

Quartz Miniature Force Sensor with Single-Wire Technique

Type 9211AAE

Sensor for indirect cavity pressure measurement in injection molding.

- Ideally suited for industrial application
- Single-wire technique

Description

Miniature quartz force sensor for measuring dynamic and quasistatic pressures in the mold in injection molding via an ejector or measuring pin (s. Fig. 4). Very high resolution, high natural frequency, very small dimensions, welded construction.

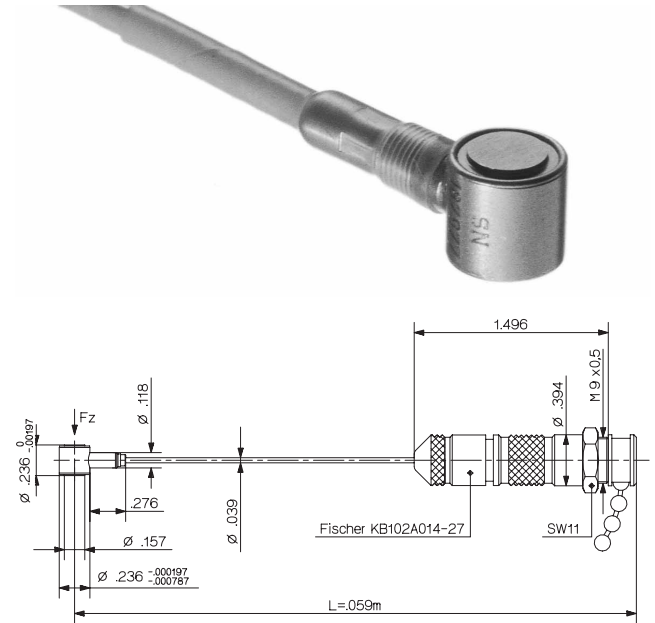
Simplified sensor installation by means of the single-wire cable, which can be flexibly installed in the mold and cut to length as required. The connector is exchangeable. The cable is tightly attached to the sensor case.

The charge signal of the sensor (pC = pico Coulombs) is transformed into a proportional output voltage in the Kistler charge amplifier. Within wide limits, the output voltage does not depend on the length of the sensor cable. At the standard amplifier output it has a max. value of 10 V. On the most sensitive range 1 N/V is obtained for the force sensor Type 9211AAE.

This product complies with the **CE** standard 89//336/EEC.

Application

This sensor is particularly suitable for optimizing, monitoring and controlling the injection molding process of thermoplastics, elastomers, thermosets and SMC.



Technical Data

| | | |
|--|----------------|------------------|
| Range | N | 0 ... 2500 |
| Calibrated partial range | N | 0 ... 250 |
| Overload | N | 3000 |
| Threshold | mN | 10 |
| Sensitivity | pC/N | -4,4 |
| Linearity, all ranges | %FSO | $\leq \pm 1$ |
| Hysteresis, all ranges | %FSO | ≤ 1 |
| Rigidity | N/ μ m | ≈ 400 |
| Natural frequency | kHz | ≈ 200 |
| Operating temperature range | $^{\circ}C$ | -40 ... 150 |
| Temperature coefficient of sensitivity | %/ $^{\circ}C$ | -0,02 |
| Capacitance | pF | ≈ 50 |
| Insulation resistance | | |
| at 20 $^{\circ}C$ | Ω | $\geq 10^{13}$ |
| at 120 $^{\circ}C$ | Ω | $\geq 10^{12}$ |
| Connecting plug Type 9211AAE | Type | KE102A014-8 neg. |
| Weight | | |
| incl. cable and plug | g | 20 |
| without cable and plug | g | 1,2 |

Mounting

The miniature force sensor has ground faces. Also the mounting surfaces must be perfectly flat, finely machined, rigid and absolutely parallel. For mounting in a blind hole the application of a hardened washer is recommended.

The single-wire cable with a cross-sectional area of approx. 0,6 mm² can be installed in a flexible manner and cut to length as required. With the single-wire technique, the mold provides electrical screening. The cable must therefore be integrated in the ejector plate. On no account must the cable be installed outside the ejector plate.

As a general rule, the cable must be installed in bores and thus well protected against mechanical damage. The single-wire cable must on no account be installed together with other electrical cables in the cable bore.

The connector (Type 1839) included in the sensor delivery schedule must be fitted onto the single-wire cable which has been cut to length but with its insulation remaining intact.

The connector has to be mounted on to the ejector plate (Fig. 7). With the single-wire cable fully ducted through the ejector plate.

For the calculation of the sensitivity in psi/pC the following formule has to be used:

$$Sp \text{ [psi/pC]} = \frac{\pi \cdot D^2}{580,15} \cdot Sf \text{ [pC/N]}$$

- Sp = Pressure sensitivity
- Sf = Force sensitivity
- D = Pin diameter

The extension cable has to be fixed to the ejector plate (s. Fig. 9).

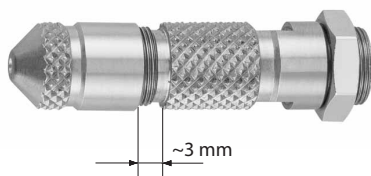
Installation: Single-Wire Cable with Connector (Art. No. 5.511.322)



1) Open the connector anti-clockwise.



3) Insert single-wire cable cut to length with insulation intact into the connector up to the limit.



2) Connector must be opened up to produce a gap of ~3 mm.



4) Close the connector clockwise. This automatically strips the insulation from the cable and clamps it.

000-458a-11.03 (DB06.9211AAE)

Mounting Examples

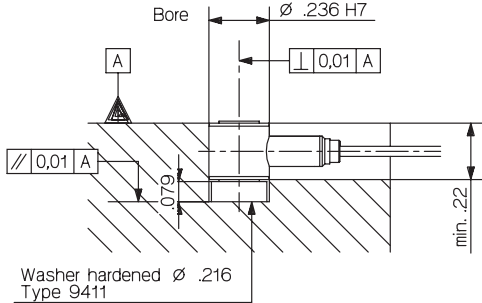


Fig. 1: Mounting in a blind hole

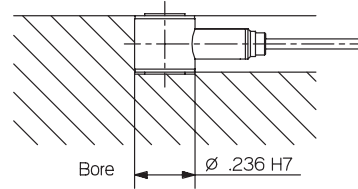


Fig. 2: Mounting in a holding plate

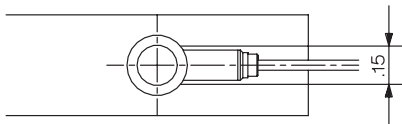
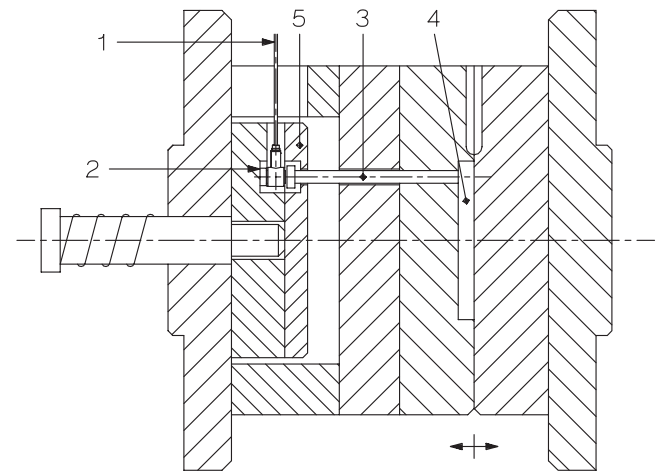


Fig. 3: Mounting plate 3.520.328 (included in the delivery) for Fischer connector KE 102A014



- 1 Force sensor
- 2 Washer
- 3 Ejector pin
- 4 Cavity
- 5 Ejector plate

Fig. 4: Force sensor for indirect injection-mold cavity pressure measurement behind an ejector pin in the mold

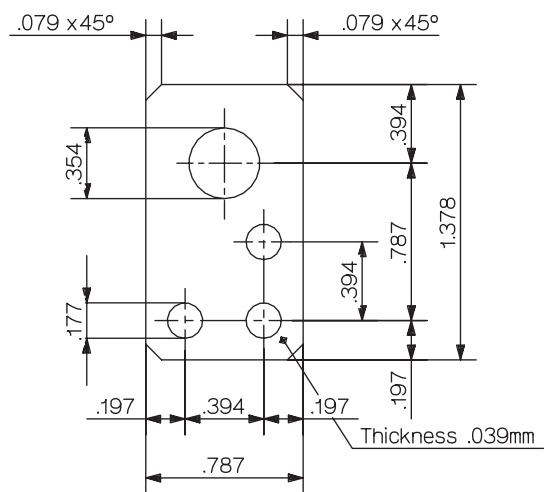


Fig. 5: Mounting plate (Art. No. 3.520.328)

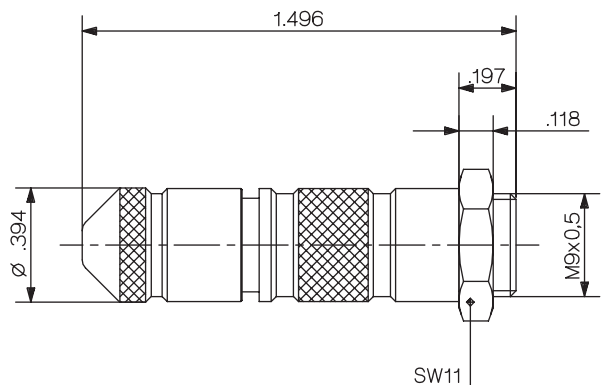


Fig. 6: Connector (Art. No. 5.511.322)

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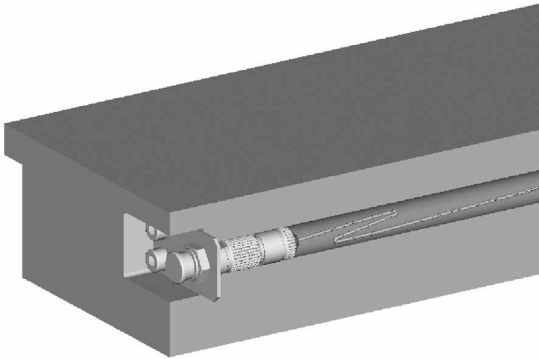


Fig. 7: Screwing the mounting plate onto the ejector plate

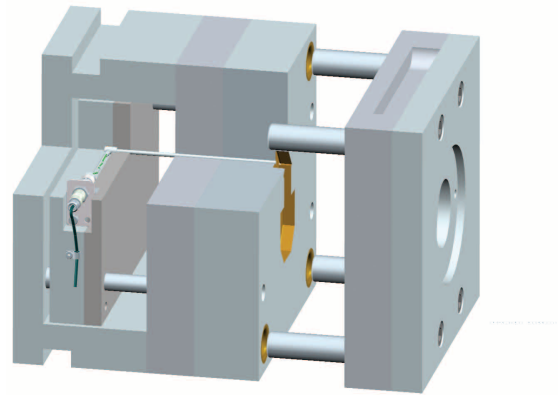
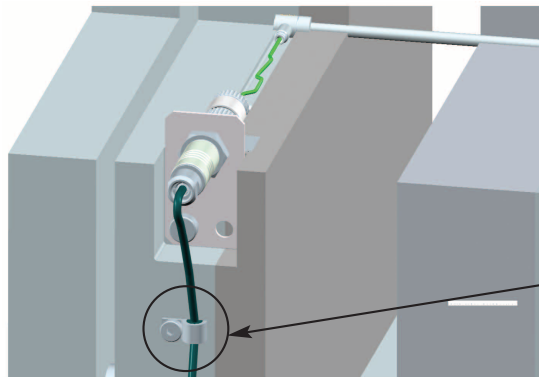


Fig. 8: Mounting of Type 9211AAE



Cable fixed to ejector plate

Fig. 9: Mounting of Type 9211AAE

Accessories Included

- Identification lable
- Connector for single-wire technique
- Mounting plate
- Washer

Art. No./Type

- 3.520.325
- 1839
- 3.520.328
- 9411

Ordering Key

Quartz miniature force sensor

Type

9211AAE

Optional Accessories

- High-temperature extension cable with connectors
Fischer SE 102A014/BNC pos.
Length 2 m
Length 5 m

Type

- 1667B2
- 1667B5

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