA) |
| Pegel Low  | $\leq 0.5V$                     | (with I = 20mA)  |
| Load High  | $\leq 20mA$                     |                  |
| Output     | A, $\bar{A}$ , B, $\bar{B}$ , 0 |                  |

| Output TTL01/TTL02 | NPN (5 VDC $\pm 5\%$ )          |  |
|--------------------|---------------------------------|--|
| Level High         | $> 4.5V$                        |  |
| Level Low          | $< 1.0V$                        |  |
| Load High          | $\leq 3mA$                      |  |
| Output (TTL01)     | A, B, 0                         |  |
| Output (TTL02)     | A, $\bar{A}$ , B, $\bar{B}$ , 0 |  |

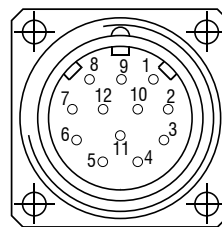
| Output HTL | Push-pull (10 ... 30 VDC)       |                  |
|------------|---------------------------------|------------------|
| Level High | $\geq UB - 3V$                  | (with I = -20mA) |
| Level Low  | $\leq 1.5V$                     | (with I = 20mA)  |
| Load High  | $\leq 40mA$  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

| Output E   | Push-pull ((5 VDC) |  |
|------------|--------------------|--|
| Level High | $\geq UB - 2.5V$   |  |
| Level Low  | $\leq 0.5V$        |  |
| Load High  | $\leq 50mA$        |  |
| Output     | A, B, 0            |  |

| Output E830 | Push-pull ((8 ... 30 VDC) |  |
|-------------|---------------------------|--|
| Level High  | $\geq UB - 3V$            |  |
| Level Low   | $\leq 2.5V$               |  |
| Load High   | $\leq 50mA$               |  |
| Output      | A, B, 0                   |  |

## Pin assignment TTL, HTL

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



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

## Connection assignment E, E830

| Cable color | Assignment |
|-------------|------------|
| white       | 0V         |
| brown       | +UB        |
| green       | A          |
| -           | $\bar{A}$  |
| yellow      | B          |
| -           | $\bar{B}$  |
| gray        | 0          |

## Connection assignment TTL01

| Cable color | Assignment |
|-------------|------------|
| brown       | 0V         |
| gray        | +UB        |
| white       | A          |
| green       | B          |
| yellow      | 0          |

## Connection assignment TTL02

| Cable color | Assignment |
|-------------|------------|
| red         | +UB        |
| black       | 0V         |
| brown       | A          |
| black       | $\bar{A}$  |
| orange      | B          |
| black       | $\bar{B}$  |
| yellow      | 0          |
| black       | n.c.       |

## High performance sensors made by Micro-Epsilon



Sensors and systems for displacement and position



Sensors and measurement devices for non-contact temperature measurement



2D/3D profile sensors (laser scanner)



Optical micrometers, fiber optic sensors and fiber optics



Color recognition sensors, LED analysers and color inline spectrometer



Measurement and inspection systems