

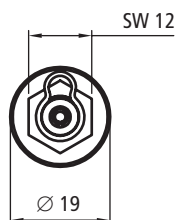
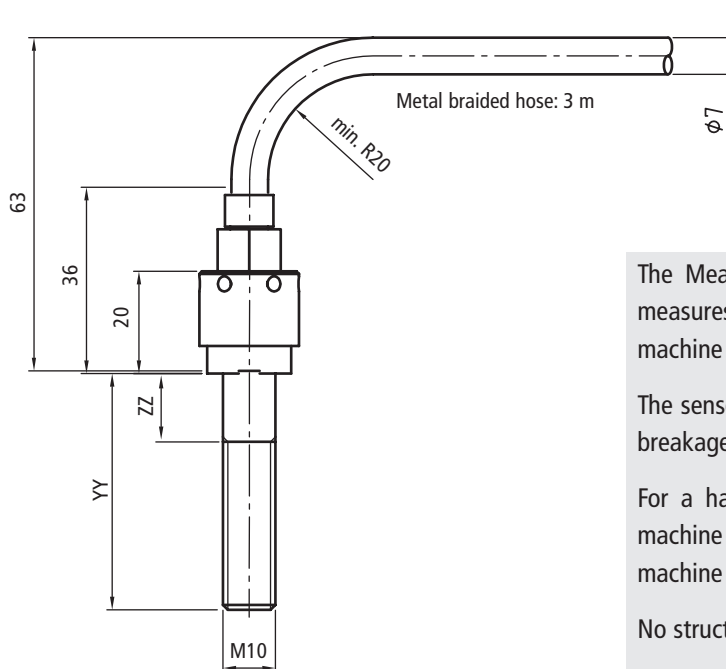
Piezoelectric Force Sensor

Measuring Bolt M 10 I

**Tool Monitoring,
Breakage Detection, Collision Protection**

**Ideal for Easy Retrofitting
on Machine Tools!**

Installed in Minutes!



Part numbers

Sensor head for Measuring Bolt M 10 I
Art.-Nr.: **0.SH.BSP.M10I**

Bolt screw for Measuring Bolt (cylinder head screw M 10 I with hexagon socket according to ISO 4762, please specify the desired YY- and ZZ-values)

Art.-Nr.: **0.SH.BSP.M10IYYZZ**

also available as Measuring Bolt M 12 I, M 14 I, M 16 I, and M 20 I – further lengths and Bolt diameters at request.

The Measuring Bolt is a piezoelectric force sensor which measures forces proportional to the load on the installed machine components.

The sensor is designed to catch any overload, collision, tool breakage or missing tool.

For a hassle free retrofit on your existing manufacturing machine the measuring bolt can be installed on any turret or machine block and there are no pockets needed.

No structural changes have to be executed on the machine.

Scope of delivery

Sensor Head and bolt screw, screw accessories for cable installation on the charge amplifier, 2 cable clamps with screws, this data sheet.

Cable configuration

Perbunane protection hose with metal braiding, \varnothing 7 mm, smallest bending radius $R = 20$ mm, Standard length $L = 3$ m, can be shortened, longer cable by request. Alternatively PU 4 protection hose without metal braiding.

Technical data of Measuring Bolt M 10 I

Sensitivity Sensor head	Fz -2.1 pC/N
Temperature range	-50 to +80°C / (-58 to 176°F)
Protection level	IP68, oil- and coolant-proof
Enclosure	Chromium nickel steel

Installation

- ① Replace one of the existing bolts on the dedicated machine part with the bolt of Measuring Bolt M 10 I (see fig.1).

For revolvers it is recommended to replace the two bolts which are closest to the revolver plate (or respectively the tool position) with Measuring Bolts.

- ② Install the bolt of Measuring Bolt M 10 I according to the specifications of its function / of the machine tool manufacturer of the machine part by means of an Allen key (see fig. 2 – make sure to use all mounting elements, like washers etc.).

Use Loctite 222 as a fluid low-strength threadlocker for the outer thread on the bolt head before installing the sensor head. Make sure to coat the thread of the bolt head only with threadlocker.

- ③ Place the sensor head of the Measuring Bolt M 10 I (Loctite 222 must be applied before) on the bolt (see fig. 3) and

hand-tighten it first. Make sure that all surfaces are clean (clean with alcohol if needed).

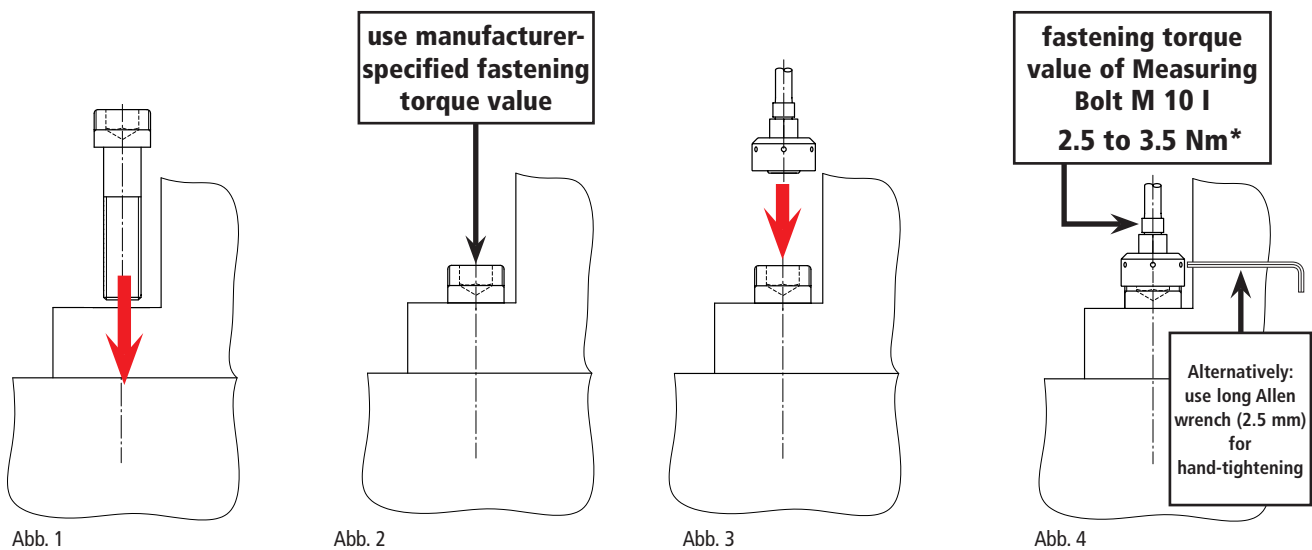
- ④ Now tighten the sensor head with a suitable torque wrench (torque 2.5 to 3.5 Nm*, fig. 4).

If you should deinstall the Sensor Head later, please make sure to clean off all remnants of the threadlocker with a wire brush from the bolt head first.

For cleaning of sensor, cable, or protection hose alcohol-based cleaning fluids have to be used, **never use acetone-containing agents.**

IMPORTANT: The protection hose has to be fixed on at least two locations on the machine in order to avoid that any forces can be transferred via the protection hose to the sensor.

In order to avoid temperature drift of the measured signal the sensor has to be protected by metal cover plates from direct coolant contact, metal chips.



***NOTE: Do never exceed this fastening torque value! The resulting mechanical overload most likely will destroy the sensor.**

**If no suitable torque wrench is available you may use as a makeshift tool the provided Allen wrench (long) for Allen*

screws 2.5 mm. Insert the Allen wrench into one of the six holes of the Sensor Head. Use the Allen wrench to hand-tighten the Sensor Head – as soon as the wrench bends under your hand pressure, the correct fastening torque value is achieved.

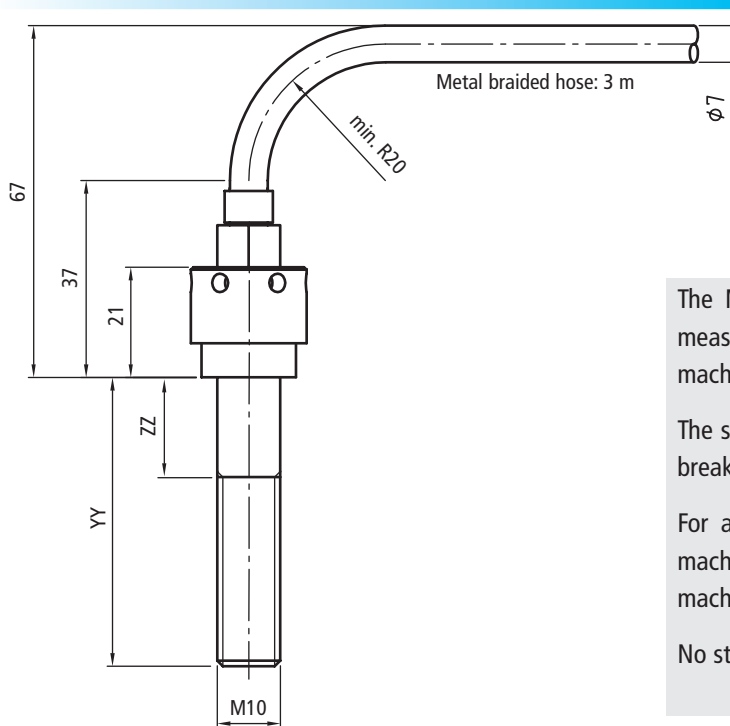
Piezoelectric Force Sensor

Measuring Bolt M 12 I

**Tool Monitoring,
Breakage Detection, Collision Protection**

**Ideal for Easy Retrofitting
on Machine Tools!**

Installed in Minutes!



The Measuring Bolt is a piezoelectric force sensor which measures forces proportional to the load on the installed machine components.

The sensor is designed to catch any overload, collision, tool breakage or missing tool.

For a hassle free retrofit on your existing manufacturing machine the measuring bolt can be installed on any turret or machine block and there are no pockets needed.

No structural changes have to be executed on the machine.

Scope of delivery

Sensor Head and bolt screw, screw accessories for cable installation on the charge amplifier, 2 cable clamps with screws, this data sheet.

Cable configuration

Perbunane protection hose with metal braiding, $\phi 7$ mm, smallest bending radius $R = 20$ mm, Standard length $L = 3$ m, can be shortened, longer cable by request. Alternatively PU 4 protection hose without metal braiding.

Technical data of Measuring Bolt M 12 I

Sensitivity Sensor head	Fz -2.1 pC/N
Temperature range	-50 to +80°C / (-58 to 176°F)
Protection level	IP68, oil- and coolant-proof
Enclosure	Chromium nickel steel

Part numbers

Sensor head for Measuring Bolt M 12 I
Art.-Nr.: **0.SH.BSP.M12I**

Bolt screw for Measuring Bolt (cylinder head screw M 16 I with hexagon socket according to ISO 4762, please specify the desired YY- and ZZ-values)

Art.-Nr.: **0.SH.BSP.M12IYYZZ**

also available as Measuring Bolt M 10 I, M 14 I, M 16 I, and M 20 I – further lengths and Bolt diameters at request.

Installation

- ① Replace one of the existing bolts on the dedicated machine part with the bolt of Measuring Bolt M 12 I (see fig.1).

For revolvers it is recommended to replace the two bolts which are closest to the revolver plate (or respectively the tool position) with Measuring Bolts.

- ② Install the bolt of Measuring Bolt M 12 I according to the specifications of its function / of the machine tool manufacturer of the machine part by means of an Allen key (see fig. 2 – make sure to use all mounting elements, like washers etc.).

Use Loctite 222 as a fluid low-strength threadlocker for the outer thread on the bolt head before installing the sensor head. Make sure to coat the thread of the bolt head only with threadlocker.

- ③ Place the sensor head of the Measuring Bolt M 12 I (Loctite 222 must be applied before) on the bolt (see fig. 3) and

hand-tighten it first. Make sure that all surfaces are clean (clean with alcohol if needed).

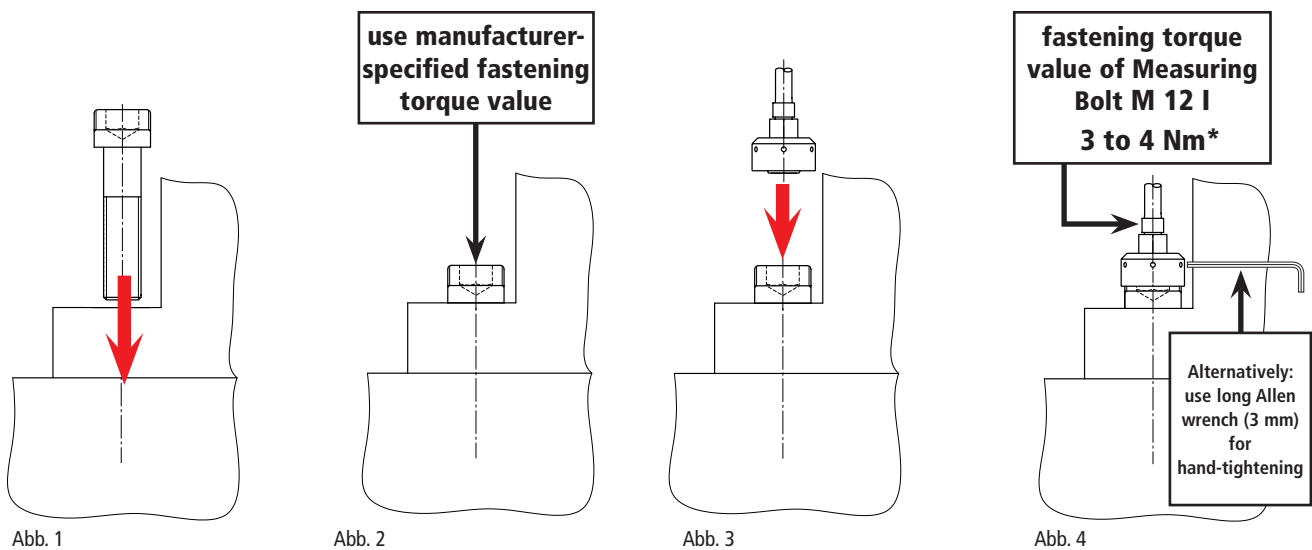
- ④ Now tighten the sensor head with a suitable torque wrench (torque 3 to 4 Nm*, fig. 4).

If you should deinstall the Sensor Head later, please make sure to clean off all remnants of the threadlocker with a wire brush from the bolt head first.

For cleaning of sensor, cable, or protection hose alcohol-based cleaning fluids have to be used, **never use acetone-containing agents.**

IMPORTANT: The protection hose has to be fixed on at least two locations on the machine in order to avoid that any forces can be transferred via the protection hose to the sensor.

In order to avoid temperature drift of the measured signal the sensor has to be protected by metal cover plates from direct coolant contact, metal chips.



***NOTE: Do never exceed this fastening torque value! The resulting mechanical overload most likely will destroy the sensor.**

**If no suitable torque wrench is available you may use as a makeshift tool the provided Allen wrench (long) for Allen*

screws 3 mm. Insert the Allen wrench into one of the six holes of the Sensor Head. Use the Allen wrench to hand-tighten the Sensor Head – as soon as the wrench bends under your hand pressure, the correct fastening torque value is achieved.

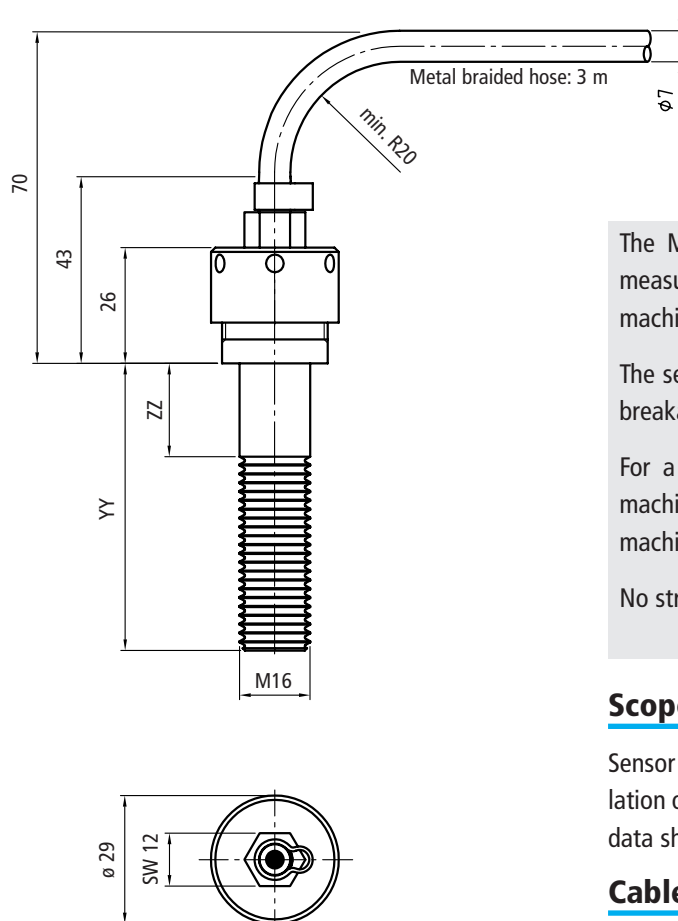
Piezoelectric Force Sensor

Measuring Bolt M 16 I

**Tool Monitoring,
Breakage Detection, Collision Protection**

**Ideal for Easy Retrofitting
on Machine Tools!**

Installed in Minutes!



The Measuring Bolt is a piezoelectric force sensor which measures forces proportional to the load on the installed machine components.

The sensor is designed to catch any overload, collision, tool breakage or missing tool.

For a hassle free retrofit on your existing manufacturing machine the measuring bolt can be installed on any turret or machine block and there are no pockets needed.

No structural changes have to be executed on the machine.

Scope of delivery

Sensor Head and bolt screw, screw accessories for cable installation on the charge amplifier, 2 cable clamps with screws, this data sheet.

Cable configuration

Perbunane protection hose with metal braiding, \varnothing 7 mm, smallest bending radius $R = 20$ mm, Standard length $L = 3$ m, can be shortened, longer cable by request. Alternatively PU 4 protection hose without metal braiding.

Technical data of Measuring Bolt M 16 I

Sensitivity Sensor head	Fz -2.1 pC/N
Temperature range	-50 to +80°C / (-58 to 176°F)
Protection level	IP68, oil- and coolant-proof
Enclosure	Chromium nickel steel

Part numbers

Sensor head for Measuring Bolt M 16 I
Art.-Nr.: **0.SH.BSP.M16I**

Bolt screw for Measuring Bolt (cylinder head screw M 16 I with hexagon socket according to ISO 4762, please specify the desired YY- and ZZ-values)

Art.-Nr.: **0.SH.BSP.M16IYYZZ**

also available as Measuring Bolt M 10 I, M 12 I, M 14 I, and M 20 I – further lengths and Bolt diameters at request.

Installation

- ① Replace one of the existing bolts on the dedicated machine part with the bolt of Measuring Bolt M 16 I (see fig.1).

For revolvers it is recommended to replace the two bolts which are closest to the revolver plate (or respectively the tool position) with Measuring Bolts.

- ② Install the bolt of Measuring Bolt M 16 I according to the specifications of its function / of the machine tool manufacturer of the machine part by means of an Allen key (see fig. 2 – make sure to use all mounting elements, like washers etc.).

Use Loctite 222 as a fluid low-strength threadlocker for the outer thread on the bolt head before installing the sensor head. Make sure to coat the thread of the bolt head only with threadlocker.

- ③ Place the sensor head of the Measuring Bolt M 16 I (Loctite 222 must be applied before) on the bolt (see fig. 3) and

hand-tighten it first. Make sure that all surfaces are clean (clean with alcohol if needed).

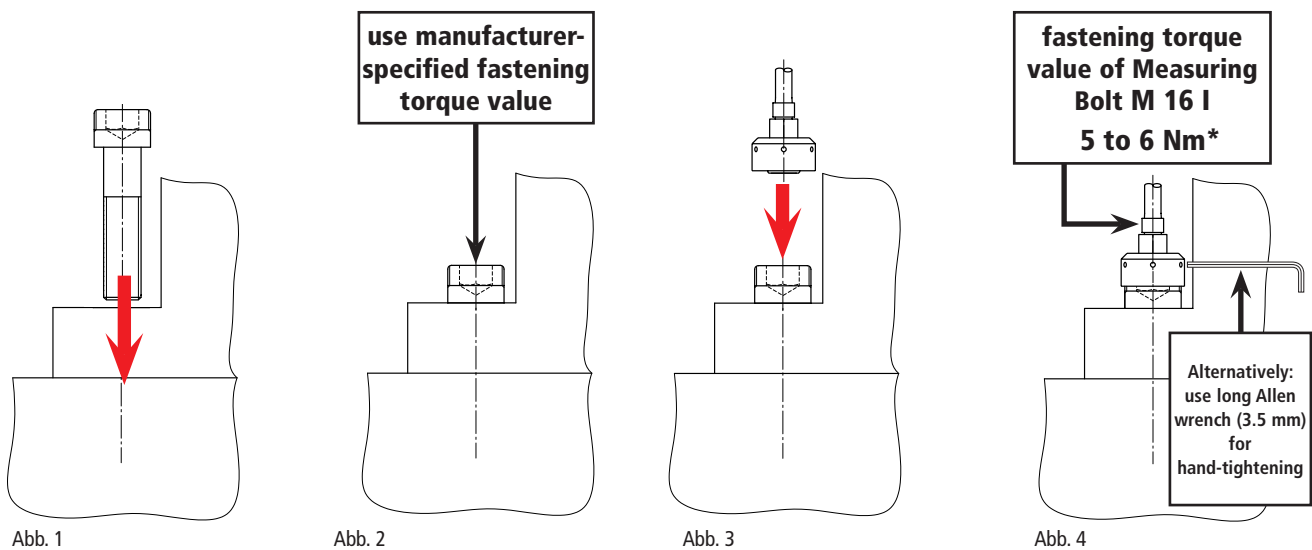
- ④ Now tighten the sensor head with a suitable torque wrench (torque 5 to 6 Nm*, fig. 4).

If you should deinstall the Sensor Head later, please make sure to clean off all remnants of the threadlocker with a wire brush from the bolt head first.

For cleaning of sensor, cable, or protection hose alcohol-based cleaning fluids have to be used, **never use acetone-containing agents.**

IMPORTANT: The protection hose has to be fixed on at least two locations on the machine in order to avoid that any forces can be transferred via the protection hose to the sensor.

In order to avoid temperature drift of the measured signal the sensor has to be protected by metal cover plates from direct coolant contact, metal chips.



***NOTE: Do never exceed this fastening torque value! The resulting mechanical overload most likely will destroy the sensor.**

**If no suitable torque wrench is available you may use as a makeshift tool the provided Allen wrench (long) for Allen*

screws 3.5 mm. Insert the Allen wrench into one of the six holes of the Sensor Head. Use the Allen wrench to hand-tighten the Sensor Head – as soon as the wrench bends under your hand pressure, the correct fastening torque value is achieved.