MICRO-EPSILON

Operating Instructions

wireSENSOR WDS

WDS-XXXX-P60
WDS-XXXX-P96
WDS-XXXX-P115
WDS-XXXX-P200

For the mentioned products with article numbers .02“

Declaration of Incorporation

Declaration of incorporation according to the EC Machinery Directive 2006/42/EC, Annex II B

The manufacturer and person authorized to compile the relevant technical documents

MICRO-EPSILON MESSTECHNIK
GmbH & Co. KG
Königbacher Straße 15
94496 Ortenburg / Germany

hereby declare that the machine designated below complies with the relevant fundamental health and safety requirements of the EC Machinery Directive, including modifications to it applicable at the time of this declaration, based on its design and construction and in the version put on the market by us – to the extent that the scope of supply allows.

Machine design: Draw-wire sensor (mechanics and models with potentiometer output)
Type designation: WDS-xxx, WPS-xxx

The following fundamental health and safety requirements according to Annex I of the directive specified above have been applied and complied with:

- No. 1.1.2. Principles of safety integration
- No. 1.7.3. Marking of machinery
- No. 1.7.4. Operating instructions

Furthermore, we declare compliance with the following directives and standards including the modifications applicable at the time this declaration is made:

- Directive 2006/42/EC (machinery)
  - EN ISO 13857:2019 Safety of machinery - Safety distances to prevent hazard zones being reached by upper and lower limbs
  - EN 60204-1:2018 Safety of machinery - Electrical equipment of machines - Part 1: General requirements
- Directive 2011/65/EU (RoHS)
  - EN IEC 63000:2018 Technical documentation for the assessment of electrical and electronic devices with respect to the restriction of hazardous substances

We also declare that the special technical documentation for this partially completed machine has been created in accordance with Annex VII, Part B, and commit ourselves to disclose this to the market surveillance authorities upon request. The commissioning of these partially completed machines is prohibited until the partially completed machine(s) has/have been installed in a machine that meets the requirements of the EC Machinery Directive and for which an EU Declaration of Conformity according to Annex II, Part A exists.

Ortenburg, Germany
July 1, 2021

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Contents

1. Safety

1.1 Symbols Used

System operation assumes knowledge of the operating instructions.

The following symbols are used in these operating instructions:

⚠ CAUTION	Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.
NOTICE	Indicates a situation that may result in property damage if not avoided.
➪	Indicates a user action.
i	Indicates a tip for users.

1.2 Warnings

⚠ CAUTION

The supply voltage must not exceed the specified limits.
> Risk of injury

> Damage to or destruction of the sensor

Do not open the sensor housing.
> Risk of injury from pre-tensioned spring motor

Do not pull or loop the measuring wire around unprotected parts of the body.
> Risk of injury

Do not let the measuring wire rewind without control (snap back).
> Risk of injury due to whiplash of the measuring wire with wire clip / eyelet

> Destruction of the measuring wire and/or the sensor

Do not pull the measuring wire over measuring range.
> Risk of injury

> Destruction of the measuring wire and/or the sensor

NOTICE

Connect the power supply and the display/output device according to the safety regulations for electrical equipment.
> Damage to or destruction of the sensor

Avoid shocks and impacts to the sensor.
> Damage to or destruction of the sensor

1.3 Notes on CE Marking

For WDS draw-wire displacement sensors with voltage, current, digital or encoder outputs, the EU Directives 2014/30/EU, 2011/65/EU shall apply. In addition, the Machinery Directive is taken into consideration (2006/42/EC).

These sensors carry the CE mark and satisfy the requirements of the EU Directives cited and the European harmonized standards (EN) listed therein.

The EU Declaration of Conformity is available to the responsible authorities at:

MICRO-EPSILON MESSTECHNIK
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94496 Ortenburg / Germany

Draw-wire displacement sensors with potentiometer output are devices (components) which cannot be operated autonomously and do not carry a CE mark. For WDS draw-wire displacement sensors with potentiometer output, the directives 2006/42/EC and 2011/65/EU shall apply. Therefore, an EU Declaration of Conformity is not issued according to EMC law and the Machinery Directive. The Declaration of Incorporation shall apply.

Sources: EMVG (Electromagnetic Compatibility of Equipment law), guidelines on the application of Directive 2014/35/EU, Directive 2006/42/EC.

1.4 Intended Use

Draw-wire sensors are used for
- distance or displacement measuring
- position determination of components or moving machine parts.
- The sensors must only be operated within the limits specified in the technical data, see 2.
- Draw wire sensors must be used in such a way that no persons are endangered or machines and other material goods are damaged in the event of malfunction or total failure of the sensor.
- Take additional precautions for safety and damage prevention in case of safety-related applications.

1.5 Proper Environment

- Protection class ~~Sensor~~: IP65 [1]
- Temperature range:
  - Operation: -20 ... +80 °C (-4 ... +176 °F)
  - Storage: -20 ... +80 °C (-4 ... +176 °F)
- Humidity: 5 ... 95 % RH (non-condensing)
- Ambient pressure: Atmospheric pressure
- Vibration: According to DIN EN 60068-2-6
- Mechanischer Schock: According to DIN EN 60068-2-27

Note the slight power dissipation of the potentiometer above +40 °C (+104 °F)! (-0.15 W/10 K)

1.6 Foreseeable Misuse

Do not pull the measuring wire beyond the measuring range listed. This causes then wire to break and thus uncontrolled snapping of the measuring wire. Risk of injury.

Do not have sensor held by a second person while the measuring wire is pulled out. Risk of snapping and injury.

1) Models with male plug connection only with gasketed female plug

2. Functional Principle, Technical Data

2.1 Functional Principle

With the wire principle, a linear motion is transformed into a change in resistance by a rotation.

A measuring wire made of highly flexible stainless steel wires is wound onto a drum with the aid of a long life spring motor.

The winding drum is coupled axially with a
- multi-turn potentiometer (Type WDS - ... - Pxx- ... - P/U/I) respectively with an
- encoder (Type WDS - ... - Pxx - ... - E/A).

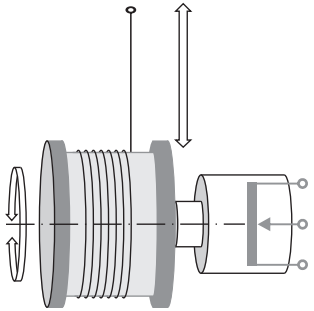


Fig. 1 Draw-wire sensor with potentiometer

2.2 Structure, Electrical Connection

The draw wire principle is used in the housing design P60, P96, P115 and P200 with different measuring lengths from 100 to 50,000 mm (3.93 to 1963.5 inches).

Five versions of the electrical connection are possible
- Potentiometer output (resistance divider)
- Voltage output (with integrated electronics)
- Current output (with integrated electronics)
- Incremental encoder (with integrated electronics, output: HTL, TTL)
- Absolute encoder (with integrated electronics, output: SSI, PROFINET, Profibus DP, CANopen, EtherNet/IP, EtherCAT)

Electrical connection

	Measuring range	
Output	up to 5,000 mm	up to 7,500 mm
P	CA	SA
U/I	SR	SA
HTL/TTL	CR	CR
SSI	SR	SR
PROFINET	BH	BH
Profibus DP	BH	BH
CANopen	BH	BH
EtherNet/IP	BH	BH
EtherCAT	BH	BH

2.3 Technical Data Model P60 Analog

Model		WDS	100-P60	150-P60	300-P60	500-P60	750-P60	1000-P60	1500-P60
Measuring range			100 mm	150 mm	300 mm	500 mm	750 mm	1000 mm	1500 mm
Analog output			Potentiometer, current, voltage						
Resolution			quasi infinite						
Linearity	Hybrid pot. P10	≤ ±0.1 % FSO	-	-	-	≤ +0.5 mm	≤ +0.75 mm	≤ +1 mm	≤ +1.5 mm
	Hybrid pot. P25	≤ ±0.25 % FSO	-	-	≤ +0.75 mm	-	-	-	-
	Conductive plastic pot. / Wire-wound-pot. P25	≤ ±0.5 % FSO	≤ +0.5 mm	≤ +0.75 mm	-	-	-	-	-
Sensor element			Conductive plastic / wire-wound-potentiometer		Hybrid potentiometer				
Wire extension force (max.)			approx. 7.5 N	approx. 5.5 N	approx. 7.5 N	approx. 7.5 N	approx. 5.5 N	approx. 7.5 N	approx. 5.5 N
Wire retraction force (min.)			approx. 6.5 N	approx. 4.5 N	approx. 6 N	approx. 6 N	approx. 4 N	approx. 5 N	approx. 3.5 N
Wire acceleration (max.)			approx. 10 - 15 g (depends on measuring range)						
Material	Housing		Aluminum						
	Measuring wire		Polyamide-coated stainless steel (Ø 0.45 mm)						
Wire mounting			Wire clip						
Mounting			Mounting nuts on sensor housing						
Tempera-ture range	Storage		-20 … +80 °C (-4 ... +176 °F)						
	Operation		-20 … +80 °C (-4 ... +176 °F)						
Connection	Potentiometer		Integrated cable, radial, length 1 m						
	Current, voltage		Pluggable cable via 8-pin flange connector (DIN45326), radial						
Shock (DIN-EN 60068-2-27)			50 g / 10 ms in 3 axes, 1000 shocks each						
Vibration (DIN-EN 60068-2-6)			20 g / 10 … 2000 Hz in 3 axes, 10 Zyklen each						
Protection class (DIN-EN 60529)			IP65 [1]						
Weight			approx. 370 g						

FSO = Full Scale Output

1) With plug version only when connected.

2.4 Technical Data Model P96 Analog

Model	WDS	2000-P96	2500-P96
Measuring range		2000 mm	2500 mm
Analog output		Potentiometer, current, voltage	
Resolution		quasi infinite	
Linearity	≤ ±0.1 % FSO	≤ ±2 mm	≤ ±2.5 mm
Sensor element		Hybrid potentiometer	
Wire extension force (max.)		approx. 11 N	approx. 9 N
Wire retraction force (min.)		approx. 7.5 N	approx. 5.5 N
Wire acceleration (max.)		ca. 8 g	
Material	Housing	Aluminum	
	Measuring wire	Polyamid-coated stainless steel (Ø 0.8 mm)	
Wire mounting		Wire clip	
Mounting		Mounting nuts on sensor housing	
Temperature range	Storage	-20 … +80 °C (-4 ... +176 °F)	
	Operation	-20 … +80 °C (-4 ... +176 °F)	
Connection	Potentiometer	Integrated cable, axial, length 1 m	
	Current, voltage	Pluggable cable via 8-pin flange connector (DIN45326), radial	
Shock (DIN-EN 60068-2-27)		50 g / 10 ms in 3 axes, 1000 shocks each	
Vibration (DIN-EN 60068-2-6)		20 g / 20 … 2000 Hz in 3 axes, 10 cycles each	
Protection class (DIN-EN 60529)		IP65 [1]	
Weight		approx. 1.1 kg	

FSO = Full Scale Output

1) With plug version only when connected.

2.5 Technical Data Model P115 Analog

Model	WDS	3000-P115	4000-P115	5000-P115	7500-P115	10000-P115	15000-P115
Measuring range		3000 mm	4000 mm	5000 mm	7500 mm	10000 mm	15000 mm
Analog output		Potentiometer, current, voltage					
Resolution		quasi infinite					
Linearity	≤ ±0.1 % FSO	≤ +3 mm	-	-	-	-	-
	≤ ±0.15 % FSO	-	≤ +6 mm	≤ +7.5 mm	≤ +11.3 mm-	≤ +15 mm	≤ +22.5 mm
Sensor element		Hybrid potentiometer					
Wire extension force (max.)		approx. 8 N	approx. 8.5 N	approx. 9 N	approx. 24 N	approx. 21 N	approx. 25 N
Wire retraction force (min.)		approx. 4 N	approx. 4 N	approx. 4 N	approx. 8 N	approx. 8 N	approx. 8 N
Wire acceleration (max.)		ca. 6 g					
Material	Housing	Aluminum					
	Measuring wire	Polyamide-coated stainless steel (Ø 0.45 mm)			Polyamide-coated stainless steel (Ø 1 mm)		
Wire mounting		Wire clip					
Mounting		Mounting nuts on sensor housing					
Temperature range	Storage	-20 … +80 °C (-4 ... +176 °F)					
	Operation	-20 … +80 °C (-4 ... +176 °F)					
Connection	Potentiometer	Integrated cable, axial, length 1 m					
	Current, voltage	Pluggable cable via 8-pin flange connector (DIN45326), radial					
Shock (DIN-EN 60068-2-27)		50 g / 10 ms in 3 axes, 1000 shocks each					
Vibration (DIN-EN 60068-2-6)		20 g / 20 … 2000 Hz in 3 axes, 10 cycles each					
Protection class (DIN-EN 60529)		IP65 [1]					
Weight		ca. 1.1 kg			ca. 2.2 kg	ca. 3.2 kg	ca. 3.5 kg

FSO = Full Scale Output

1) With plug version only when connected.

Models with potentiometric output WDS - .... - Pxx - CR - P

Electrical data

Supply voltage:	max. 32 VDC at 1 kOhm / max. 1 W
Resistance:	1 kOhm ±10 % (potentiometer)
Viper current:	≤ 3 mA
Temperature coefficient:	±0.0025 % FSO/K (±0.0014 % FSO/°F)
Sensitivity:	Depends on measuring range, individually reported on product label
Electrical connection:	Integral cable, radial, 3 wire, 1 m long

i Note the slight power dissipation of the potentiometer above +40 °C (+104 °F)! (-0.15 W/10 K)

Models with voltage output WDS - .... - Pxx - SR - U

Electrical data

Supply voltage:	14 ... 27 VDC non stabilized
Current consumption:	30 mA max.
Output voltage:	0 ... 10 VDC (Options: 0 - 5 / ±5 V)
Output current:	2 mA max.
Load impedance:	> 5 kOhm
Output noise:	0.5 mV_{eff}
Temperature coefficient:	±0.005 % FSO/K (±0.0028 % FSO/°F)

Adjustment ranges

Zero:	±20 % FSO
Sensitivity:	±20 %

Electromagnetic

Models with current output (2-wire) WDS - .... - Pxx - SR - I

Electrical data

Supply voltage:	14 ... 27 VDC non stabilized (measured on the input terminal of the sensor)
Current consumption:	35 mA max.
Output current:	4 ... 20 mA
Load:	< 600 Ohm
Temperature coefficient:	±0.01 % FSO/K (±0.005 % FSO/°F)
Output noise:	< 1.6 μA_{eff}

Adjustment ranges

Zero:	±18 % FSO
Sensitivity:	±15 %

2.6 Technical Data Model P60 Digital

Model	WDS	1000-P60	1500-P60
Measuring range		1000 mm	1500 mm
Digital interface		PROFINET, Profibus DP, CANopen, EtherNet/IP, EtherCAT	
Digital output		HTL, TTL, SSI	
Resolution	HTL, TTL	0.067 mm (15 pulse/mm)	0.1 mm (10 pulse/mm)
	SSI, PROFINET, Profibus DP, CANopen, EtherNet/IP, EtherCAT	0.012 mm	0.018 mm
Linearity	≤ ±0.02 % FSO	≤ ±0.2 mm	≤ ± 0.3 mm
Sensor element		Incremental / absolute encoder	
Wire extension force (max.)		approx. 7.5 N	approx. 5.5 N
Wire retraction force (min.)		approx. 5 N	approx. 3.5 N
Wire acceleration (max.)		approx. 10 g	approx. 15 g
Material	Housing	Aluminum	
	Measuring wire	Polyamid-coated stainless steel (Ø 0.45 mm)	
Wire mounting		Wire clip	
Mounting		Mounting nuts on sensor housing	
Tempera-ture range	Storage	-20 … +80 °C (-4 ... +176 °F)	
	Operation	-20 … +80 °C (-4 ... +176 °F)	
Connection	HTL, TTL	Integrated cable, radial, length 1 m	
	SSI	12-pin flange connector, radial	
	PROFINET, Profibus DP, CANopen, EtherNet/IP, EtherCAT	Bus cover	
Shock (DIN-EN 60068-2-27)		50 g / 10 ms in 3 axes, 1000 shocks each	
Vibration (DIN-EN 60068-2-6)		20 g / 10 … 2000 Hz in 3 axes, 10 cycles each	
Protection class (DIN-EN 60529)		IP65 [1]	
Weight		approx. 1 kg	

FSO = Full Scale Output
1) With plug version only when connected.

2.7 Technical Data Model P96 Digital

Model	WDS	3000-P96
Measuring range		3000 mm
Digital interface		PROFINET, Profibus DP, CANopen, EtherNet/IP, EtherCAT
Digital output		HTL, TTL, SSI
Resolution	HTL, TTL	0.087 mm (11.53 pulse/mm)
	SSI, PROFINET, Profibus DP, CANopen, EtherNet/IP, EtherCAT	0.032 mm
Linearity	≤ ±0.02 % FSO	≤ ±0.6 mm
Sensor element		Incremental / absolute encoder
Wire extension force (max.)		approx. 11 N
Wire retraction force (min.)		approx. 7.5 N
Wire acceleration (max.)		approx. 8 g
Material		Aluminum
		Polyamid-coated stainless steel (Ø 0,8 mm)
Wire mounting		Wire clip
Mounting		Mounting nuts on sensor housing
Temperature range	Storage	-20 … +80 °C (-4 ... +176 °F)
	Operation	-20 … +80 °C (-4 ... +176 °F)
Connection	HTL, TTL	Integrated cable, radial, length 1 m
	SSI	12-pin flange connector, radial
	PROFINET, Profibus DP, CANopen, EtherNet/IP, EtherCAT	Bus cover
Shock (DIN-EN 60068-2-27)		50 g / 10 ms in 3 axes, 1000 shocks each
Vibration (DIN-EN 60068-2-6)		20 g / 20 … 2000 Hz in 3 axes, 10 cycles each
Protection class (DIN-EN 60529)		IP65 [1]
Weight		approx. 1.7 kg

FSO = Full Scale Output
1) With plug version only when connected.

2.8 Technical Data Model P115 Digital

Model	WDS	5000-P115	7500-P115	10000-P115	15000-P115
Measuring range		5000 mm	7500 mm	10000 mm	15000 mm
Digital interface		PROFINET, Profibus DP, CANopen, EtherNet/IP, EtherCAT			
Digital output		HTL, TTL, SSI			
Resolution	HTL, TTL	0.105 mm (9.52 pulse/mm)			
	SSI, PROFINET, Profibus DP, CANopen, EtherNet/IP, EtherCAT	0.038 mm			
Linearity	≤ ±0.01 % FSO	-	-	≤ ±1 mm	≤ ±1.5 mm
	≤ ±0.02 % FSO	≤ ±1 mm	≤ ±1.5 mm	-	-
Sensor element		Incremental / absolute encoder			
Wire extension force (max.)		approx. 16 N	approx. 24 N	approx. 21 N	approx. 25 N
Wire extension force (min.)		approx. 4 N	approx. 8 N	approx. 8 N	approx. 8 N
Wire acceleration (max.)		approx. 5 g	approx. 6 g	approx. 3 g	approx. 3 g
Material	Housing	Aluminum			
	Measuring wire	Polyamid-coated stainless steel (Ø 1 mm)			
Wire mounting		Eyelet (Ø 20.2 mm)			
Mounting		Mounting nuts on sensor housing			
Temperature range	Storage	-20 … +80 °C (-4 ... +176 °F)			
	Operation	-20 … +80 °C (-4 ... +176 °F)			
Connection	HTL, TTL	Integrated cable, radial, length 1 m			
	SSI	12-pin flange connector, radial			
	PROFINET, Profibus DP, CANopen, EtherNet/IP, EtherCAT	Bus cover			
Shock (DIN-EN 60068-2-27)		50 g / 10 ms in 3 axes, 1000 shocks each			
Vibration (DIN-EN 60068-2-6)		20 g / 20 … 2000 Hz in 3 axes, 10 cycles each			
Protection class (DIN-EN 60529)		IP65 [1]			
Weight		approx. 2 kg	approx. 2.5 kg	approx. 3.5 kg	approx. 4.5 kg

FSO = Full Scale Output

1) With plug version only when connected.

2.9 Technical Data Model P200 Digital

Model	WDS	30000-P200	40000-P200	50000-P200
Measuring range		30000 mm	40000 mm	50000 mm
Digital interface		PROFINET, Profibus DP, CANopen, EtherNet/IP, EtherCAT		
Digital output		HTL, TTL, SSI		
Resolution	HTL, TTL	0.167 mm (6 pulse/mm)		
	SSI, PROFINET Profibus DP, CANopen, EtherNet/IP, EtherCAT	0.061 mm		
Linearity	≤ ±0.01 % FSO	≤ ±3 mm	≤ ±4 mm	≤ ±5 mm
Sensor element		Incremental / absolute encoder		
Wire extension force (max.)		approx. 22 N	approx. 22 N	approx. 24 N
Wire retraction force (min.)		approx. 12 N	approx. 11 N	approx. 11 N
Wire acceleration (max.)		approx. 2 g		
Material	Housing	Aluminum		
	Measuring wire	Polyamid-coated stainless steel (Ø 0.8 mm)		
Wire mounting		Eyelet (Ø 20.2 mm)		
Mounting		Mounting nuts on sensor housing		
Temperature range	Storage	-20 … +80 °C (-4 ... +176 °F)		
	Operation	-20 … +80 °C (-4 ... +176 °F)		
Connection	HTL, TTL	Integrated cable, radial, length 1 m		
	SSI	12-pin flange connector, radial		
	PROFINET, Profibus DP, CANopen, EtherNet/IP, EtherCAT	Bus cover		
Shock (DIN-EN 60068-2-27)		50 g / 10 ms in 3 axes, 1000 shocks each		
Vibration (DIN-EN 60068-2-6)		20 g / 20 … 2000 Hz in 3 axes, 10 cycles each		
Protection class (DIN-EN 60529)		IP65 [1]		
Weight		approx. 10 kg	approx. 11 kg	approx. 12 kg

FSO = Full Scale Output 1) With plug version only when connected.

3. Delivery

3.1 Unpacking/Included in Delivery

1 Sensor

1x 8-pole cable connector

1 Assembly Instructions

- Do not remove draw-wire displacement sensors from packaging using the measuring wire, the wire clip or the eyelet.
- Transport them in such a way that they cannot be damaged.
- Check the delivery for completeness and shipping damage immediately after unpacking.
- If there is damage or parts are missing, immediately contact the manufacturer or supplier.

i The transport lock of the measuring wire must only be removed immediately prior to installation and only by technical staff.

Optional accessories are listed in the appendix, see A 1.

3.2 Storage

⚠ CAUTION

Store sensors solely with the transport lock installed. This prevents the measuring wire from ever being pulled out and intentional snapping.
> Risk of injury due to whiplash of the wire, the wire clip or the eyelet

Temperature range (storage): -20 ... +80 °C (-4 ... +176 °F)

Humidity: 5 ... 95 % RH (non-condensing)

Atmospheric pressure

⚠ CAUTION

Free return of measuring wire not permitted!

> Risk of injury due to whiplash of the wire with wire clip or eyelet

> Destruction of the wire and/or the sensor.

Secure the measuring wire during installation work.

4. Installation and Mounting

4.1 Precautions

Do not pull out the measuring wire beyond the measuring range listed

> Damage to or destruction of the sensor

Do not damage the measuring wire.

Do not oil or grease the measuring wire.

Do not kink the measuring wire

Do not pull the measuring wire diagonally

Do not let the measuring wire drag around objects.

Attach the measuring wire to the measured object while the wire is retracted.

Do not wrap the measuring wire around body parts.

4.2 Sensor Assembly

- Mount the sensor through mounting grooves for nut M4 DIN 934 or bolt M4 DIN 931, see Fig. 1 et seq.
- Mount the sensor through mounting clamps MT60-WDS, see Fig. 44.

The sensor does not have to be oriented in a special way.

➡ Select the installation position in such a way that damage to or contamination of the measuring wire is avoided.

i If possible, prefer an installation position in which the measuring wire exits downward.
This prevents liquids from entering the measuring wire outlet.

i Do not let the measuring wire snap!
There is no liability for material defects in case of damage due to snapping.

⚠ CAUTION

If a measuring wire is stretched in the area where operating personnel is located, injuries may occur.

NOTICE

Do not twist the measuring wire.

4.3 Dimensional Drawings

4.3.1 wireSENSOR WDS P60 Analog

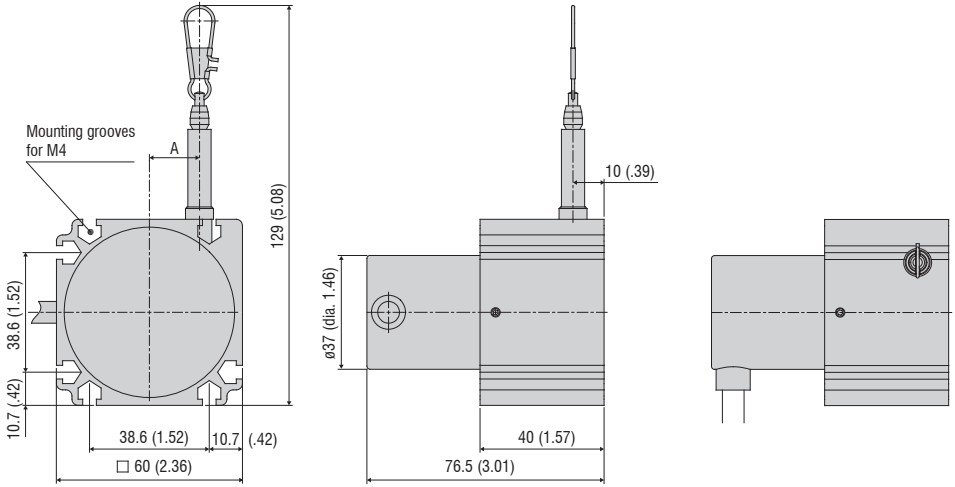


Fig. 2 Dimensional drawing WDS- ... - P60 - CR - P, dimensions in mm (inches, rounded-off)

Measuring range (mm)	A (mm)
100 / 300 / 500 / 1000	approx. 16.15 (.64)
150 / 750 / 1500	approx. 24.2 (.95)

⚠ CAUTION

If a measuring wire is stretched in the area where operating personnel is located, injuries may occur.

NOTICE

Do not twist the measuring wire.

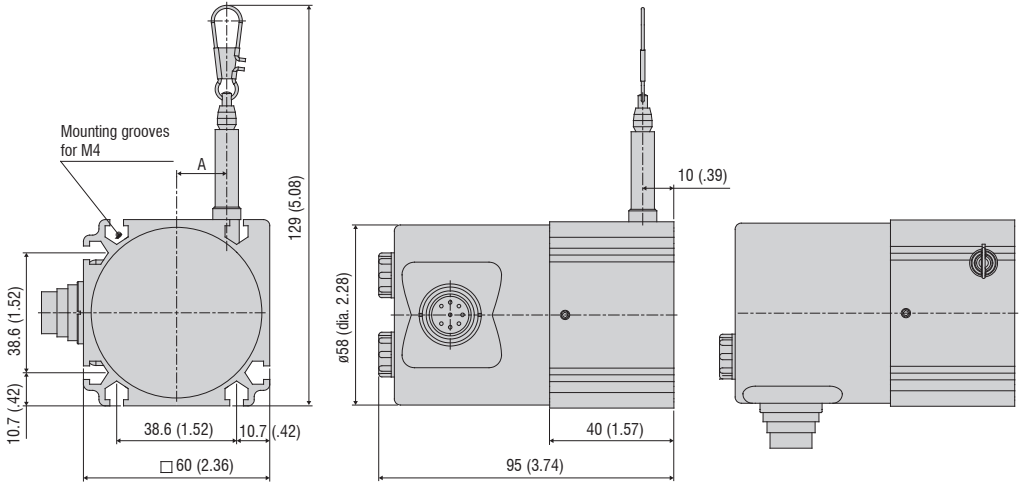


Fig. 3 Dimensional drawing WDS- ... - P60 - SR - U/I, dimensions in mm (inches, rounded-off)

Measuring range (mm)	A (mm)
100 / 300 / 500 / 1000	approx. 16.15 (.64)
150 / 750 / 1500	approx. 24.2 (.95)

⚠ CAUTION

If a measuring wire is stretched in the area where operating personnel is located, injuries may occur.

NOTICE

Do not twist the measuring wire.

4.3.2 wireSENSOR WDS P60 Digital

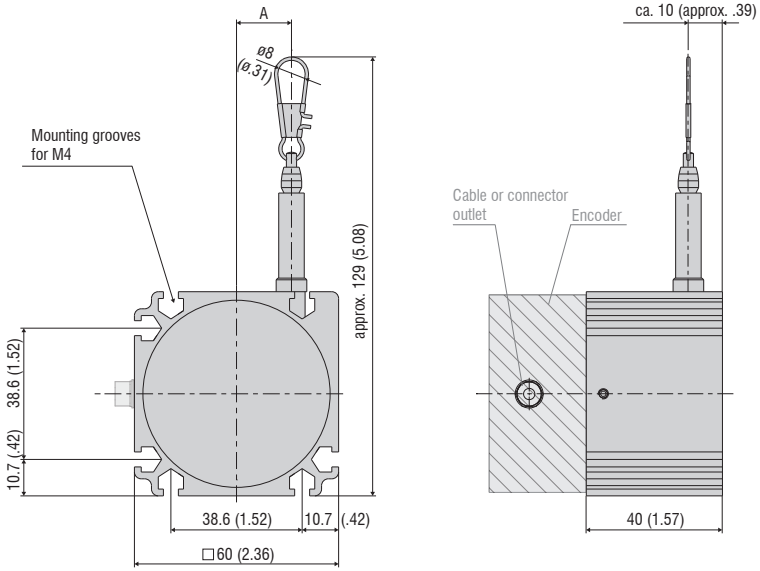


Fig. 4 Dimensional drawings WDS- ... - P60 - XX - XXX, dimensions in mm (inches, rounded-off)

Measuring range (mm)	A (mm)
1000	approx. 16.15 (.64)
1500	approx. 24.2 (.95)

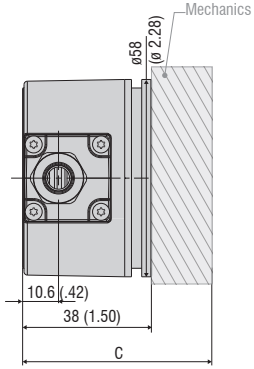


Fig. 5 Dimensional drawing WDS- ... - P60 - CR - HTL/TTL

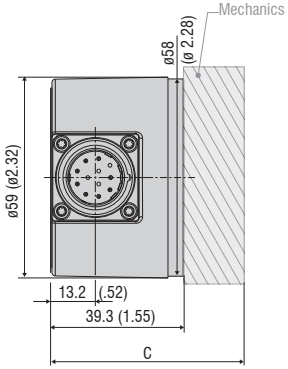


Fig. 6 Dimensional drawing WDS- ... - P60 - SR - SSI

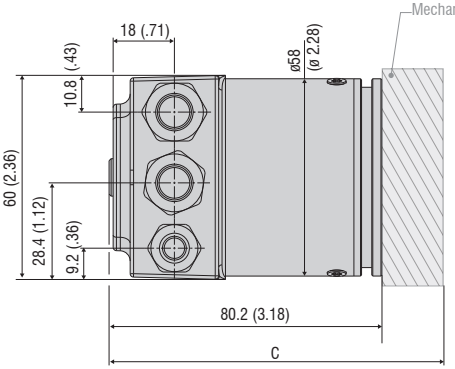


Fig. 7 Dimensional drawing WDS- ... - P60 - BH - CO/PB

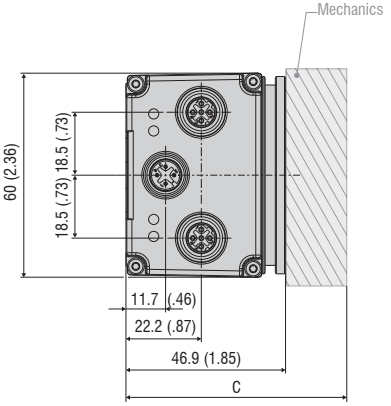


Fig. 8 Dimensional drawing WDS- ... - P60 - BH - PN/ENIP/CAT

Dimensions in mm (inches, rounded-off)

Total length mechanics + encoder (C)				
Output	HTL/TTL	SSI	CO/PB	PN/ENIP/CAT
C (mm)	78 (3.07)	79.3 (3.12)	120.3 (4.74)	86.9 (3.42)

⚠ CAUTION

If a measuring wire is stretched in the area where operating personnel is located, injuries may occur.

NOTICE

Do not twist the measuring wire.

4.3.3 wireSENSOR WDS P96 Analog

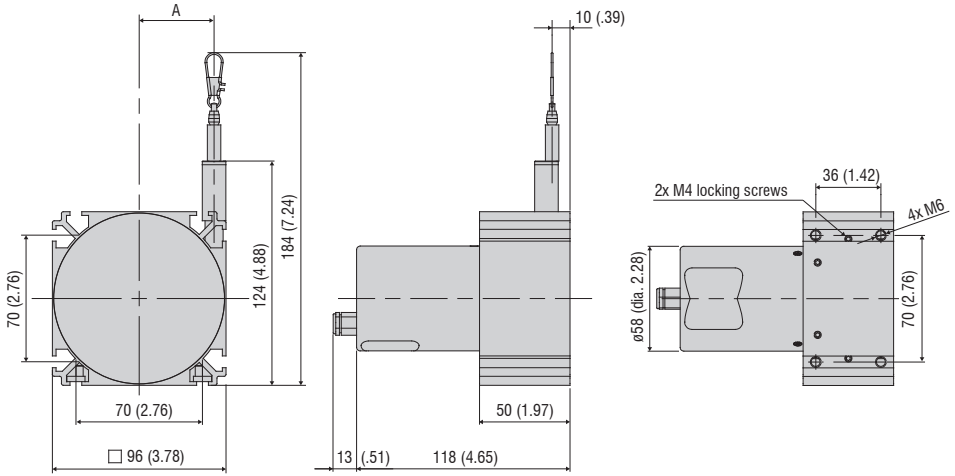


Fig. 9 Dimensional drawing WDS- ... - P96 - CA - P, dimensions in mm (inches, rounded-off)

Measuring range (mm)	A (mm)
2000	approx. 32 (1.26)
2500	approx. 41.4 (1.63)

⚠ CAUTION

If a measuring wire is stretched in the area where operating personnel is located, injuries may occur.

NOTICE

Do not twist the measuring wire.

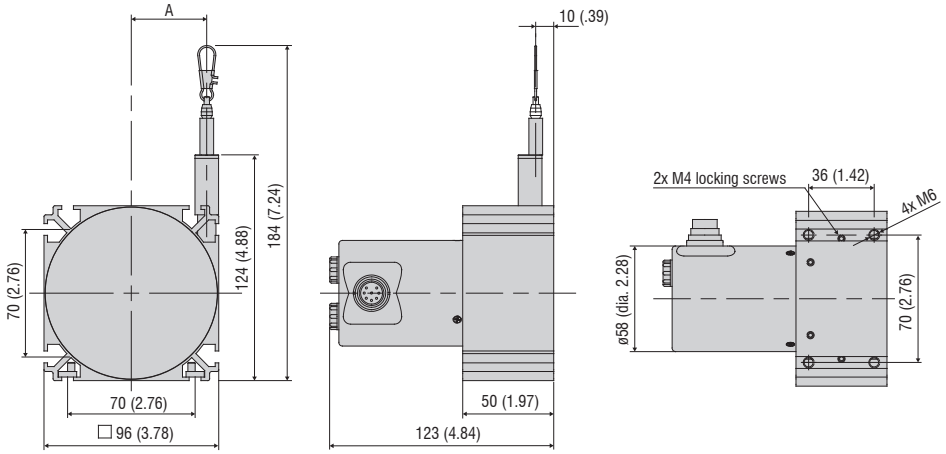


Fig. 10 Dimensional drawing WDS- ... - P96 - SR - U/I, dimensions in mm (inches, rounded-off)

Measuring range (mm)	A (mm)
2000	approx. 32 (1.26)
2500	approx. 41.4 (1.63)

4.3.4 wireSENSOR WDS P96 Digital

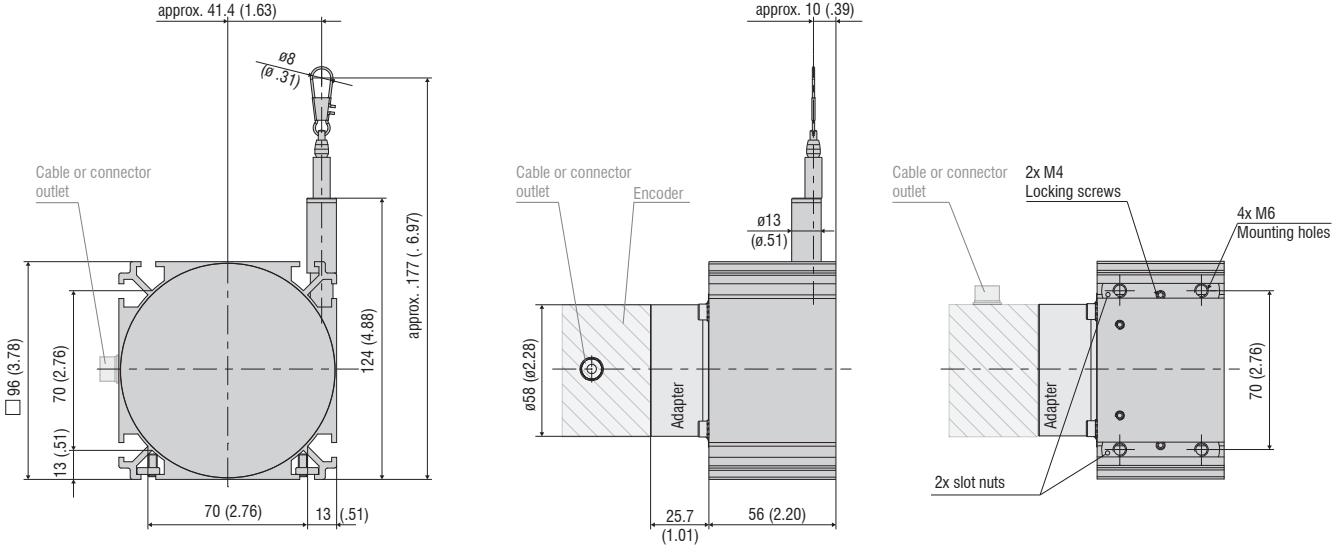


Fig. 11 Dimensional drawing WDS- 3000 - P96 - XX - XXX, dimensions in mm (inches, rounded-off)

⚠ CAUTION

If a measuring wire is stretched in the area where operating personnel is located, injuries may occur.

NOTICE

Do not twist the measuring wire.

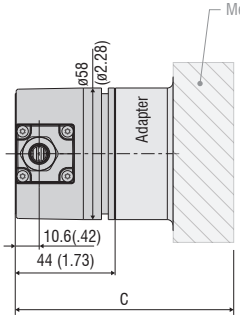


Fig. 12 Dimensional drawing WDS- ... - P96- CR - HTL/TTL

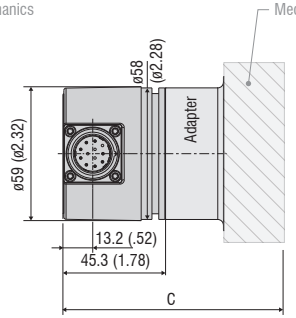


Fig. 13 Dimensional drawing WDS- ... - P96 - SR - SSI

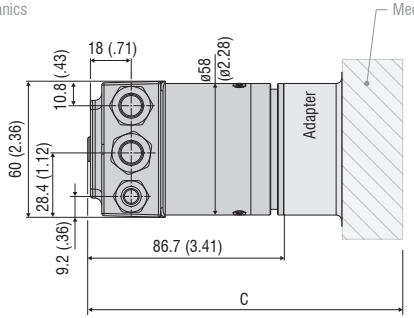


Fig. 14 Dimensional drawing WDS- ... - P96 - BH - CO/PB

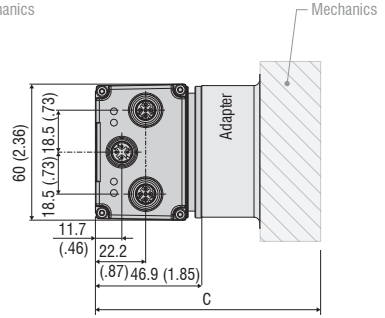


Fig. 15 Dimensional drawing WDS- ... - P96 - BH - PN/ENIP/CAT

Dimensions in mm (inches, rounded-off)

Total length mechanics + encoder (C)				
Output	HTL/TTL	SSI	CO/PB/ PN/ENIP/CA	PN/ENIP/CAT
C (mm)	125.7 (4.95)	127 (5.0)	168.4 (6.63)	128.6 (5.06)

⚠ CAUTION

If a measuring wire is stretched in the area where operating personnel is located, injuries may occur.

NOTICE

Do not twist the measuring wire.

4.3.5 wireSENSOR WDS P115 Analog

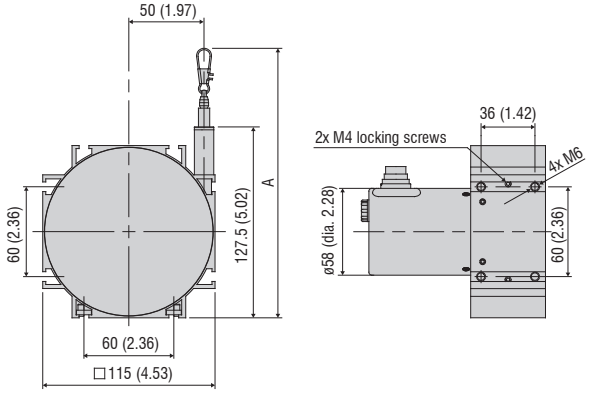


Fig. 16 Dimensional drawing WDS- XXXX - P115 - XX - measuring ranges 3000, 4000, 5000 mm

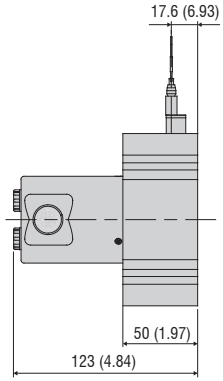


Fig. 17 Dimensional drawing WDS- XXXX - P115 - U/I

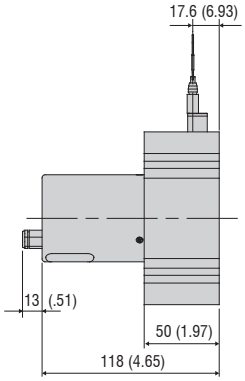


Fig. 18 Dimensional drawing WDS- XXXX - P115 - P

Measuring range (mm)	A (mm)
3000	approx. 186 (7.32)
4000 / 5000	approx. 180 (7.09)

Dimensions in mm (inches, rounded-off)

⚠ CAUTION

If a measuring wire is stretched in the area where operating personnel is located, injuries may occur.

NOTICE

Do not twist the measuring wire.

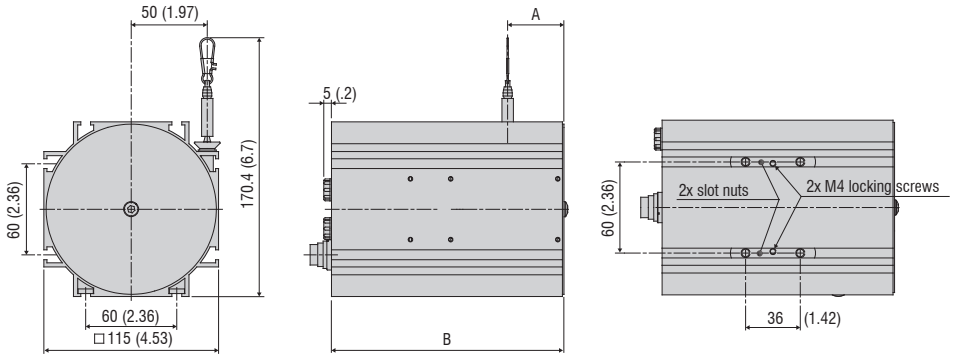


Fig. 19 Dimensional drawing WDS- ... - P115 - U/I/P, measuring ranges 7500, 10000, 15000 mm, dimensions in mm (inches, rounded-off)

Measuring range (mm)	A (mm)	B (mm)
7500	37 (1.46)	153 (6.02)
10000	44.5 (1.75)	198 (7.80)
15000	60.5 (2.38)	228 (8.98)

Dimensions in mm (inches, rounded-off)

4.3.6 wireSENSOR WDS P115 Digital

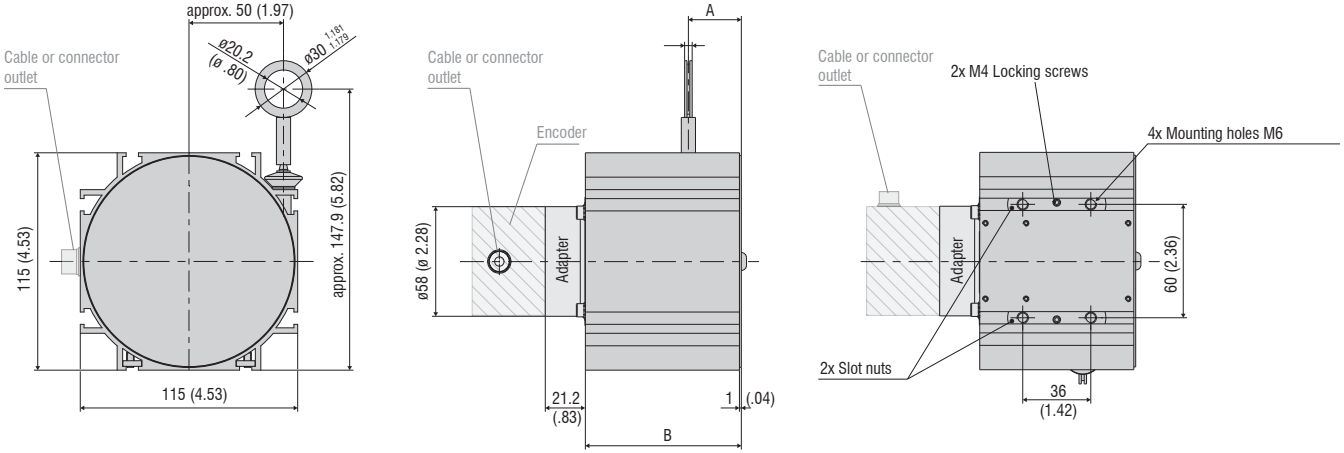


Fig. 20 Dimensional drawing WDS- ... - P115 - XX - XXX, dimensions in mm (inches, rounded-off)

⚠ CAUTION

If a measuring wire is stretched in the area where operating personnel is located, injuries may occur.

NOTICE

Do not twist the measuring wire.

Measuring range (mm)	A (mm)	B (mm)
5000	approx. 28 (1.10)	82.5 (3.25)
7500	approx. 37 (1.46)	105.5 (4.15)
10000	approx. 44.5 (1.75)	148.5 (5.85)
15000	approx. 61 (2.40)	180.5 (7.11)

Dimensions in mm (inches, rounded-off)

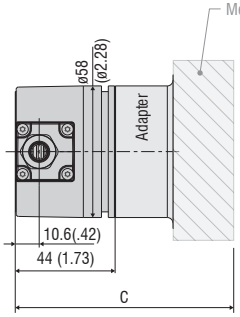


Fig. 22 Dimensional drawing WDS- ... - P115- CR - HTL/TTL

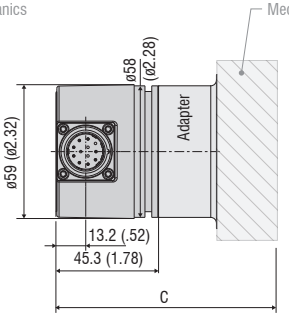


Fig. 23 Dimensional drawing WDS- ... - P115 - SR - SSI

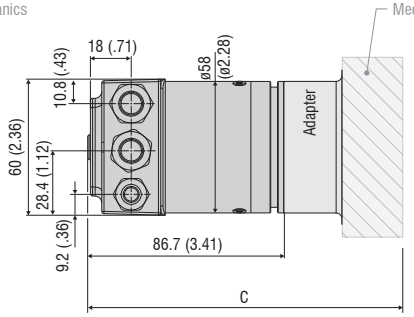


Fig. 24 Dimensional drawing WDS- ... - P115 - BH - CO/PB

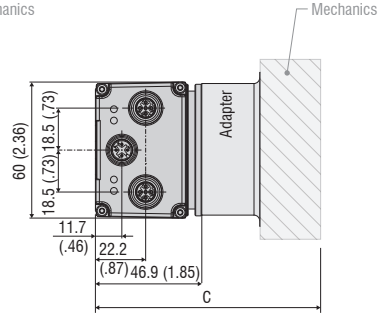


Fig. 25 Dimensional drawing WDS- ... - P115 - BH - PN/ENIP/ CAT

Total length mechanics + encoder (C)					
Output		HTL/TTL	SSI	CO/PB/PN/ENIP/CA	PN/ENIP/CAT
C (mm)	MR 5000	147.7 (5.81)	149 (5.87)	190.4 (7.50)	150.6 (5.93)
	MR 7500	170.7 (6.72)	172 (6.77)	213.4 (8.40)	173.6 (6,83)
	MR 10000	213.7 (8.41)	215 (8.46)	256.4 (10.09)	216.6 (8.53)
	MR 15000	245.7 (9.67)	247 (9.72)	288.4 (11.35)	248.6 (9.79)

Dimensions in mm (inches, rounded-off)

⚠ CAUTION

If a measuring wire is stretched in the area where operating personnel is located, injuries may occur.

NOTICE

Do not twist the measuring wire.

4.3.7 wireSENSOR WDS P200 Digital

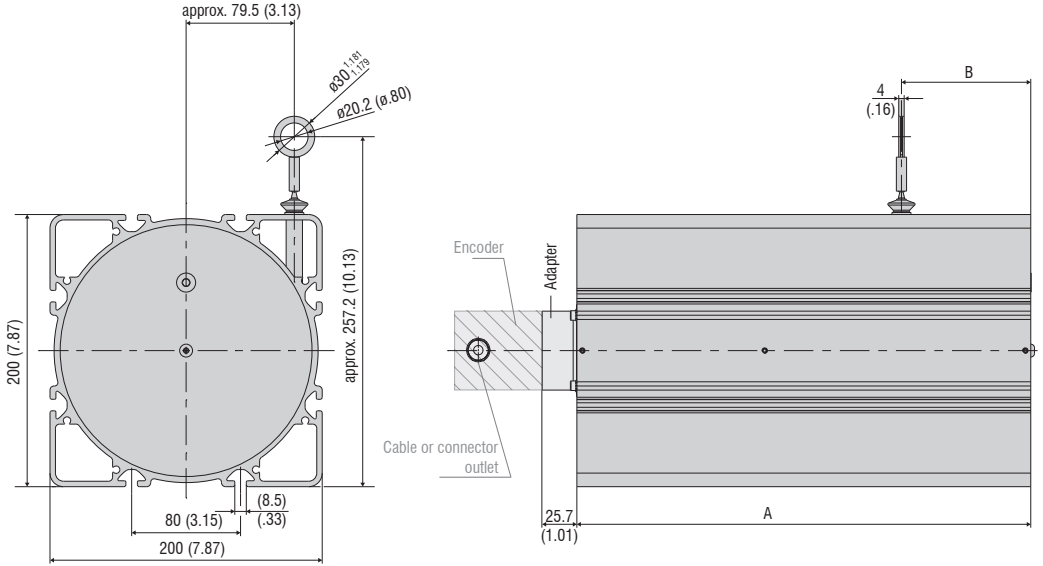


Fig. 26 Dimensional drawing WDS- ... - P200 - XX - XXX, dimensions in mm (inches, rounded-off)

Measuring range (mm)	A (mm)	B (mm)
30000	268 (10.55)	75 (2.95)
40000	300 (11.81)	95 (3.74)
50000	333.5 (13.13)	95 (3.74)

Dimensions in mm (inches, rounded-off)

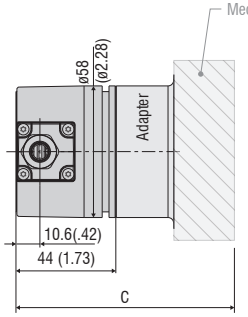
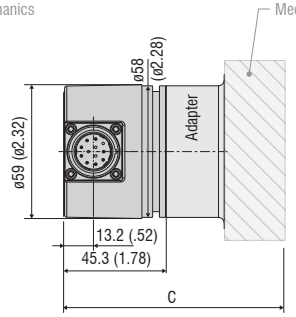
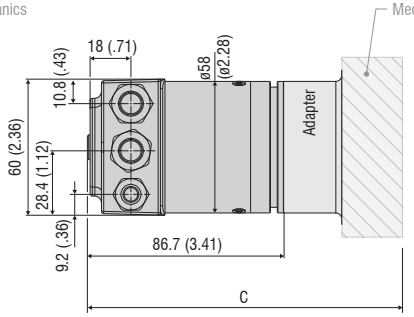


Fig. 27





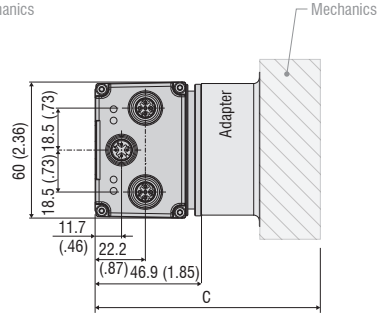


Fig. 28 Dimensional drawing WDS- ... - P200- CR - HTL/TTL

Fig. 29 Dimensional drawing WDS- ... - P200 - SR - SSI

Fig. 30 Dimensional drawing WDS- ... - P200 - BH - CO/PB

Fig. 31 Dimensional drawing WDS- ... - P200 - BH - PN/ENIP/ CAT

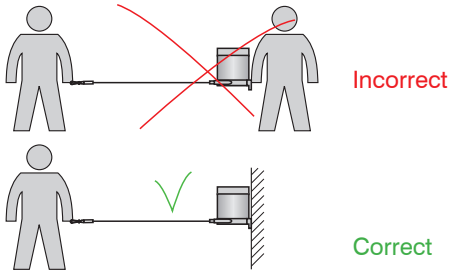
Total length mechanics + encoder (C)					
Ausgang		HTL/TTL	SSI	CO/PB	PN/ENIP/CAT
C (mm)	MR 30000	337.7 (13.30)	339 (13.35)	380.4 (14.98)	340.6 (13.41)
	MR 40000	369.7 (14.56)	371 (14.61)	412.4 (16.24)	372.6 (14.67)
	MR 50000	403.7 (15.89)	404.5 (15.93)	445.9 (17.56)	406.1 (15.99)

Dimensions in mm (inches, rounded-off)

4.4 Guiding and Attaching the Wire

If the measuring wire must be pulled out of the sensor to guide the wire or attach it to the measured object:

- the sensor must not be held by a second person during that process,
- the measuring wire must not be pulled out beyond the measuring range listed,
- the area around the sensor must be protected against snapping of the measuring wire.



➡ Fix the measuring wire to the target using a wire clip or an eyelet.

➡ Guide the measuring wire vertically out of the sensor housing.

Diagonal pull is only permitted up to 3 degrees.

If you drag the measuring wire over the insertion hole or other objects, the measuring wire will be damaged and/or tear.

i If the measuring wire cannot be fed vertically out of the housing, it is essential to use a guide pulley (accessory TR1-WDS and TR2-WDS, see A 1).

➡ Guide the measuring wire in a protected area so that it cannot get caught or otherwise be damaged.

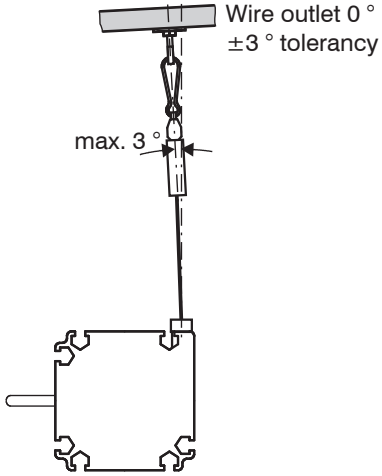
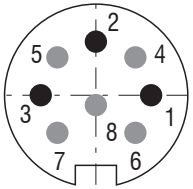


Fig. 32 Attachment and maximum diagonal pull of measuring wire

4.5 Pin Assignment Analog

4.5.1 Potentiometer Output



View on solder pin side 8-pole socket

Electrical connection		Output
-CA/CR- integrated cable	-SA- Connector [1]	- P - Potentiometer
Farbe DIN 47 100	Pin	
White	1	Input +
Brown	2	Ground
Green	3	Signal
Shield	Shield	Housing

Fig. 33 Pin assignment

Draw wire sensors with potentiometer output are connected according to the pin assignment, see Fig. 19, see Fig. 34.

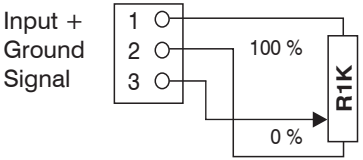
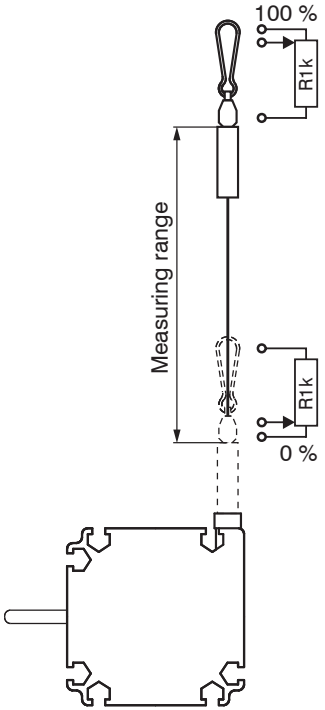


Fig. 34 Model with potentiometer output



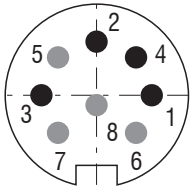
Use the potentiometer only as a voltage divider, not as variable series resistor!

Using them as a variable resistor, destroys the element.

➡ Ensure that the maximum current through the viper is limited.

1) Pins 4 to 8 on the connector are not connected.

4.5.2 Voltage Output



View on solder pin side 8-pole socket

Electrical connection	Output
- SA/SR - Connector [1]	- U - Voltage
1	Supply +
2	Ground
3	Signal
4	Ground (Signal)

Fig. 35 Pin assignment

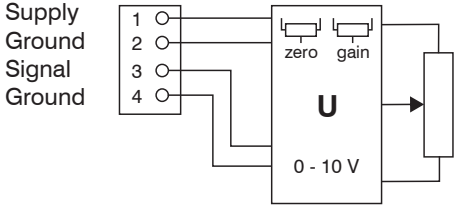
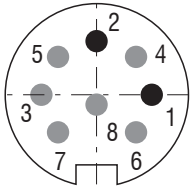


Fig. 36 Model with voltage output

Draw wire sensors with voltage output are connected by the 8-pin built-in plug SA/SR according to the pin assignment, see Fig. 35, see Fig. 36.

1) Pins 5 to 8 on the connector are not connected.

4.5.3 Current Output



View on solder pin side 8-pole socket

Electrical connection	Output
- SA/SR - Connector [1]	- I - Current
1	Supply +
2	Ground

Fig. 37 Pin assignment

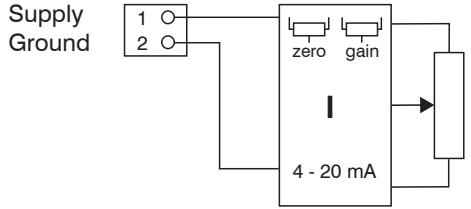


Fig. 38 Model with current output

Draw wire sensors with current output are connected by the 8-pin built-in plug SA/SR according to the pin assignment, see Fig. 37, see Fig. 38.

1) Pins 3 to 8 on the connector are not connected.

Cable assembly by the customer

An 8-pin cable socket for the user-side assembly of your own connecting cable is part of the delivery scope of the standard sensors.

Note when assembling (Requirements of power and output cables to satisfy the EMC regulations):

➡ Use a shielded cable.

➡ Earth shield on electronics side.

- Recommended conductor cross-section 0.14 mm ^{2} (up to 9 m/30 ft cable length)
- Maximum cable diameter 8 mm / 0.3 inch.

The EMC regulations are only satisfied under these basic conditions.

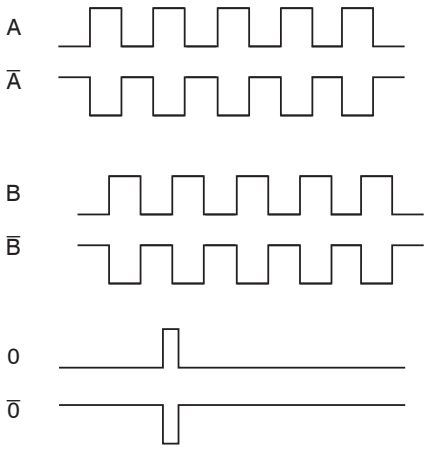
A pre-assembled connecting cable PC3/8-WDS is available as an optional accessory, see A 1.

4.6 Pin Assignment Digital

4.6.1 TTL, HTL

Note the pin assignment for draw-wire displacement sensors with **encoder output**. The sensor contains an additional supplement for detailed information.

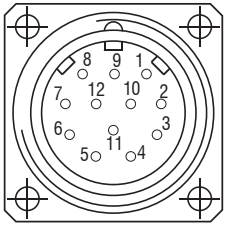
Output signals



Output TTL		**Linedriver (5 VDC)**	
Level High		≥ 2.5 V	(with *I* = -20 mA)
Level Low		≤ 0.5 V	(with *I* = 20 mA)
Load High		≤ 20 mA	
Output		A, Ā, B, B̄, O	
Output HTL		**Push-pull (10 ... 30 VDC)**	
Level High		≥ V_+ -3 V	(with *I* = -20 mA)
Level Low		≤ 1.5 V	(with *I* = 20 mA)
Load High		≤ 40 mA	
Output		A, Ā, B, B̄, O	
Output E		**Push-pull (5 ... 30 VDC)**	
Level High		≥ V_+ -2.5 V	
Level Low		≤ 0,5 V	
Load High		≤ 50 mA	
Output		A, B, O	
Output E 830		**Push-pull (5 ... 30 VDC)**	
Level High		≥ V_+ -3 V	
Level Low		≤ 2.5 V	
Load High		≤ 50 mA	
Output		A, B, O	

Pin assignment TTL, HTL		
Connector	**Cable color**	**Assignment**
Pin 1	Pink	Track B inv.
Pin 2	---	---
Pin 3	Blue	Track N (reference pulse)
Pin 4	Red	Track N inv. (reference pulse inv.)
Pin 5	Green	Track A
Pin 6	Yellow	Track A inv.
Pin 7	---	---
Pin 8	Grey	Track B
Pin 9	---	---
Pin 10	White	GND
Pin 11	---	---
Pin 12	Brown	V_+

Pin assignment E, E830	
Cable color	**Assignment**
White	0 V
Brown	V_+
Green	A
-	$\overline{A}$
Yellow	B
-	$\overline{B}$
Grey	0



Pin-side sensor male connector

Recommendation:

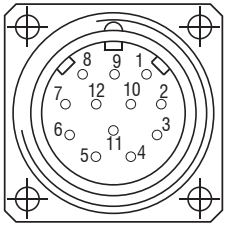
From a cable length of 10 m, use twisted pairs (e.g. A/A inv.).

4.6.2 SSI

Contact description

Pin	Assignment	Description
1	$+V_S$	Encoder power supply connection.
2	0 V	Encoder ground connection. The voltage drawn to GND is V_+ .
3	Clock +	Positive SSI pulse input. Pulses + forms a current loop with pulse -. A current of approximately. 7 mA indirection 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	SET	Zero setting input. For setting a zero point at any point. The zeroing process is triggered by a High pulse and must take place after the rotating direction selection (DIR). Pulse duration >100 ms. For maximum interference immunity, connect to 0 V 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	Clock -	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	---	---
9	DIR	Counter direction input. When not connected, this input is on high. DIR High means increasing output data with a clockwise rotating shaft when looking at the flange. DIR-Low means increasing values with a counterclockwise rotating shaftwhen looking at the flange. For maximum interference immunity, connect to $+V_s$ or 0 V depending on the direction of rotation.
10 ... 12	---	Not in use

Pin assignment SSI		
Connector	**Cable color**	**Assignment**
Pin 1	Brown	$+V_S$
Pin 2	Black	0 V
Pin 3	Blue	Clock +
Pin 4	Beige	Data +
Pin 5	Green	SET
Pin 6	Yellow	Data -
Pin 7	Violet	Clock -
Pin 8	Brown/yellow	---
Pin 9	Pink	DIR
Pin 10	Black/yellow	---
Pin 11	---	---
Pin 12	---	---



Sensor connector M23 (pin), 12-pin

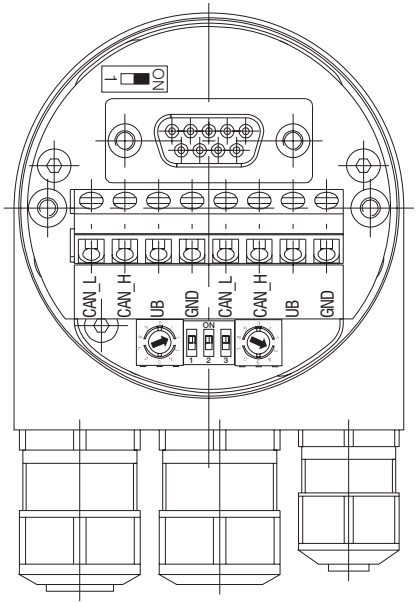
➡ Please use leads twisted in pairs for extension cables.

Switching level	
Control inputs	**Input circuit**
Input level High	> 0,7 V_+
Input level Low	< 0,3 V_+
Input resistance	10 kΩ
SSI	**Circuit**
SSI clock	RS422 with terminating resistance 120 Ω
SSI data	RS422

4.6.3 CANopen

CANopen features

Bus protocol	CANopen
Device profile	CANopen - CiA DSP 406, V 4.1.0
CANopen features	Device Class 2, CAN 2.0B
Operating modes	Polling Mode (asynch, via SDO)
(with SDO progr.)	Cyclic Mode (asynch-cyclic): The encoder cyclically sends the current process actual value without a request by a master. The cycle time can be parameterized for values between 1 and 65535 ms. Synch Mode (synch-cyclic): The encoder sends the current actual process value after receiving a synch telegram sent by a master. The synch counter in the encoder can be parameterized so that the position value is not sent until after a defined number of synch telegrams. Acyclic Mode (synch-acyclic)
Preset value	With the `Preset` parameter the encoder can be set to a desired actual process value that corresponds to the defined axis position of the system. The offset value between the encoder zero point and the mechanical zero point of the system is saved in the encoder.
Rotating direction	With the operating parameter the rotating direction in which the output code is to increase or decrease can be parameterized. Scaling the steps per revolution and the total revolution can be parameterized.
Scaling:	The steps per revolution and the total revolution can be parameterized.
Diagnose	The encoder supports the following error messages: - Position and parameter error - Lithium cell voltage at lower limit (Multiturn)
Default setting	250 kBit/s Node-ID 01

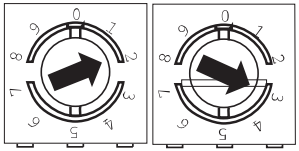


Setting of terminating resistor for CANopen

ON = Last user
OFF = User X

Settings of user address for CANopen

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



Setting CANopen baud rate			
Baud rate	Setting dip switch		
	1	2	3
10 kBit/s	OFF	OFF	OFF
20 kBit/s	OFF	OFF	ON
50 kBit/s	OFF	ON	OFF
125 kBit/s	OFF	ON	ON
250 kBit/s [1]	ON	OFF	OFF
500 kBit/s	ON	OFF	ON
800 kBit/s	ON	ON	OFF
1 MBit/s	ON	ON	ON

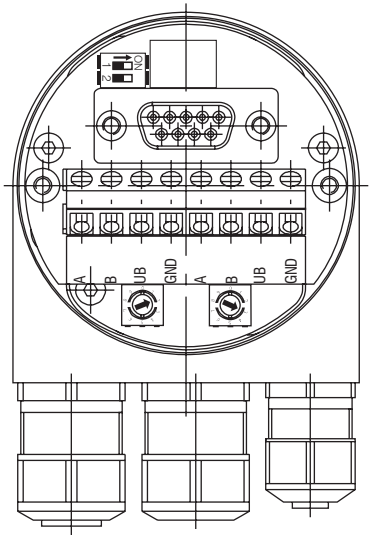
Contact description CANopen	
CAN_L	CAN Bus Signal (dominant Low)
CAN_H	CAN Bus Signal (dominant High)
UB	Supply voltage 8 ... 30 VDC
GND	Ground contact for *UB* (Terminals with the same designation are internally interconnected).

1) Default setting

4.6.4 PROFIBUS DP

PROFIBUS DP features

Bus protocol	PROFIBUS-DPV0
Device profile	Device Class 1 and 2
Cyclical data exchange	Communication in accordance with DPVO
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. The storage is non-volatile.
Parameter functions	Rotating direction: With the operating parameter the rotating direction for which the output code is to increase or decrease can be parameterized.
Diagnosis	- Position and parameter errors - Monitoring multi-turn scanning - Hour meter
Default setting	User address 00



Settings of terminating resistor for PROFIBUS DP

ON = Last user
OFF = User X [1]

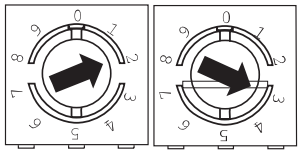
Contact description PROFIBUS-DPV0	
A	Negative serial data line
B	Positive serial data line
UB	Supply voltage 8 ... 30 VDC
GND	Ground contact for *UB* (Terminals with the same designation are internally interconnected.) These *UB*-*UB* / 0V-0V terminal connections may be loaded with max. 1A.

Cable: 1, 2 = ø8 ... 10 mm (-40 ... 85 °C / -40 ... 185 °F) / ø5 ... 9 mm (-25 ... 85 °C / -13 ... 185 °F)
Cable: 3 = ø4,5 ... 6 mm (-40 ... 85 °C / -40 ... 185 °F) / ø5 ... 9 mm (-25 ... 85 °C / -13 ... 185 °F)

Settings of user address for PROFIBUS-DPV0

Adress can be set with rotary switch.

Example: User adress 23

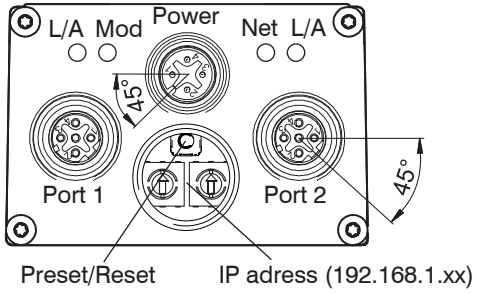


1) Default setting

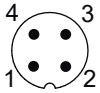
4.6.5 EtherNet/IP

Characteristics Ethernet/IP

Bus protocol	EtherNet/IP
Device profile	CIP Nov 2016. 22_{hex} Encoder
Cycle time	1 ms
Features	- Gear factor (round axis) and continuous operation - Plausibility check of adjustable parameters - Comprehensive diagnosis function - Adress Conflict Detection - Device Level Ring - Several simultaneous IO connections
LED status display	2x Link/Activity, module status, network status

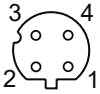


Pin assignment supply voltage		
Connector	**Connection**	**Description**
Pin 1	UB	Supply voltage
Pin 2	n.c.	Not assigned
Pin 3	GND	Ground connection
Pin 4	n.c.	Not assigned



1 x M12 connector (pin), A-coded

Ethernet/IP (data line)		
Connector	**Connection**	**Description**
Pin 1	TxD+	Transmitted data+
Pin 2	RxD+	Received data+
Pin 3	TxD-	Transmitted data-
Pin 4	RxD-	Received data-

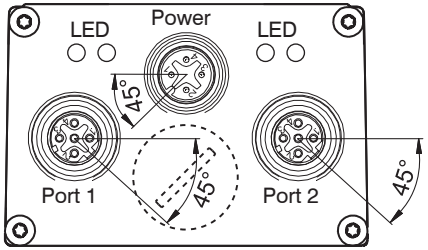


2 x M12 connectors (socket), D-coded

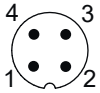
4.6.6 EtherCAT

Characteristics EtherCAT

Bus protocol	EtherCAT
Device profile	Encoder profile CANopen® CiA 406 Vers. 4.0.2 dated Aug 18, 2016
Operating modes	Free Run, synchronous with SM3 Event, DC mode (Distributed Clocks)
Cycle times	Minimum 62.5 µs
Features	- Gear factor (round axis) and continuous operation - Time stamp (time of position data acquisition) - Plausibility check of adjustable parameters - Comprehensive diagnosis functions - Preset gauge for position - File Access over EtherCAT (FoE)
Prozessdaten	- Position value 32-Bit input data with/without rotational speed 32 Bit - Comprehensive process data mapping
LED status display	2x Link/Activity, RUN, ERR

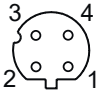


Pin assignment supply voltage		
Connector	Connection	Description
Pin 1	UB	Supply voltage
Pin 2	n.c.	Not assigned
Pin 3	GND	Ground connection
Pin 4	n.c.	Not assigned



1 x M12 connector (pin), A-coded

EtherCAT (data line)		
Connector	Connection	Description
Pin 1	TxD+	Transmitted data+
Pin 2	RxD+	Received data+
Pin 3	TxD-	Transmitted data-
Pin 4	RxD-	Received data-



2 x M12 connectors (socket), D-coded

5. Operation

For draw wire sensors with potentiometer output (P) there are no adjustment and setting elements.

Draw wire sensors with voltage output (U) or current output (I) are equipped with integrated electronics with setting potentiometers (trimmers) for zero and gain.

The access holes for the trimmers are located in the housing cover.

With the zero trimmer the zero point can be shifted by ±20 % of the range with voltage output (±18 % with current output).

With the gain trimmer the signal span (sensitivity) is adjusted by ±20 % with voltage output (±15 % with current output). For draw wire sensors with encoder output (E,A) there are no adjustment and setting elements.

Standard setting:

U-output: 0 ... 10 Volt

I-output: 4 ... 20 mA

6. Operation and Maintenance

The measuring wire, wire drum, the spring motor and potentiometer must not be greased or oiled.

Notes about how to guide the wire, see 4.4, must be observed during the operation.

Imperfect guiding of the wire can cause increased wear and early failure.

If third parties intervene, the claim for liability for material defects becomes void. MICRO-EPSILON is exclusively responsible for repairs, see 8.

7. Disclaimer

All components of the device have been checked and tested for functionality in the factory. However, should any defects occur despite careful quality control, these shall be reported immediately to MICRO-EPSILON or to your distributor / retailer.

MICRO-EPSILON undertakes no liability whatsoever for damage, loss or costs caused by or related in any way to the product, in particular consequential damage,
e.g., due to

- non-observance of these instructions/this manual,
- improper use or improper handling (in particular due to improper installation, commissioning, operation and maintenance) of the product,
- repairs or modifications by third parties,
- the use of force or other handling by unqualified persons.

This limitation of liability also applies to defects resulting from normal wear and tear (e.g., to wearing parts) and in the event of non-compliance with the specified maintenance intervals (if applicable).

MICRO-EPSILON is exclusively responsible for repairs. It is not permitted to make unauthorized structural and / or technical modifications or alterations to the product. In the interest of further development, MICRO-EPSILON reserves the right to modify the design.

In addition, the General Terms of Business of MICRO-EPSILON shall apply, which can be accessed under Legal details | Micro-Epsilon https://www.micro-epsilon.com/impressum/.

8. Service, Repair

If the sensor is defective, please send us the affected parts for repair or exchange.

If the cause of a fault cannot be clearly identified, please send the entire measuring system to:

MICRO-EPSILON MESSTECHNIK
GmbH & Co. KG
Koenigbacher Str. 15
94496 Ortenburg / Germany

Tel. +49 (0) 8542 / 168-0
Fax +49 (0) 8542 / 168-90
info@micro-epsilon.com
www.micro-epsilon.com

9. Decommissioning, Disposal

In order to avoid the release of environmentally harmful substances and to ensure the reuse of valuable raw materials, we draw your attention to the following regulations and obligations:

- Remove all cables from the sensor and/or controller.
- Dispose of the sensor and/or the controller, its components and accessories, as well as the packaging materials in compliance with the applicable country-specific waste treatment and disposal regulations of the region of use.
- You are obliged to comply with all relevant national laws and regulations.

For Germany / the EU, the following (disposal) instructions apply in particular:

- Waste equipment marked with a crossed garbage can must not be disposed of with normal industrial waste (e.g. residual waste can or the yellow recycling bin) and must be disposed of separately. This avoids hazards to the environment due to incorrect disposal and ensures proper recycling of the old appliances.

- A list of national laws and contacts in the EU member states can be found at https://ec.europa.eu/environment/topics/waste-and-recycling/waste-electrical-and-electronic-equipment-weee_en.
  Here you can inform yourself about the respective national collection and return points.
- Old devices can also be returned for disposal to MICRO-EPSILON at the address given in the imprint at https://www.micro-epsilon-de/impressum/.
- We would like to point out that you are responsible for deleting the measurement-specific and personal data on the old devices to be disposed of.
- Under the registration number WEEE-Reg.-Nr. DE28605721, we are registered at the foundation Elektro-Altgeräte Register, Nordostpark 72, 90411 Nuremberg, as a manufacturer of electrical and/or electronic equipment.

Appendix

A 1 Accessories and Spare Parts

PC3/8-WDS	Supply and output cable, 3 m long, for WDS with 8-pole cable connector
FC8	Mating plug for WDS straight, 8-pin
FC8/90	Mating plug, 90 ° angled for WDS
MH1-WDS	Magnetic holder with hole for M4 wire coupling, wire clip, eyelet or attachment head, see Fig. 39.
MH2-WDS	Magnetic holder, threaded M4/nut M4 for P60-mounting in mounting groove, see Fig. 40.
TR1-WDS	Guide pulley adjustable with mounting socket, see Fig. 41.
TR3-WDS	Guide pulley fix with mounting socket, see Fig. 42.
GK1-WDS	Attachment head with mounting thread, see Fig. 43, DIN 71 752 G4 x 3, weight appr. 7 g
MT60-WDS	Mounting clamps for P60-mounting, see Fig. 44.
WE-xxxx-M4	Wire extension with 2 x M4 thread, see Fig. 45, wire length in millimeters for xxxx, max. 10,000 mm (33 ft)
WE-xxxx-CLIP	Wire extension with wire clip and eyelet, see Fig. 46, wire length in millimeters for xxxx, max. 10,000 mm (33 ft)

A 2 Cable Connection and Color Code Connection Cable PC3/8-WDS

PIN	Color	Assignment			
		- P	- U	- I	
1	White	Input +	Supply +	Supply +	Outer cable area with total shield
6	Green	n.c. [1]	n.c.	n.c.	
2	Brown	Ground	Ground	Ground	
4	Yellow	n.c.	Ground	n.c.	
5	Grey	n.c.	n.c.	n.c.	
3	Green	Signal	Signal	n.c.	Inner cable 3-wire with shield
7	Blue	n.c.	n.c.	n.c.	
8	Red	n.c.	n.c.	n.c.	

	Black	Outer shield			Grounding at electronics side
	Bare	Inner shield			

[1] n.c. = not connected

A 3 Drawings and References for Attachment

Mounting Instructions for Magnetic Holder MH1 - WDS

The force normal to the St 37 plate is approximately 18 kg (635 oz) at 20 °C (+68 °F).

The lateral force sustainable is, dependent on the surface, about 20 - 35 % of normal adhesion.

Temperature range operation: -40 ... +120 °C (-40 ... +248 °F)

Temperature coefficient of the adhesion (reversible): -4 % per 10 °C at 20 °C

Strong vibration may cause a displacement of the magnetic holder when subject to a strong lateral force.

Weight appr. 100 g

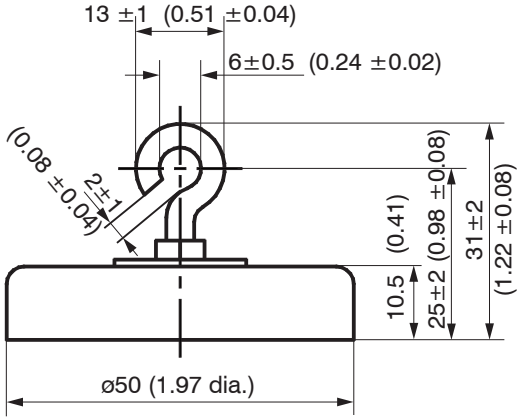


Fig. 39 Magnetic holder MH1 - WDS, dimensions in mm (inches)

i When mounting, make sure there is adequate adhesion!
Uneven surfaces, layers of lacquer and rust reduce adhesion.

Mounting instructions for magnetic holder MH2 - WDS

The force normal to the St 37 plate is approximately 13 kg / 459 oz at +20 °C (+68 °F).

The lateral force sustainable is, dependent on the surface, about 20 - 35 % of normal adhesion.

Temperature range operation: -40 ... +120 °C (-40 ... +248 °F)

Temperature coefficient of the adhesion (reversible): -4 % per 10 °C at 20 °C

Strong vibration may cause a displacement of the magnetic holder when subject to a strong lateral force.

Weight appr. 55 g

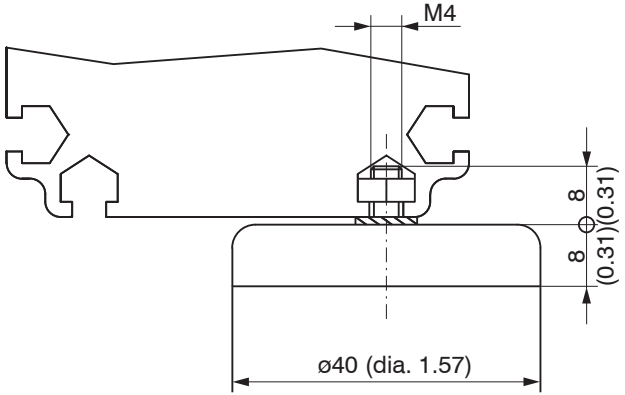


Fig. 40 Magnetic holder MH2 - WDS, dimensions in mm (inches)

i When mounting, make sure there is adequate adhesion!
Uneven surfaces, layers of lacquer and rust reduce adhesion.

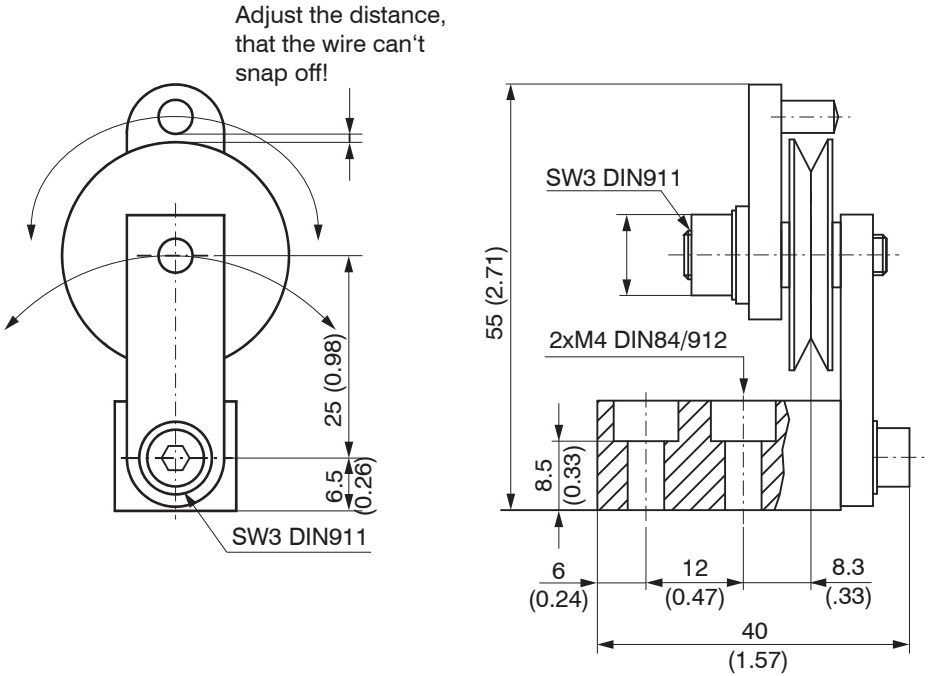


Fig. 41 Guide pulley TR1-WDS with mounting socket, dimensions in mm (inches)

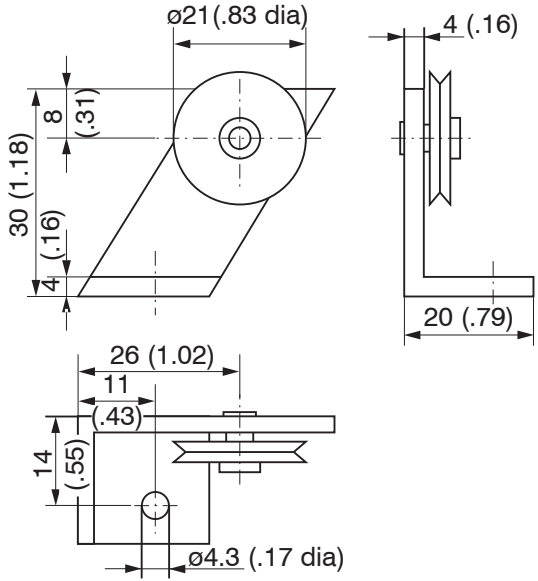


Fig. 42 Guide pulley TR3-WDS fix with mounting socket, dimensions in mm (inches)

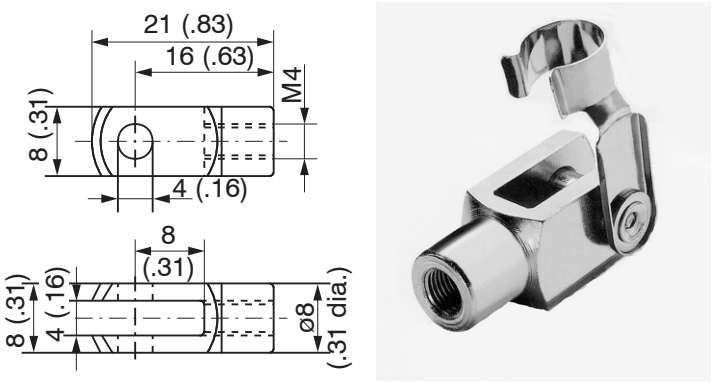
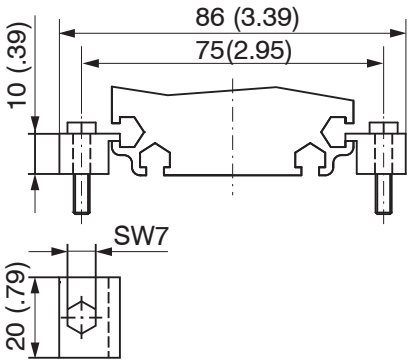


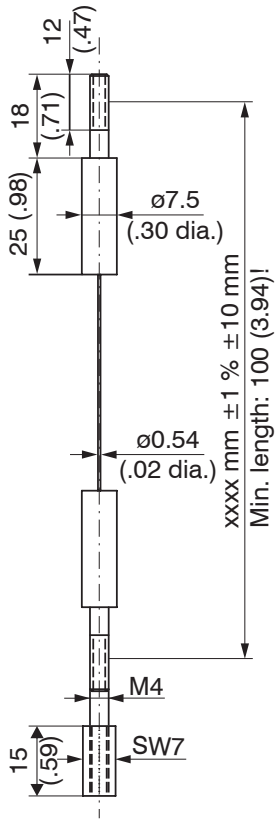
Fig. 43 Attachment head GK1-WDS, dimensions in mm (inches)



1 Set contains:

2 Pieces	mounting clamp Alu anodized
2 Pieces	bolt M4x20 DIN 933-A2
2 Pieces	antiturn washer J4.3 DIN 6797
2 Pieces	nut M4 DIN 934-A2

Fig. 44 Mounting clamp MT60-WDS, dimensions in mm (inches)



The delivery includes:

1 Pieces	wire extension
2 Pieces	nut M4 DIN 934-A2
2 Pieces	antiturn washer J4.3 DIN 6797
1 Pieces	distance piece M4 15 mm long

Dimensions in mm (inches)

Fig. 45 Wire extension WE-xxxx-M4

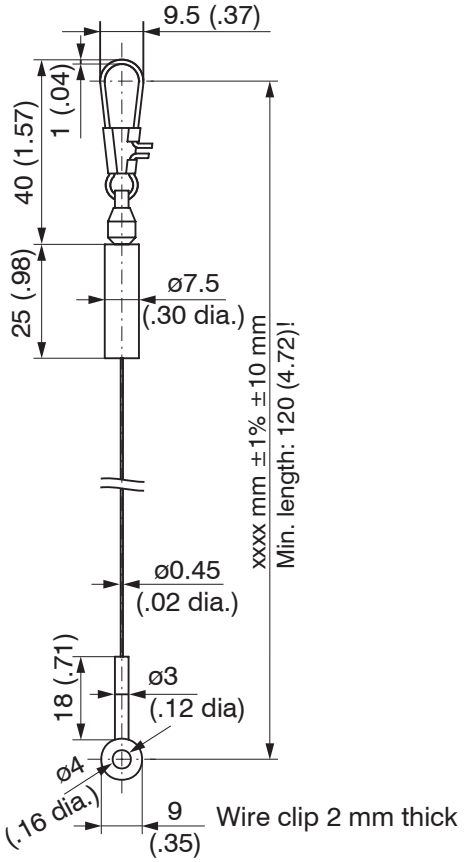


Fig. 46 Wire extension WE-xxxx-CLIP

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X9751481-A012024HDR