

Instruction Manual  
**wire**SENSOR, WDS

WDS-70-F50

## **Declaration of incorporation**

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

Manufacturer and authorized representative for the compilation of the relevant technical documents

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

hereby declares that the machine designated below, as a result of its manner of design, construction as well as version that has been placed on the market - to the extent possible in the scope of delivery - corresponds to the relevant, fundamental health and safety requirements of the EC Machinery Directive, including the valid changes at the time of declaration.

Model: wiresensor

Type designation: WDS-xxx, WPS-xxx

The following fundamental health and safety requirements in accordance with Annex I of the above-named directive are applied and maintained:

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

Furthermore, the compliance with the following EC Directives and standards is explained, including the valid changes at the time of this declaration:

- EN ISO 13857:2008 Safety of machinery - Safety distances to prevent hazard zones being reached by upper and lower limbs
- EN 60204-1:2006 Safety of machinery - Electrical equipment of machines  
Part 1: General requirements
- DIN EN 61326-1: 2006-10
- DIN EN 61326-2-3: 2007-05

Moreover, we declare that the relevant technical documentation for this partly completed machinery has been created in accordance with part B of Annex VII, and that we shall be obligated to deliver these upon the request of the market surveillance authorities.

The described partly completed machinery is intended for installation in a production line.

The commissioning of this partly completed machinery shall be prohibited until the partly completed machinery has been installed in a machine that complies with the provision of the EC Machinery Directive and for which an EC Declaration of Conformity in accordance with Annex II A is available.

**Ortenburg, May 5th 2015**



**Dr. Thomas Wisspeintner**  
**Managing Director**

Tel. +49 (0) 8542 / 168-0

Fax +49 (0) 8542 / 168-90

e-mail [info@micro-epsilon.de](mailto:info@micro-epsilon.de)

[www.micro-epsilon.com](http://www.micro-epsilon.com)

Certified acc. to

DIN EN ISO 9001: 2008

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# Contents

<b>1.</b>	<b>Safety .....</b>	<b>5</b>
1.1	Symbols Used .....	5
1.2	Warnings .....	5
1.3	Notes on CE Identification .....	6
1.4	Proper Use .....	7
1.5	Proper Environment .....	7
1.6	Foreseeable Misuse .....	7
<b>2.</b>	<b>Functional Principle, Technical Data .....</b>	<b>8</b>
2.1	Functional Principle .....	8
2.2	Type Designation .....	9
2.3	Technical Data .....	10
<b>3.</b>	<b>Delivery .....</b>	<b>12</b>
3.1	Unpacking .....	12
3.2	Storage .....	12
<b>4.</b>	<b>Installation and Assembly .....</b>	<b>13</b>
4.1	Precautionary Measures .....	13
4.2	Sensor Mounting .....	13
4.3	Wire Guide and Fastening .....	15
4.4	Power Supply and Display/Output Device .....	16
<b>5.</b>	<b>Commissioning .....</b>	<b>17</b>
<b>6.</b>	<b>Operation .....</b>	<b>18</b>
<b>7.</b>	<b>Operation and Maintenance .....</b>	<b>18</b>
<b>8.</b>	<b>Warranty .....</b>	<b>19</b>
<b>9.</b>	<b>Decommissioning, Disposal .....</b>	<b>19</b>
	<b>Appendix .....</b>	<b>20</b>



## 1. Safety

The handling of the sensor assumes knowledge of the instruction manual.

### 1.1 Symbols Used

The following symbols are used in this instruction manual:



Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.



Indicates a situation which, if not avoided, may lead to property damage.



Indicates an user action.



Indicates an user tip.

### 1.2 Warnings



Do not open the sensor housing.

- > Danger of injury from pre-tensioned spring motor

Do not let the measuring wire rewind without control (snap back).

- > Danger of injury from whiplash effect of the wire with assembly bolts/clips
- > Destruction of wire and/or of sensor

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

- > Danger of injury

Connect the power supply in accordance with the safety regulations for electrical equipment.

- > Danger of injury
- > Damage to or destruction of the sensor safety

**NOTICE**

Do not pull the measuring wire over measuring range.  
> Destruction of the measuring wire and/or the sensor

Don't let the power supply exceed the specified limits.  
> Damage to or destruction of the sensor

Avoid banging and knocking the sensor  
> Damage to or destruction of the sensor

### **1.3 Notes on CE Identification**

The following applies to series WDS draw wire sensors: Directive 2006/42/EC

The following applies to series WDS draw wire sensors with voltage, current or encoder output:

- EU directive 2004/108/EC
- EU directive 2011/65/EC, "RoHS" category 9

Products which carry the CE mark satisfy the requirements of the quoted EU directives and the European standards (EN) listed therein. The EC declaration of conformity is kept available to EU regulation, article 10 by the authorities responsible at

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

Draw wire sensors with potentiometer output are not automatically operable devices (components). An EC declaration of conformity or CE identification is therefore not issued by EMC law.

Draw wire sensors with encoder output carry the CE mark.

Sources: EMC law, Guidelines on the application of council directive 2004/108/EC, directive 2006/42/EC.

## 1.4 Proper Use

- Draw wire sensors are used for
  - distance or displacement measuring
  - position determination of components or moving machine parts.
- The sensors may only be operated within the limits specified in the technical data, see Chap. 2.
- Draw wire sensors should only be used in such a way that in case of malfunction or failure personnel or machinery are not endangered.
- Additional precautions for safety and damage prevention must be taken for safety-related applications.

## 1.5 Proper Environment

- Protection class for sensor IP00
- Operating temperature: -40 °C to +100 °C (-40 to +212 °F)
- Storage temperature: -40 °C to +100 °C (-40 to +212 °F)
- Humidity: 5 - 95 % (non-condensing)
- Ambient pressure: atmospheric pressure

## 1.6 Foreseeable Misuse

Do not further extract the measuring wire but only to the specified measuring range. This may lead to damage of the measuring wire and also to uncontrollable snapping of the measuring wire. Danger of injury.

Make sure the sensor is not held by another person when the measuring wire is extracted. Danger of snapping and injury.



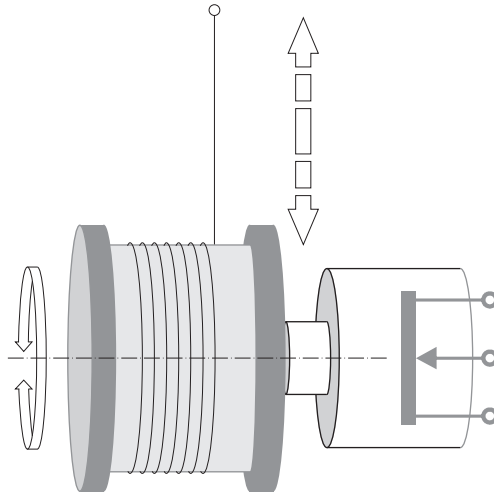
## 2. Functional Principle, Technical Data

### 2.1 Functional Principle

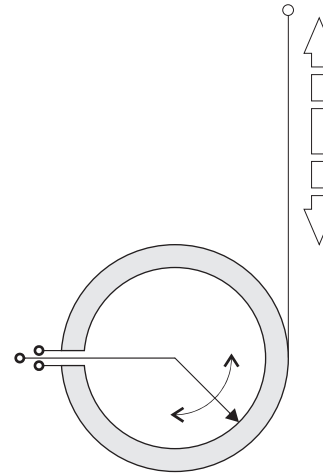
With the wire principle, a linear motion is transformed into a change in resistance by a rotation.

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 conductive plastic potentiometer.



*Fig. 1 Draw-wire sensor with potentiometer*

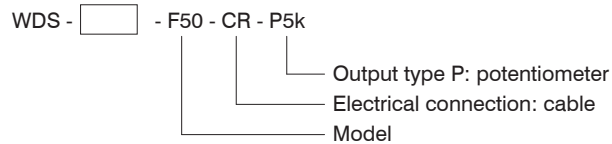


*Fig. 2 Viper action at wire extraction*

The draw wire principle is used in the housing design F50 with a measuring length of 70 mm (2.75 in).  
As an electrical connection a potentiometer output (resistance divider) is possible.

A design feature of the sensor is, that you can freely define the 70 mm measuring range and therewith the zero point within the extraction length of the measuring wire by turning the potentiometer. The conductive plastic potentiometer offers an electric range of 350 ° and is unrestricted turnable.

## 2.2 Type Designation



### 2.3 Technical Data

<b>Model</b>		<b>WDS-70-F50-CR-P5k</b>
Output		Potentiometer
Measuring range		70 mm <sup>1)</sup>
Wire extraction length		150 mm
Linearity		±0.1 % FSO, 0.15 mm
Resolution		Quasi infinite
Sensitivity potentiometer		See test report
Sensor element		Conductive plastic potentiometer, electrical range 350 °, unrestricted turnable
Operating temperature		-40 °C ... +100 °C (-40 to +212 °F)
Storage temperature		-40 °C ... +100 °C (-40 to +212 °F)
Humidity		5 ... 95 %, no condensation
Material	Housing	Aluminum
	Wire	Stainless steel with polyamid sheath (ø 0.45 mm)
Sensor mounting		Internal thread M5
Wire mounting		Wire clip
Wire acceleration		approx. 10 g
Wire retraction / extension force		approx. 5.5 N
Protection class	DIN EN 60529	IP00
Electrical connection		Integrated cable, 1 m long
Weight		160 g (without cable)
Input voltage		max. 42 V
Input current		max. 8.4 mA
Resistance		5 kOhm (±20 %)

#### CAUTION

Uncontrolled retraction of the measuring wire is incorrect!

- > Danger of injury from whiplash effect of the wire with assembly bolts/clips
- > Destruction of wire and/or of sensor.

Save the wire during installation work.

<b>Model</b>	<b>WDS-70-F50-CR-P5k</b>
Viper current	< 1 $\mu$ A
Temperature stability potentiometer	type 25 ppm/K
Durability	ca. $1 \times 10^6$ strokes At movement over the electrical range of the potentiometer the durability is reduced.

FSO = Full Scale Output

1) Wire extraction 150 mm, the position of the 70 mm measuring range can be selected within the extraction length by turning the potentiometer.

### **3. Delivery**

#### **3.1 Unpacking**

- Do not unpack the sensor by pulling the wire.
- Ship so, that no damage can appear.
- Check for completeness and shipping damages immediately after unpacking.
- In case of damage or missing parts, please contact the manufacturer or supplier.

#### **3.2 Storage**

Store only with the transport protection in place. This prevents the measuring wire being pulled out and accidental is snapping back.

- Storage temperature: -40 °C to +100 °C (-40 to +212 °F)
- Humidity: 5 - 95 % (non-condensing)
- Atmospheric pressure

**⚠ CAUTION**

Uncontrolled retraction of the measuring wire is incorrect!

- > Danger of injury from whiplash effect of the wire with assembly bolts/clips
- > Destruction of wire and/or of sensor.

Save the wire during installation work.

## **4. Installation and Assembly**

### **4.1 Precautionary Measures**

Do not pull the measuring wire over the mechanical extraction length.

- > Damage to or destruction of the sensor is possible

Do not damage the measuring wire.

Do not oil or grease the measuring wire.

Do not bend the measuring wire.

Do not pull the measuring wire at an angle.

Do not allow to loop the measuring wire around objects.

Fix the sensor with drawn in measuring wire to the target.

Do not loop the measuring wire around parts of the body.

### **4.2 Sensor Mounting**

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

➡ Choose the installation position so that damage and soiling of the measuring wire is avoided.

➡ Prefer an installation position with measuring wire outlet facing downwards if possible.

This prevents liquids penetrating the measuring wire outlet.

- i** Do not let snap the measuring wire!
- l** No warranty by damage through snapping.

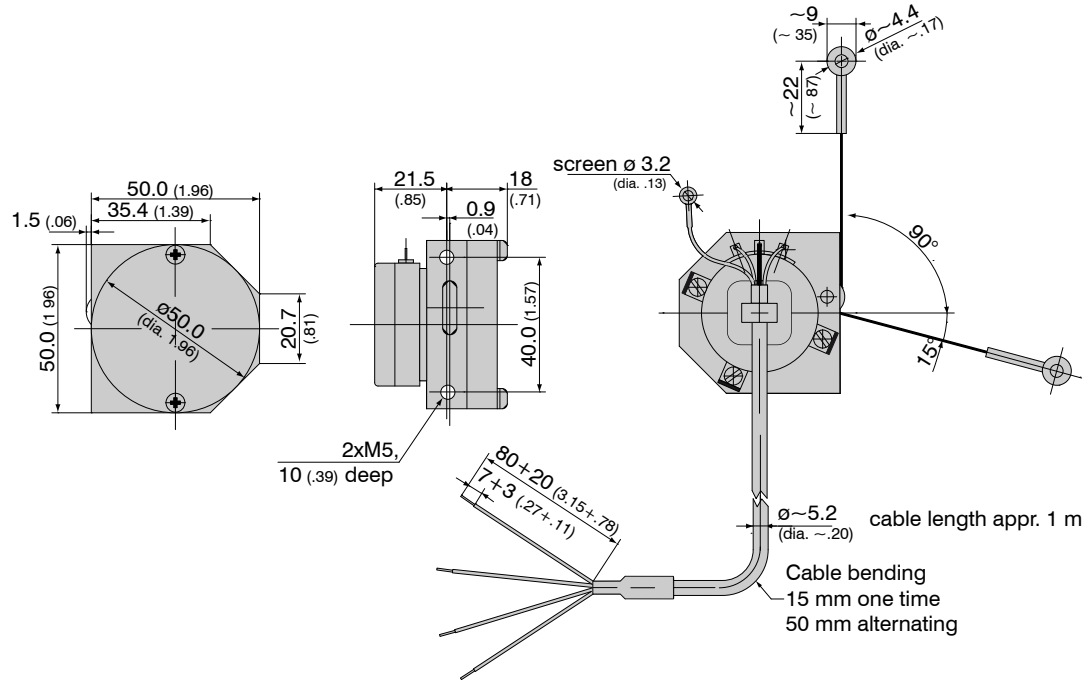


Fig. 3 Dimensional drawing WDS-70-F50 with potentiometer, dimensions in mm (inches), not to scale

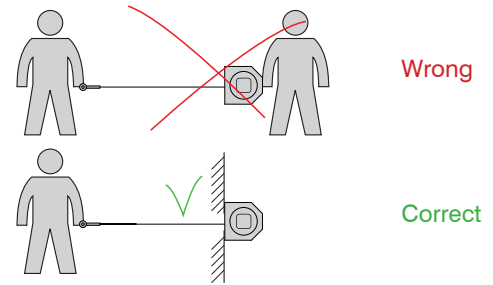
**CAUTION**

A measuring wire under tension where operators are standing can lead to injuries.

**4.3 Wire Guide and Fastening**

If the measuring wire has to be extracted from the sensor to guide the wire resp. to fix it to the target

- the sensor may not be held by another person
- the measuring wire may not be further extracted but only to the specified measuring range
- the surroundings of the sensor have to be protected against snapping of the measuring wire



- ➡ Fix the measuring wire to the target using a wire clip
- ➡ Fed the measuring wire in the indicated range from the sensor housing.

If the measuring wire drags on the inlet hole or other objects, this leads for damaging and/or snapping of the measuring wire.

- ➡ Keep measuring wire in an area where it cannot be snagged or otherwise be violated.

**NOTICE**

Do not twist the measuring wire!

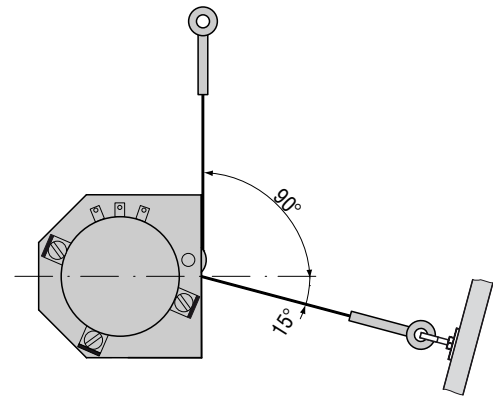
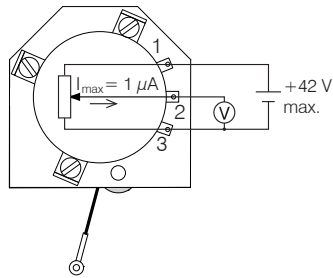


Fig. 4 Wire guiding



#### 4.4 Power Supply and Display/Output Device



Pin Assignment:

1	Input	+ white
2	Signal	green
3	Ground	brown
Total screen		black

### NOTICE

All potentiometers must only be used in a voltage divider circuit. Using them as a variable resistor, destroys the element. Ensure that the maximum current through the viper is limited.

Fig. 5 Model with potentiometer output

Draw wire sensors with potentiometer output are connected according to [Fig. 5](#),

**i** Use potentiometer only as voltage divider, not as variable series resistor!

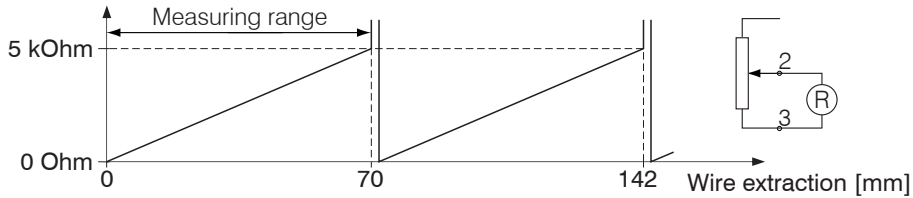
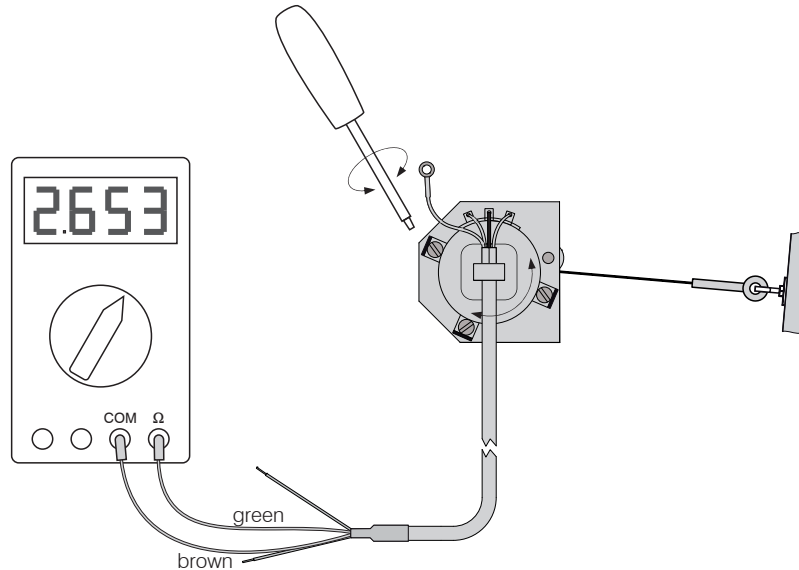


Fig. 6 Signal characteristic within the wire extraction length

## 5. Commissioning

- Mount the sensor according to Chap. 4.2
- Connect the wire at the target, see Chap. 4.3
- Connect a multimeter at the outputs of the sensor cable. Mode: Resistance measurement.
- Move the target to start or end of measuring range.
- Loose the three screws for fixation of the potentiometer at the sensor.
- Turn the potentiometer until the multimeter displays the designated value.
- Once again tighten the screws at the sensor cautiously.



**i** The measuring range of the sensor is displayed within wire extension length completely twice. Apply the start and the end of measuring range in that kind, that this range is located within the complete measuring range of the sensor.

Fig. 7 Adjustment of the sensors zero point

## **6. Operation**

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

## **7. Operation and Maintenance**

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

The notes on wire guiding in section 4.3 must be observed during operation.

Imperfect wire guiding can lead to increased wear and premature defects.

The warranty and all liability claims are null and void if the device is manipulated by unauthorised persons.

Repairs are to be made exclusively by Micro-Epsilon.

## **8. Warranty**

All components of the device have been checked and tested for perfect function in the factory.

In the unlikely event that errors should occur despite our thorough quality control, this should be reported immediately to MICRO-EPSILON.

The warranty period lasts 12 months following the day of shipment. Defective parts, except wear parts, will be repaired or replaced within this period if you return the device to MICRO-EPSILON free of charge.

This warranty does not apply towards damages resulting from abuse of the equipment and devices, from forceful handling or installation of the devices or from repair or modifications performed by third parties.

No other claims, except as warranted, are accepted.

The terms of the purchasing contract apply in full.

MICRO-EPSILON will specifically not be responsible for eventual consequential damages.

MICRO-EPSILON always strives to supply customers with the finest and most advanced equipment. Development and refinement is therefore performed continuously and the right for design changes without prior notice is accordingly reserved.

For translation in other languages the data and statements of the German language operation manual are to be taken as authoritative.

## **9. Decommissioning, Disposal**

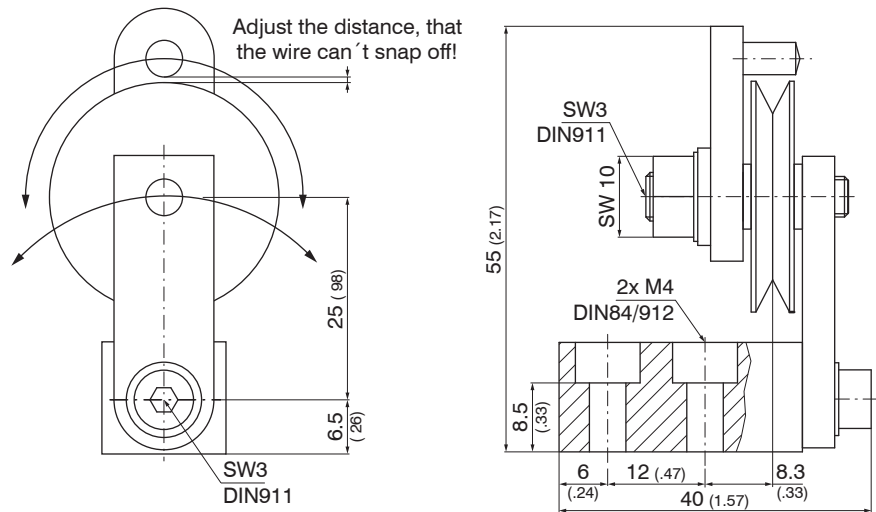
➡ Disconnect the power supply and output cable on the sensor.

➡ Do the disposal according to the legal regulations (see directive 2002/96/EC).

## Appendix

### Accessories and Spare Parts

- TR1-WDS Guide pulley adjustable with mounting socket, see [Fig. 8](#)
- TR3-WDS Guide pulley fix with mounting socket, see [Fig. 9](#)
- WE-xxxx-CLIP Wire extension with wire clip, see [Fig. 10](#), wire length in millimeters for xxxx max. 10,000 mm (33 ft)
- MH1-WDS Magnetic holder with hole for M4 wire coupling, wire clip or attachment head, see [Fig. 11](#)



*Fig. 8 Guide pulley TR1-WDS with mounting socket, dimensions in mm (inches), not to scale*

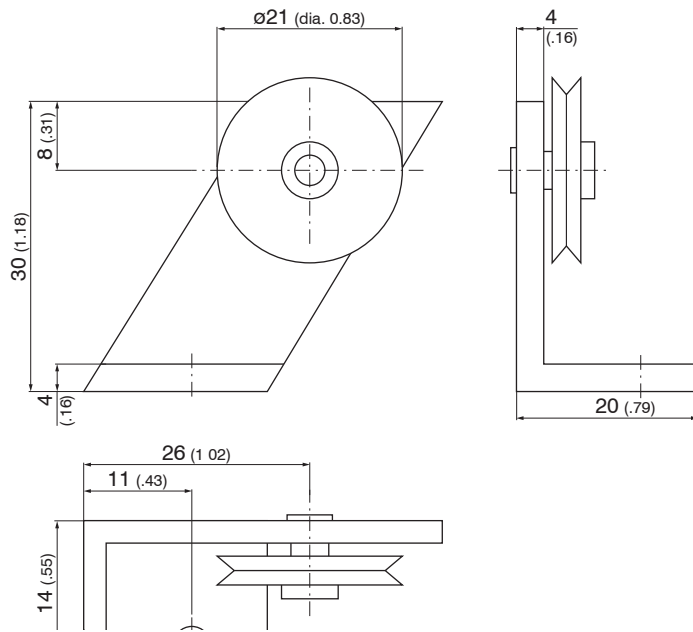


Fig. 9 Guide pulley TR3-WDS fix with mounting socket, dimensions in mm (inches), not to scale

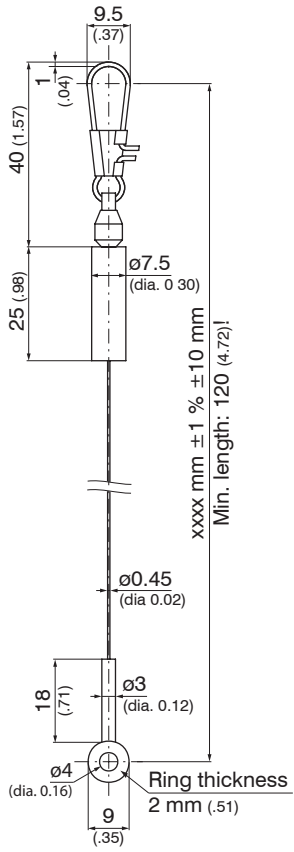


Fig. 10 Wire extension WE-xxxx-CLIP, dimensions in mm (inches), not to scale

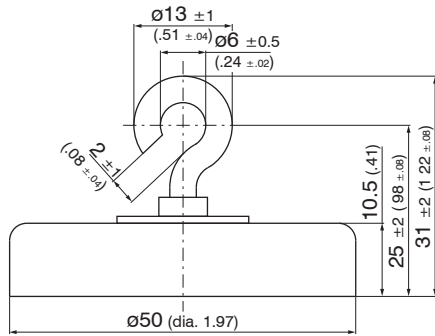


Fig. 11 Magnetic holder MH1-WDS, dimensions in mm (inches), not to scale







MICRO-EPSILON MESSTECHNIK GmbH & Co. KG  
Königbacher Str. 15 · 94496 Ortenburg / Germany  
Tel. +49 (0) 8542 / 168-0 · Fax +49 (0) 8542 / 168-90  
info@micro-epsilon.de · www.micro-epsilon.com

X9751193-A031075GBR

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