MICRO-EPSILON



Operating Instructions

wireSENSOR, WDS Series

WDS-40-MT19-P
WDS-80-MT33-P
WDS-130-MT56-P

Draw-wire sensor

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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

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

Do not let the measuring wire snap.
> Risk of injury due to whiplash of the wire with eyelet

> Destruction of the wire and/or the sensor

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

Connect the power supply according to the safety regulations for electrical equipment.
> Risk of injury

> Damage to or destruction of the sensor

Do not pull out the measuring wire beyond the measuring range listed.
> Risk of injury
> Destruction of the measuring wire and/or the sensor

NOTICE

The supply voltage must not exceed the specified limits
> 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

Draw-wire displacement sensors with potentiometer output are devices (components) that cannot be operated independently. These sensors are subject to Directive 2011/65/EU and bear the CE marking and meet the requirements of the cited EU Directive and the European harmonized standards (EN) listed therein.
The EU Declaration of Conformity is kept available for the competent authorities at:

MICRO-EPSILON MESSTECHNIK GmbH & Co. KG

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1.4 Intended Use

- Draw-wire displacement sensors are used for test applications during crash tests, for simulators and in test benches.
- The sensor must only be operated within the limits specified in the technical data, see 2.3.
- The sensor must be used only 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: IP50
- Temperature range:
  - Operation: -40 ... +85 °C (-40 ... +185 °F)
  - Storage: -40 ... +85 °C (-40 ... +185 °F)
- Humidity: 5 ... 95 % (non-condensing)
- Ambient pressure: Atmospheric pressure
- Vibration: According to DIN EN 60068-2-6
- Schock: According to DIN EN 60068-2-27

1.6 Foreseeable Misuse

Do not pull out the measuring wire beyond the measuring range listed. This causes the 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 thus injury.

2. Functional Principle, Technical Data

2.1 Measuring Principle

The draw-wire principle transforms a linear movement into a change in resistance.

A measuring wire made of highly flexible stainless-steel cores is wound onto a drum by using a durable spring motor.

The winding drum is coupled axially with a potentiometer made of conductive plastic.

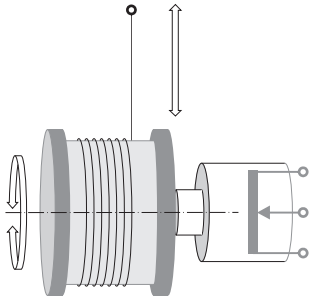


Fig. 1 Draw-wire displacement sensor with potentiometer

2.2 Structure

The draw-wire principle is applied in housing designs 40-MT, 80-MT and 130-MT with different measuring ranges from 40 to 130 mm.

The electrical connection is the potentiometer output (resistance divider).

2.3 Technical Data

Model		WDS-40-MT19-P	WDS-80-MT33-P	WDS-130-MT56-P
Measuring range		40 mm	80 mm	130 mm
Analog output		Potentiometer		
Resolution		virtually infinite		
Linearity[1]	≤ ±0.4 % FSO	-	≤ ±0.32 mm	≤ ±0.52 mm
	≤ ±1 % FSO [2]	≤ ±0.4 mm	-	-
Sensor element		Conductive plastic potentiometer		
Wire extension force (max.)		ca. 2 N	ca. 1,5 N	ca. 1 N
Wire retraction force (min.)		ca. 0,7 N	ca. 0,5 N	ca. 0,3 N
Wire acceleration (max.)		ca. 60g	ca. 60g	ca. 15g
Material	Housing	Aluminum		
	Measuring wire	Polyamide-coated stainless steel (Ø 0.36)	Polyamide-coated stainless steel (Ø 0.45)	
Wire mounting		Eyelet (ø 4,5 mm)		
Mounting		Through-bores ø 2.1 mm	Through-bores ø 3.2 mm	Through-bores ø 4.2 mm
Temperature range	Storage	-40 … +85 °C		
	Operation	-40 … +85 °C		
Connection		Stranded wires, approx. 6 cm		
Shock (DIN EN 60068-2-27)		50g / 10 ms in 1 direction, 1000 shocks		
Vibration (DIN EN 60068-2-6)		20g / 20 … 2000 Hz in 3 axes, 10 cycles each		
Protection class (DIN EN 60529)		IP50		
Weight		approx. 8 g	approx. 22 g	approx. 82 g

[1] FSO = Full Scale Output
[2] typ. 1 % up to max. 2 % FSO

3. Delivery

3.1 Unpacking/Included in Delivery

1 Sensor

1 Setup Guide

- Do not remove draw-wire displacement sensors from packaging using the wire or 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 your supplier.

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

Return of packaging

Micro-Epsilon Messtechnik GmbH & Co. KG offers customers the opportunity to return the packaging of products purchased from Micro-Epsilon by prior arrangement so that it can be reused or recycled.

To arrange the return of packaging, for questions about the costs and / or the exact return procedure, please contact us directly at

info@micro-epsilon.com

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 unintentional snapping.
> Risk of injury due to whiplash of the wire with eyelet

Temperature range:	-40 ... +85 °C (-40 ... +185 °F)
Humidity:	5 ... 95 % (non-condensing)
Atmospheric pressure	

⚠ CAUTION

Free return of measuring wire not permitted!

> Risk of injury due to whiplash of the wire with eyelet.

> Destruction of the wire and/or the sensor.

Secure the measuring wire during installation work.

4. Installation and Assembly

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 Mounting

Install the sensor according to the information in the table below:

Model	Screws for through-hole	Threaded holes (on sides)
WDS-40-MT19-P	2 x M2	-
WDS-80-MT33-P	2 x M3	8 x M2.5; depth 5 mm
WDS-130-MT56-P	2 x M4	8 x M3; depth 6 mm

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.

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

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

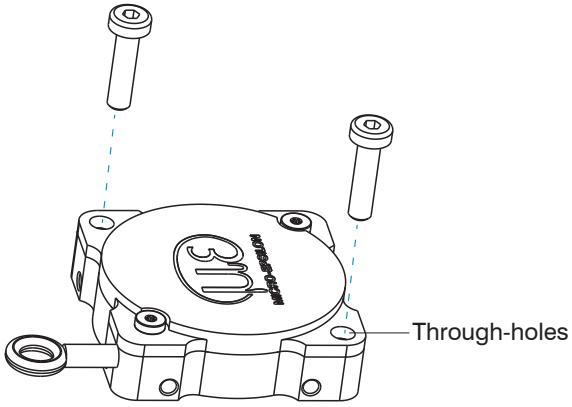


Fig. 2 Horizontal installation via through-holes

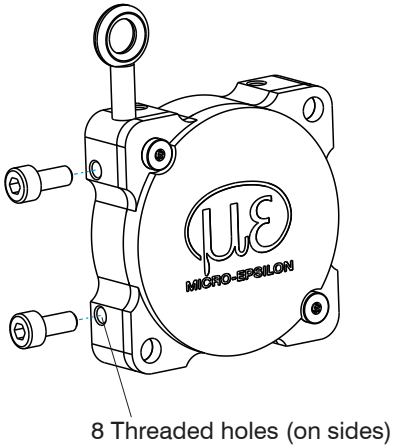


Fig. 3 Vertical installation via threaded side holes

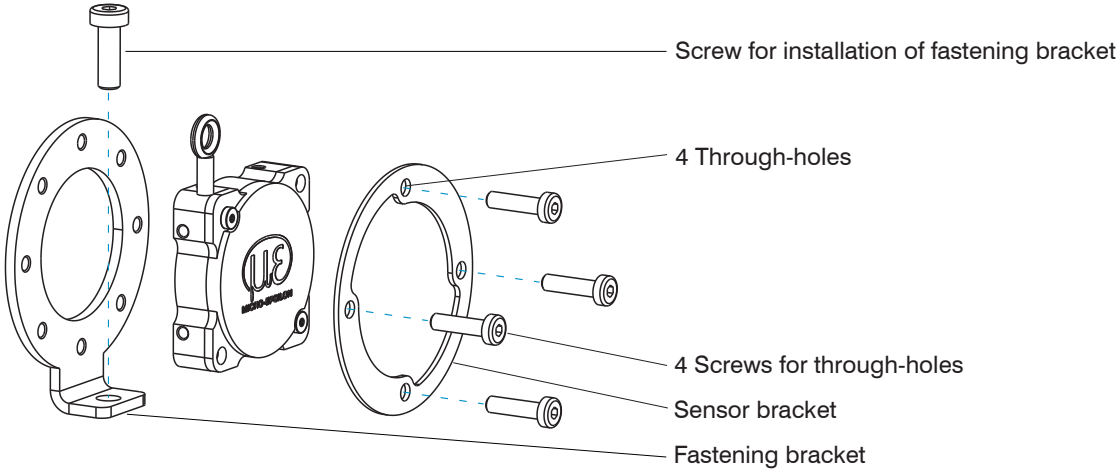


Fig. 4 Installation with the wire outlet at an infinitely variable angle (complete set), see A 1.2

i Combined installation is only possible for sensors WDS-80-MT33-P and WDS-130-MT56-P.

Additional installation options, see Fig. 4, are available in the appendix under Accessories, Mounting Bracket Set, see A 1.2.

⚠ 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

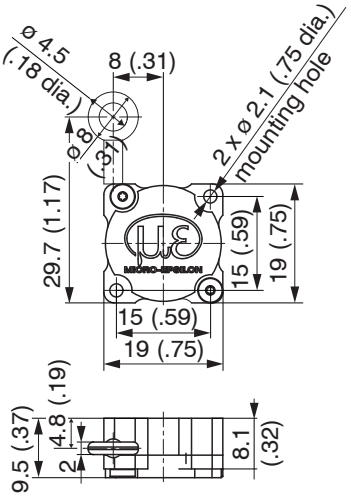


Fig. 5 Dimensional drawing WDS-40-MT19-P, dimensions in mm (inches, rounded off)

Cable outlet, see 4.4

Length of integrated cable: 6 cm (2.36 inches)

Cable diameter: Ø 1.2 mm (dia. 0.047 inches)

Cross-sectional area of wires: 0.04 mm² (AWG 31)

⚠ 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!

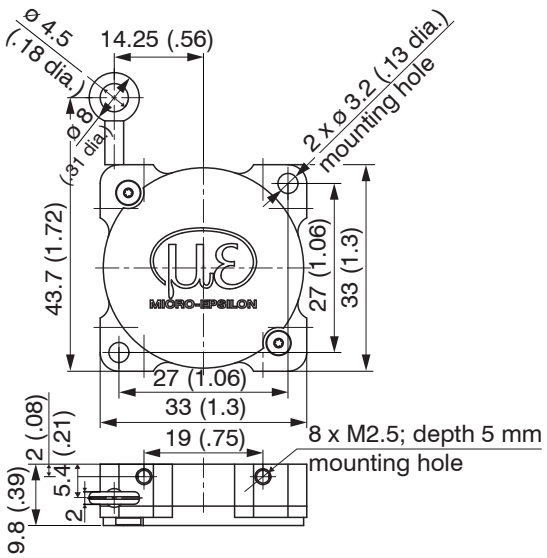


Fig. 6 Dimensional drawing WDS-80-MT33-P, dimensions in mm (inches, rounded off)

Cable outlet, see 4.4

Length of integrated cable: 6 cm (2.36 inches)

Cable diameter: Ø 1.2 mm (dia. 0.047 inches)

Cross-sectional area of wires: 0.034 mm² (AWG 32)

⚠ 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!

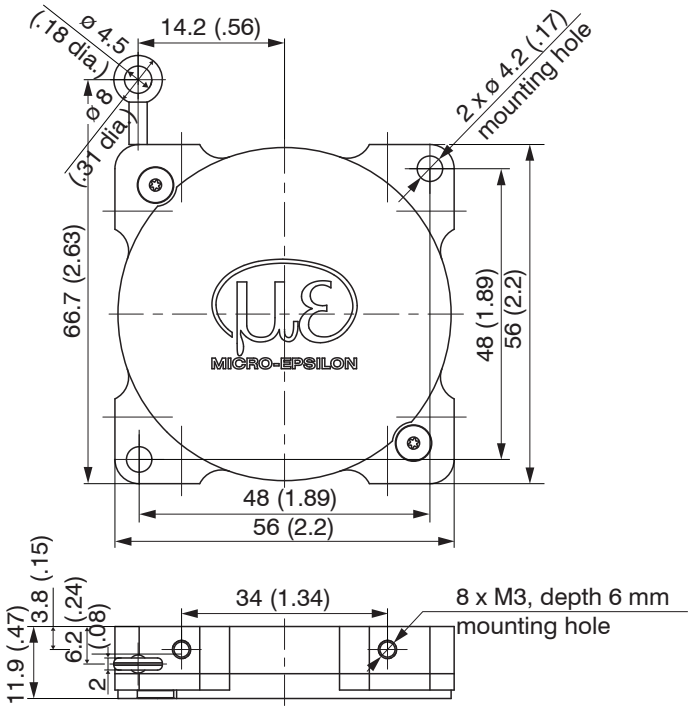


Fig. 7 Dimensional drawing WDS-130-MT56-P, dimensions in mm (inches, rounded off)

Cable outlet, see 4.4
Length of integrated cable: 6 cm (2.36 inches)
Cable diameter: Ø 1.2 mm (dia. 0.047 inches)
Cross-sectional area of wires: 0.034 mm² (AWG 32)

4.4 Cable Outlet

The integrated cable with 3 wires exits laterally from the sensor, see Fig. 8.

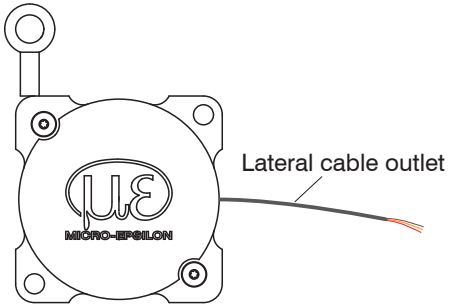


Fig. 8 Integrated cable, lateral outlet, example with WDS-80-MT33-P model

	WDS-40-MT19-P	WDS-80-MT33-P	WDS-130-MT56-P
Cable length	6 cm (2.36 inches)		
Cable diameter	Ø 1.2 mm (dia. 0.047 inches)		
Cross-sectional area of wires	0.04 mm² (AWG 31)	0.034 mm² (AWG 32)	0.034 mm² (AWG 32)

⚠ CAUTION

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

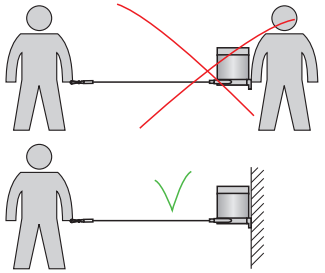
NOTICE

Do not twist the measuring wire!

4.5 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 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.

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

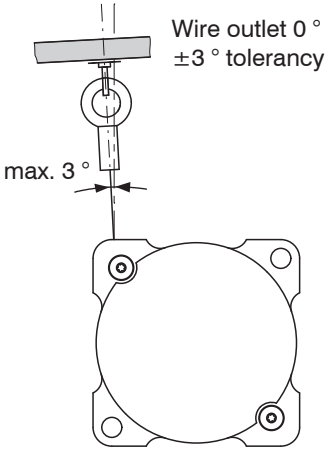


Fig. 9 Attachment and maximum diagonal pull of measuring wire

i For optimal wire guidance, the eyelet at the end of the measuring wire must move freely. Therefore, do not bolt the eyelet, e.g., with a screw or rivet.

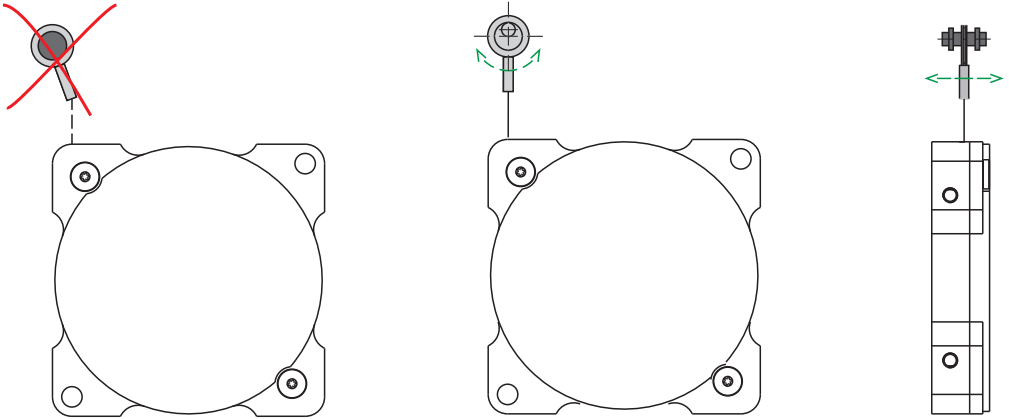


Fig. 10 Free-running eyelet

4.6 Potentiometer Output

Draw-wire displacement sensors with potentiometer output are connected according to the table, see Fig. 11.

		WDS-40-MT19-P	WDS-80-MT33-P	WDS-130-MT56-P
Input voltage		max. 30 VDC		
Resistance		5 kOhm ±5%	5 kOhm ±20%	
Recommended contact current		≤ 1 µA		
Temporary contact current		10 mA		
Pin assignment	Input+	Red	Brown	
	Ground	Black	Orange	
	Signal	Yellow	Red	

Fig. 11 Table of potentiometer output

Use any potentiometer only when switched to voltage divider. Using it as a variable resistor destroys the component. Observe maximum contact currents.

Use potentiometers only as voltage dividers, not as variable series resistors!

5. Operation

There are no adjustment and setting elements for draw-wire displacement sensors with potentiometer output.

6. Operation and Maintenance

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

Notes about how to guide the wire, see 4.5, must be observed during 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 and the firmware.

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/legal-details/.

8. Service, Repair

If the sensor or sensor cables are 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 system incl. cables to:

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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://environment.ec.europa.eu/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 legal details at https://www.micro-epsilon.com/legal-details/.
- 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 Optional Accessories

WE-xxxx-CLIP	Wire extension with wire clip and eyelet, see Fig. 12, use for xxxx wire length in mm (max. 10,000 mm)
WDS-MB19 Mounting bracket set	WDS-MB19 Mounting bracket for sensor WDS-40-MT19-P incl. screws for sensor fastening
WDS-MB33 Mounting bracket set	WDS-MB33 Mounting bracket for sensor WDS-80-MT33-P incl. screws for sensor fastening, see Fig. 18
WDS-MB56 Mounting bracket set	WDS-MB56 Mounting bracket for sensor WDS-130-MT56-P incl. screws for sensor fastening, see Fig. 19

A 1.1 Wire Extension

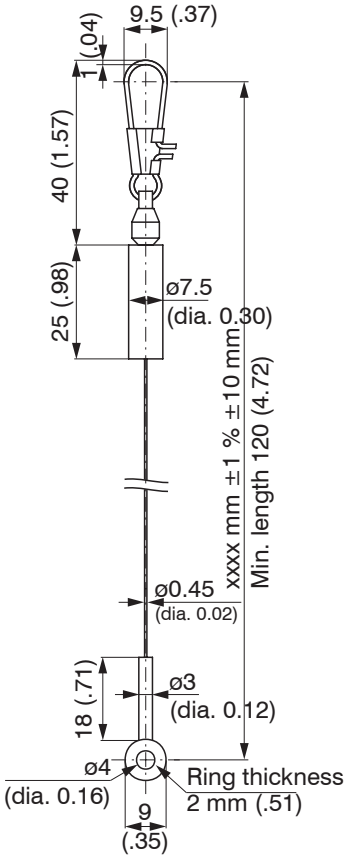


Fig. 12 Wire extension WE-xxxx-CLIP, dimensions in mm (inches, rounded off)

A 1.2 Mounting Bracket Set

The mounting bracket set provides you with various installation options, see Fig. 13, see Fig. 14, see Fig. 17.

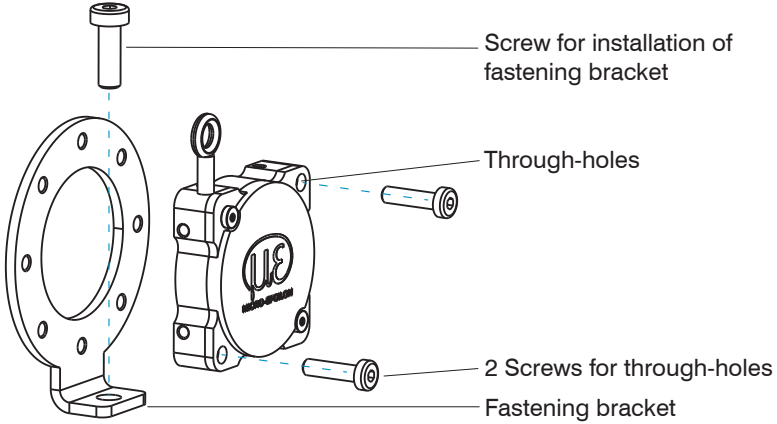


Fig. 13 Vertical installation with the wire outlet at a 45° angle

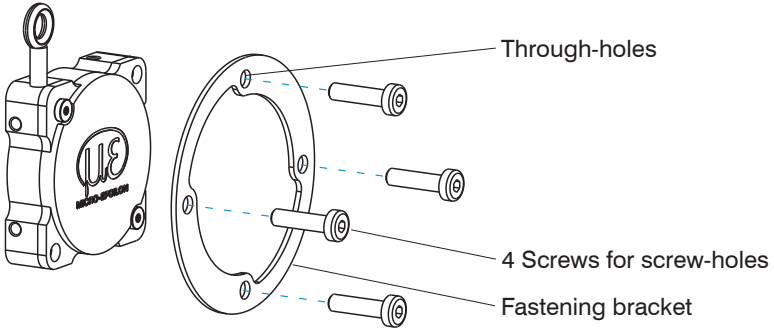
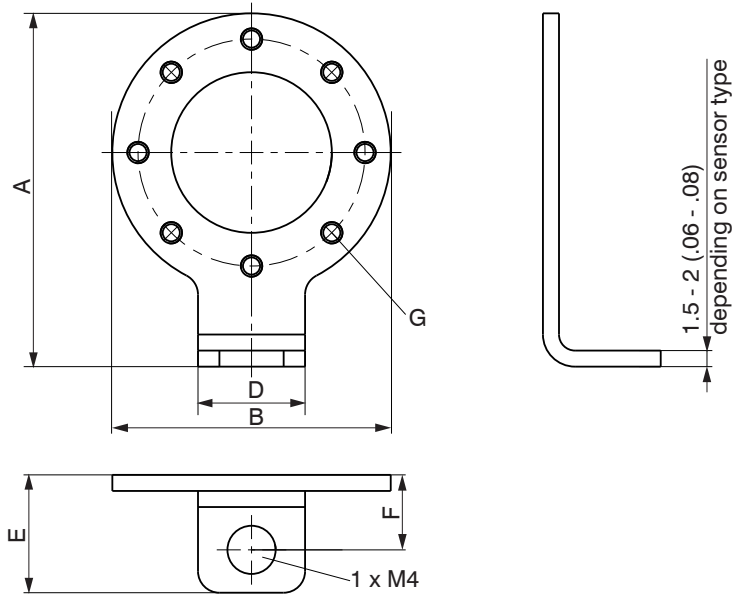


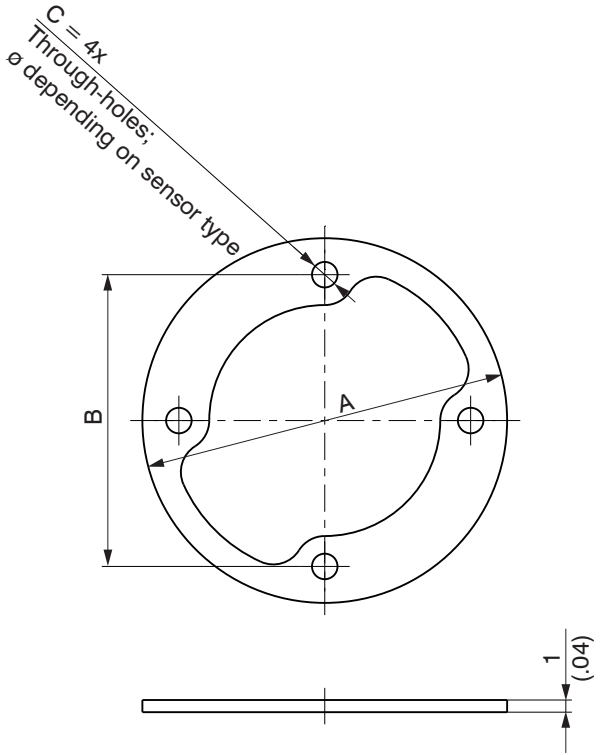
Fig. 14 Horizontal installation with the wire outlet at an infinitely variable angle

i If the device is installed with the wire outlet at an infinitely variable angle, mounting the sensor with only one screw and then rotating it around that screw may be sufficient, if the basic conditions are suitable for such an installation.



Dimensions of Fastening Bracket	WDS-MB19	WDS-MB33	WDS-MB56
A (height)	33 (1.30)	53 (2.09)	86 (3.39)
B (width)	26 (1.02)	46 (1.81)	78 (3.07)
D (width of foot)	10 (.39)	15 (.59)	15 (.59)
E (depth of foot)	11 (.43)	11.8 (.46)	11.8 (.46)
F (hole dimension in foot)	4.5 (.18)	4.5 (.18)	4.5 (.18)
G (thread size of fastening hole)	M2	M3	M3

Fig. 15 Dimensional drawing of mounting bracket set - fastening bracket, dimensions in mm (inches, rounded off)



Dimensions of Sensor Bracket		WDS-MB19	WDS-MB33	WDS-MB56
A	Outer ø	30 (1.18)	46 (1.81)	78 (3.07)
B	Pitch circle	24 (.94)	38.2 (1.50)	67.9 (2.67)
C	(ø of through-hole)	2.1 (.08)	3.2 (.13)	3.5 (.14)

Fig. 16 Dimensional drawing of mounting bracket set - sensor bracket, dimensions in mm (inches, rounded off)

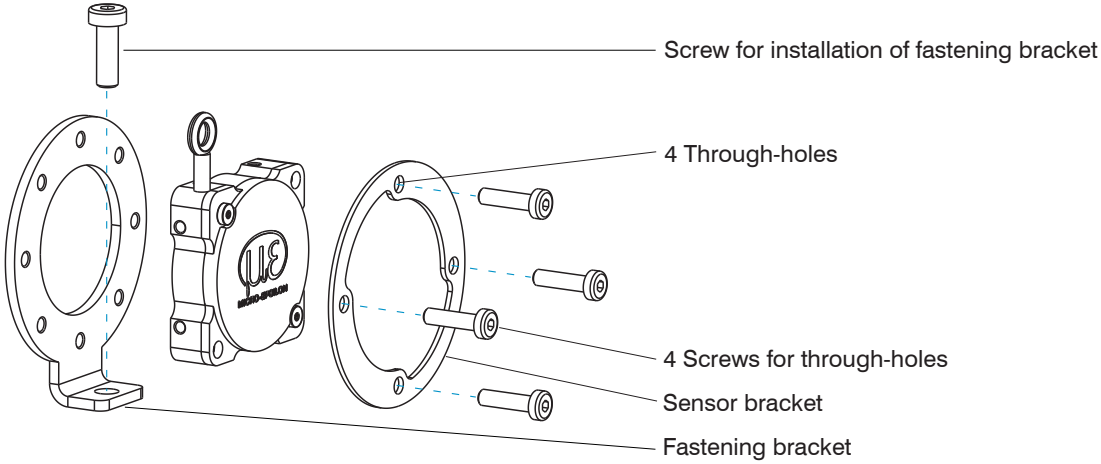


Fig. 17 Vertical installation with the wire outlet at an infinitely variable angle (complete set), see A 1.2

i Combined installation is only possible for sensors WDS-80-MT33-P and WDS-130-MT56-P.
For WDS-40-MT19-P, the parts in the mounting bracket set can only be used individually!

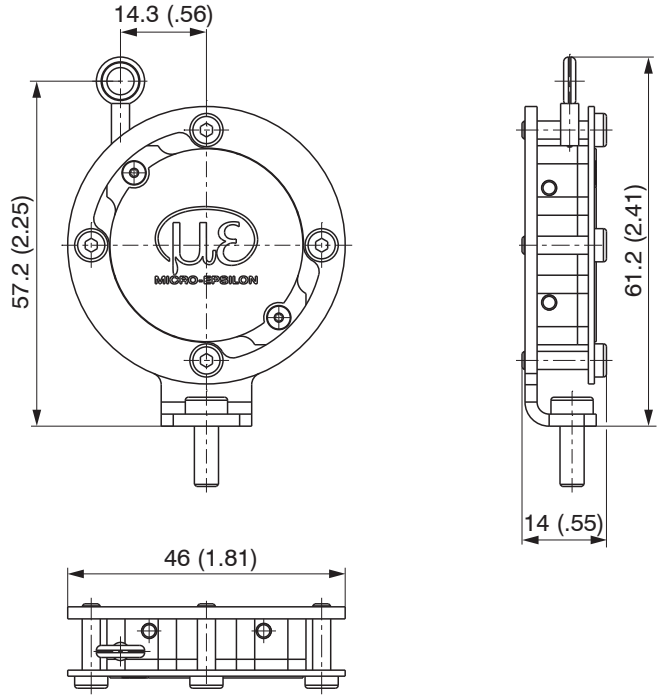


Fig. 18 Dimensional drawing of WDS-MB33 mounting bracket set - side view, dimensions in mm (inches, rounded off)

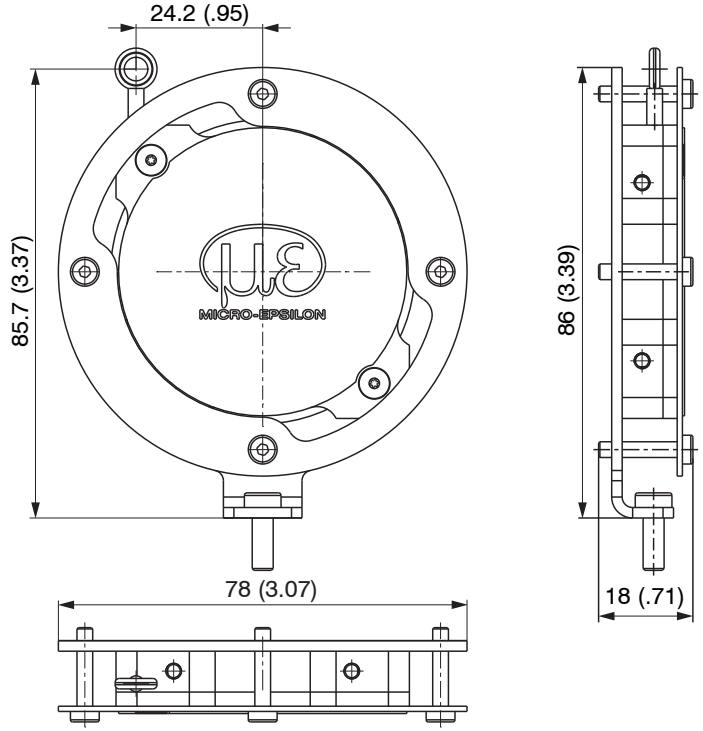


Fig. 19 Dimensional drawing of WDS-MB56 mounting bracket set - side view, dimensions in mm (inches, rounded off)

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