MICRO-EPSILON

Operating Instructions

wireSENSOR, WDS Series

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

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: 2008 Safety of machinery - Safety distances to prevent hazard zones being reached by upper and lower limbs
  - EN 60204-1: 2006 + EN 60204-1: 2006/A1: 2009 Safety of machinery - Electrical equipment of machines - Part 1: General requirements
- Directive 2011/65/EU (RoHS)
  - EN 50581: 2012 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, May 22th 2019

Dr. Thomas Wisspeintner
Managing Director

Tel. +49 (0) 8542 / 168-0
Fax +49 (0) 8542 / 168-90

e-mail info@micro-epsilon.de
www.micro-epsilon.com

Contents

Appendix

1. Safety

Sensor operation assumes knowledge of the operating instructions.

1.1 Symbols Used

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 mounting bolts/hooks

> 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

NOTICE

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

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

For WDS draw-wire displacement sensors with potentiometer output, the directives 2006/42/EC and 2011/65/EU shall apply.

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

1.4 Intended Use

- Draw-wire displacement sensors are used for test applications during crash tests, for simulators and in test benches.
- Sensors must only be operated within the limits specified in the technical data, see Chap. 2.3.
- Draw-wire displacement sensors 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

- Sensor protection class: IP 50
- Temperature range:
  - Operation: -40 °C ... +85 °C (-40 ... +185 °F)
  - Storage: -40 °C ... +85 °C (-40 ... +185 °F)
- Humidity: 5 - 95% (non-condensing)
- Ambient pressure: Atmospheric pressure

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.

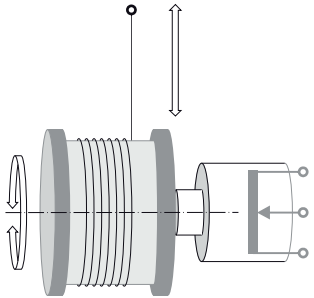


Fig. 1 Draw-wire displacement sensor with potentiometer

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
Analog output		Potentiometer		
Measuring range		40 mm	80 mm	130 mm
Resolution		Towards infinity		
Linearity		≤ ± 1 %	≤ ± 0.4 %	≤ ± 0.4 %
Sensor element		Potentiometer made of conductive plastic		
Wire extension force (max)		2.0 N	1.5 N	1.0 N
Wire retraction force (min.)		0.7 N	0.5 N	0.3 N
Wire acceleration (max.)		60 g	60 g	15 g
Material	Housing	Aluminum		
	Measuring wire	Stainless steel		
Wire mounting		Eyelet (ø 4.5 mm)		
Installation		Through-holes ø 2.1 mm	Through-holes ø 3.2 mm	Through-holes ø 4.2 mm
Temperature range	Operation	-40 to +85 °C (-40 ... +185 °F)		
	Storage	-40 to +85 °C (-40 ... +185 °F)		
Connection		Stranded wires, approx. 6 cm		
Shock (DIN EN 60068-2-29)		50 g, 10 ms in 3 axes, 1 direction and 1000 shocks each		
Vibration (DIN EN 60068-2-6)		20 g/ 20 Hz ... 2 kHz in 3 axes and 10 cycles each		
Protection class (DIN EN 60529)		IP 50		
Typ. service life		1 million cycles		
Weight		approx. 8 g	approx. 22 g	approx. 82 g

⚠ CAUTION

Free return of measuring wire not permitted!

> Risk of injury due to whiplash of the wire with mounting bolts/ hooks.

> Destruction of the wire and/or the sensor.

3. Delivery

3.1 Unpacking/Included in Delivery

1 Sensor

1 Assembly instructions

- Do not remove draw-wire displacement sensors from packaging using the wire, threaded bolts on the wire or the wire eye.
- 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.

Optional accessories are listed in the appendix, see Chap. 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 mounting bolts/hooks

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

⚠ CAUTION

Free return of measuring wire not permitted!

> Risk of injury due to whiplash of the wire with mounting bolts/ hooks.

> 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.

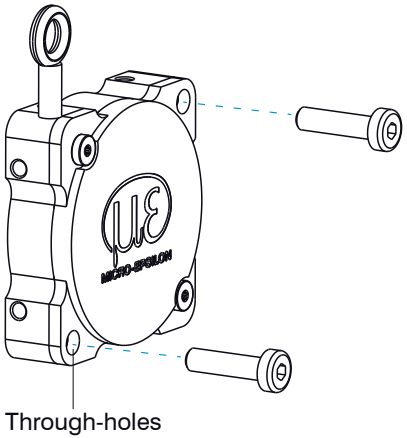


Fig. 2 Horizontal installation via through-holes

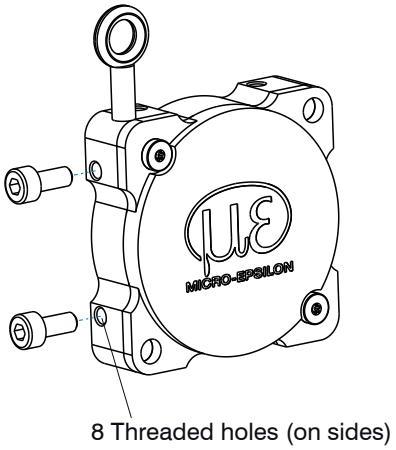


Fig. 3 Vertical installation via threaded side holes

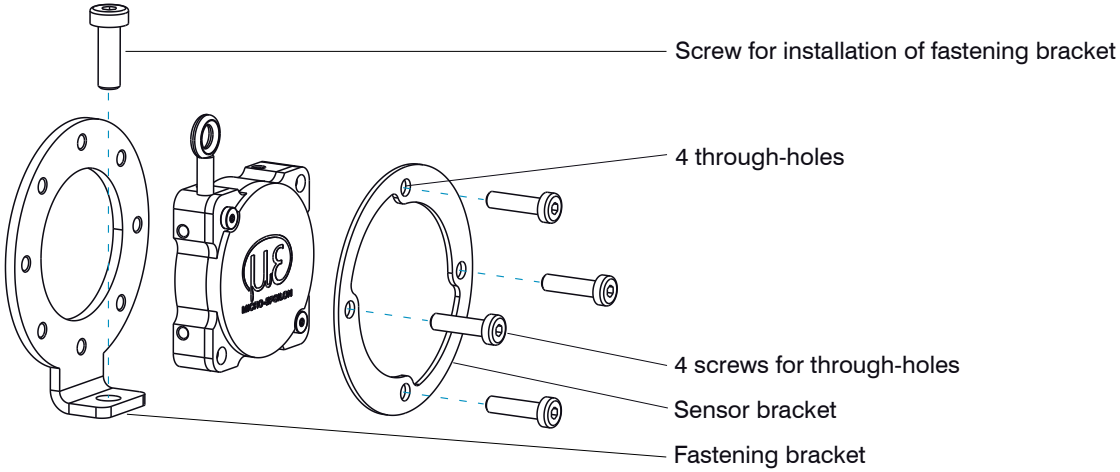


Fig. 4 Installation with the wire outlet at an infinitely variable angle (complete set), see Chap. A 1.2

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 Chap. 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

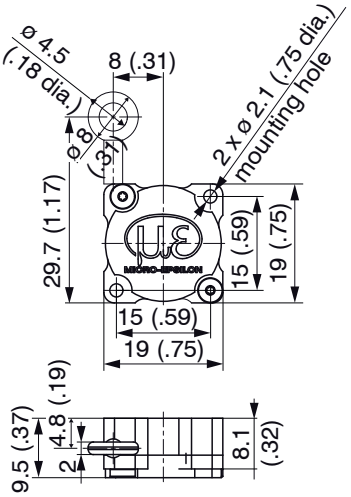


Fig. 5 Dimensional drawing WDS-40-MT19-P, dimensions in mm, not to scale

⚠ 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!

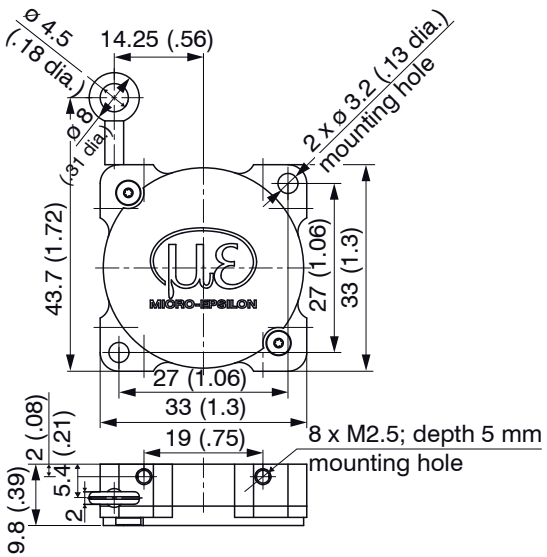


Fig. 6 Dimensional drawing WDS-80-MT33-P, dimensions in mm, not to scale

⚠ 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!

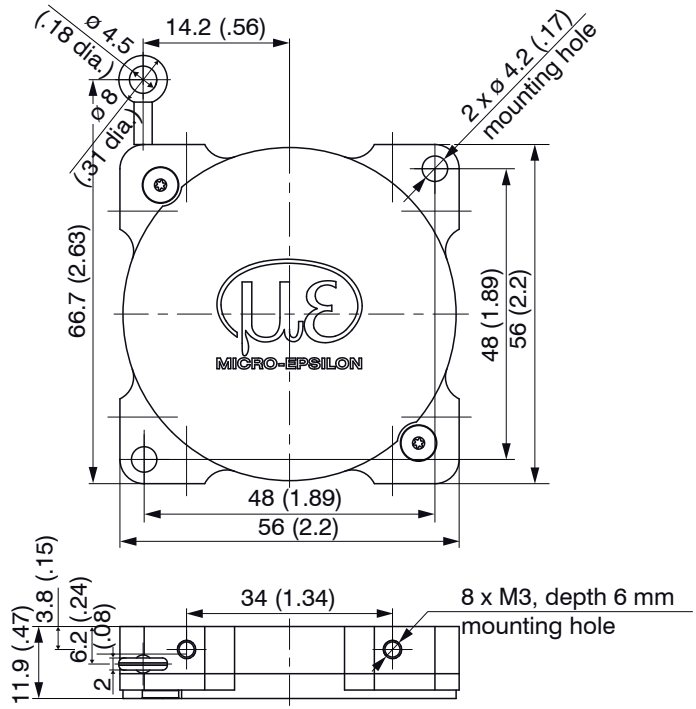


Fig. 7 Dimensional drawing WDS-130-MT56-P, dimensions in mm, not to scale

⚠ CAUTION

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

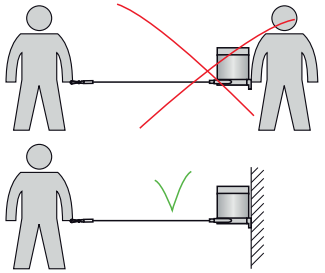
NOTICE

Do not twist the measuring wire!

4.4 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.



➡ Attach the measuring wire to the measured object by using a wire eye.

➡ 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.

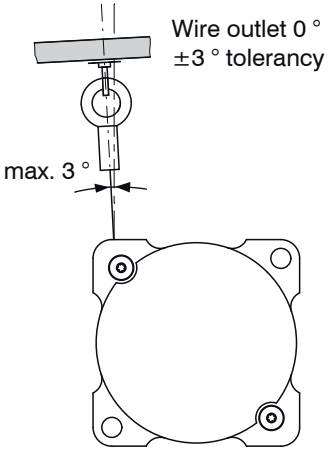


Fig. 8 Attachment and maximum diagonal pull of measuring wire

4.5 Potentiometer Output

Draw-wire displacement sensors with potentiometer output are connected according to the table, see Fig. 9.

		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. 9 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 Chap. 4.4, 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. Repairs are carried out exclusively by MICRO-EPSILON, see Chap. 9.

7. Liability for Material Defects

All components of the device have been checked and tested for functionality at the factory. However, if defects occur despite our careful quality control, MICRO-EPSILON or your dealer must be notified immediately.

The liability for material defects is 12 months from delivery. Within this period, defective parts, except for wearing parts, will be repaired or replaced free of charge, if the device is returned to MICRO-EPSILON with shipping costs prepaid. Any damage that is caused by improper handling, the use of force or by repairs or modifications by third parties is not covered by the liability for material defects. Repairs are carried out exclusively by MICRO-EPSILON.

Further claims can not be made. Claims arising from the purchase contract remain unaffected. In particular, MICRO-EPSILON shall not be liable for any consequential, special, indirect or incidental damage. In the interest of further development, MICRO-EPSILON reserves the right to make design changes without notification. For translations into other languages, the German version shall prevail.

8. Decommissioning, Disposal

➪ Disconnect the measuring wire from the measured object. Do not let the measuring wire return without control (snap).

Incorrect disposal may cause harm to the environment.

➪ Dispose of the device, 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.

9. Service, Repair

In the event of a defect in the sensor, please send in the affected parts for repair or replacement.

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

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

Appendix

A 1 Accessories

WE-xxxx-CLIP	Wire extension with wire clip and eyelet, see Fig. 10, 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. 16
WDS-MB56 Mounting bracket set	WDS-MB56 Mounting bracket for sensor WDS-130-MT56-P incl. screws for sensor fastening, see Fig. 17

A 1.1 Wire Extension

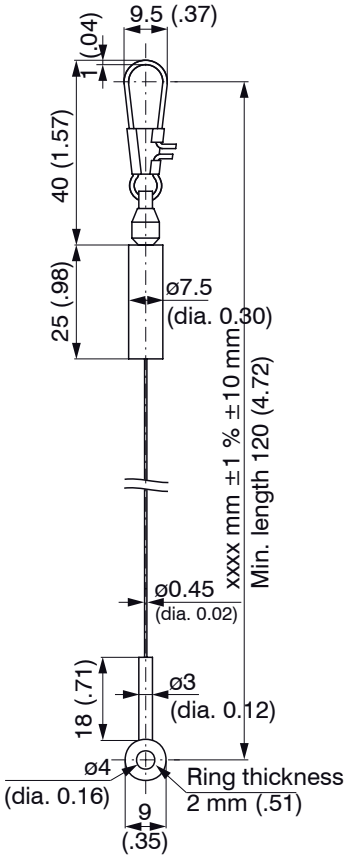


Fig. 10 Wire extension WE-xxxx-CLIP, dimensions in mm, not to scale

A 1.2 Mounting Bracket Set

The mounting bracket set provides you with various installation options, see Fig. 11, see Fig. 12, see Fig. 15.

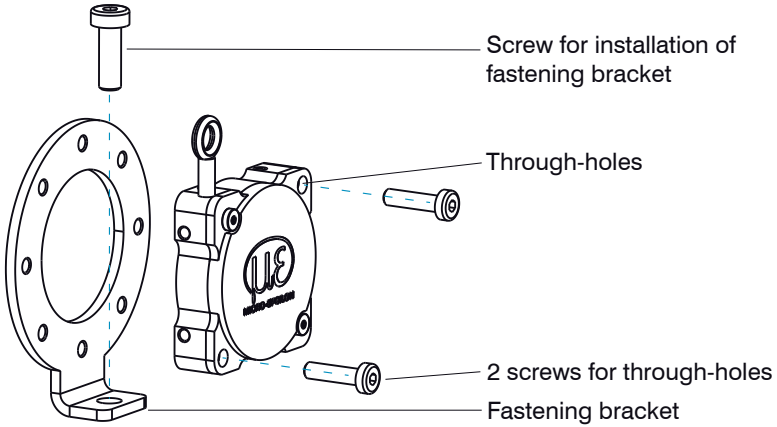


Fig. 11 Vertical installation with the wire outlet at a 45° angle

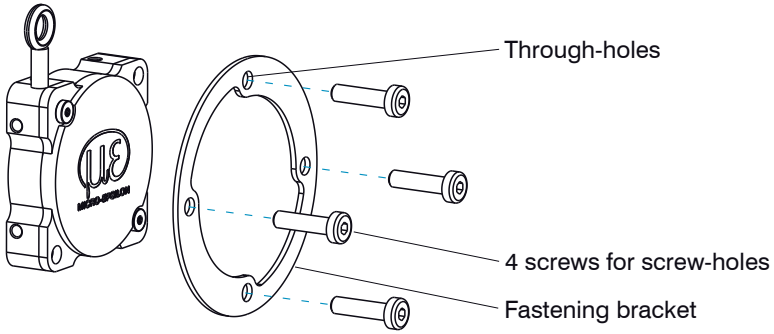
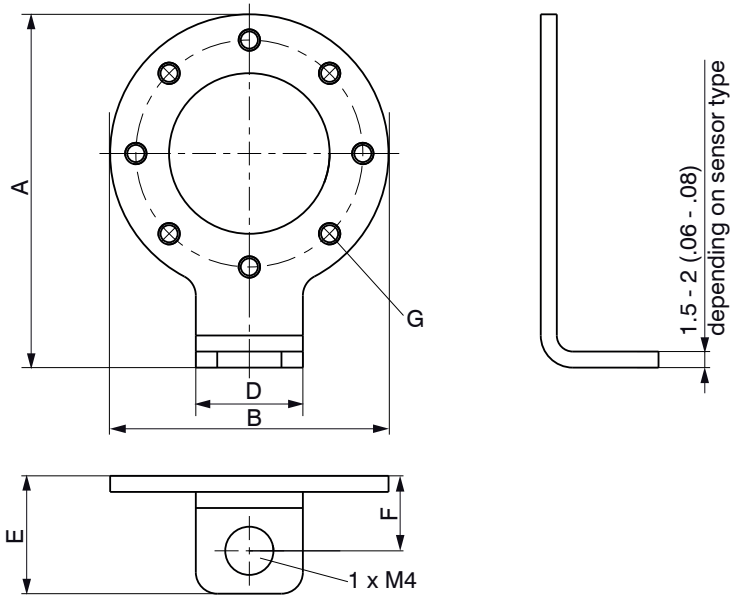


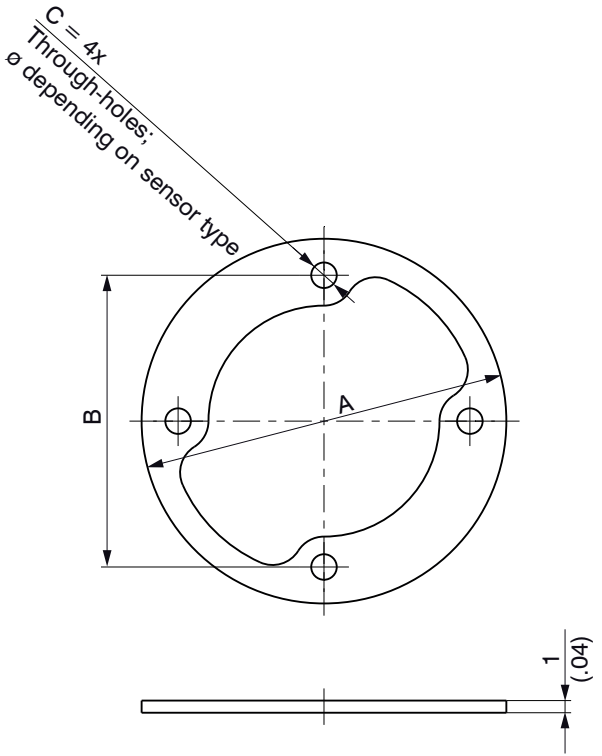
Fig. 12 Horizontal installation with the wire outlet at an infinitely variable angle

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	53	86
B (width)	26	46	78
D (width of foot)	10	15	15
E (depth of foot)	11	11.8	11.8
F (hole dimension in foot)	4.5	4.5	4.5
G (thread size of fastening hole)	M2	M3	M3

Fig. 13 Dimensional drawing of mounting bracket set - fastening bracket, dimensions in mm, not to scale



Dimensions of Sensor Bracket		WDS-MB19	WDS-MB33	WDS-MB56
A	Outer ø	30	46	78
B	Pitch circle	24	38.2	67.9
C	(ø of through-hole)	2.1	3.2	3.5

Fig. 14 Dimensional drawing of mounting bracket set - sensor bracket, dimensions in mm, not to scale

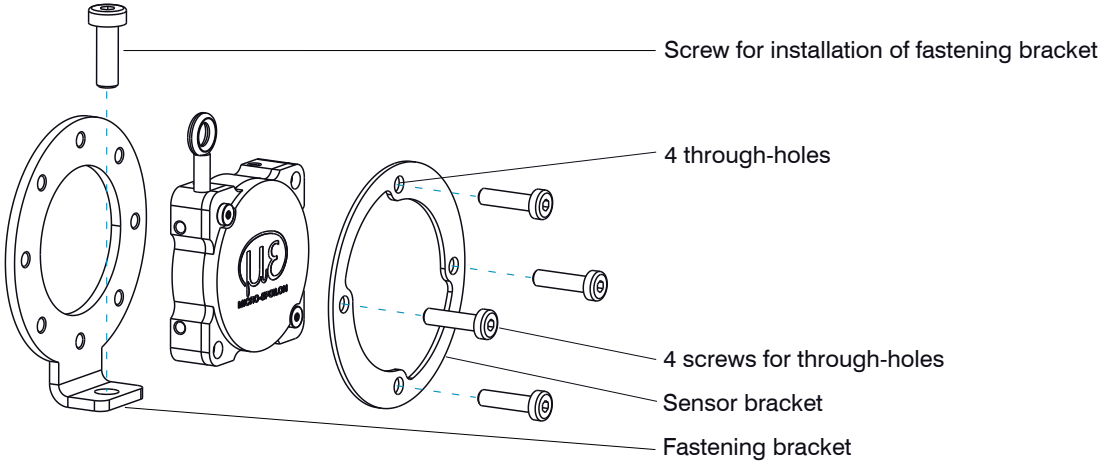


Fig. 15 Vertical installation with the wire outlet at an infinitely variable angle (complete set), see Chap. A 1.2

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!

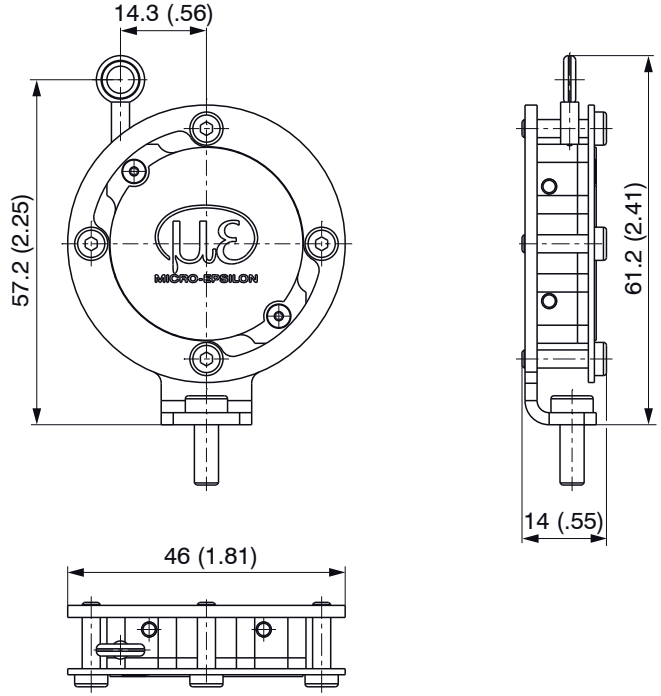


Fig. 16 Dimensional drawing of WDS-MB33 mounting bracket set - side view, dimensions in mm, not to scale

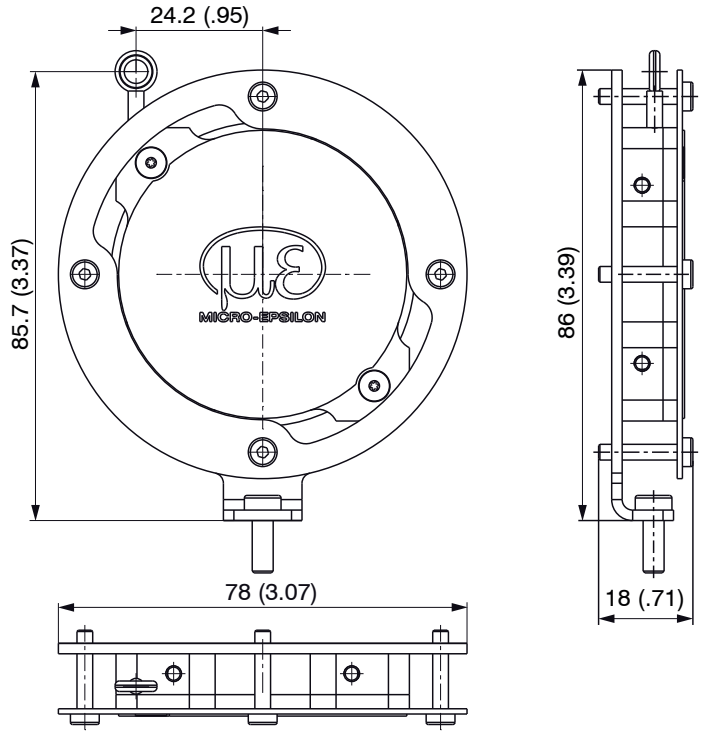


Fig. 17 Dimensional drawing of WDS-MB56 mounting bracket set - side view, dimensions in mm, not to scale

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.de

X9751401-A021079HDR