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PinSens Force Sensor

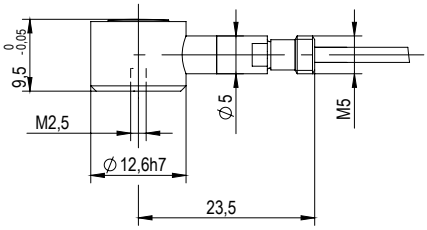
Type 9204B...

for mold cavity pressure with diameter 12,6 mm

Quartz force sensor for the measuring range from 0 ... 10 000 N or for measuring mold cavity pressure of up to >3 000 bar during injection molding of plastics.

- Replaceable cable
- Available with single-wire technology





Description

The 9204B… sensor offers high resolution and a rugged, welded case. The charge signal (pC = pico coulombs) output by the force sensor is converted in the Kistler charge amplifier or in a monitoring unit into a proportional output voltage that is largely independent of the length of the sensor cable. The maximum possible output voltage from the standard amplifier is 10 V. In the most sensitive range this gives 1 N/V. The replaceable cables allow a wide choice of connecting cables, including the single-wire version. With single-wire technology an individual cable is shortened to the required length and connected to the connector using the proven cut and grip technique. With this arrangement the mold serves as a shield for signal transmission.

For multi-cavity applications the sensor Type 9204B... is used without the single-wire connector Typ 1839. For 4-channel applications the Sensor Type 9204B... is mounted with the Multi-Channel Connector Type 1708... and for 8-channel applications with the Multi-Channel Connector Type 1710...

Application

Although the mold cavity pressure in industrial applications is normally measured directly in the cavity, there are situations in which this is not possible, for example for reasons of space. The sensor is positioned under the ejector pin in the ejector plate, and measures the force curve by means of the ejector. This allows calculation of the actual mold cavity pressure.

Technical data

Measuring range	N	0 ... 10 000
Calibrated partial range	N	0 ... 1 000
Overload	N	12 000
Threshold	mN	30
Sensitivity	pC/N	–1,6
Linearity, all ranges	%FSO	≤±2
Operating temperature range	°C	–40 ... 200
Insulation resistance		
at 20 °C	Ω	$\geq 10^{13}$
at 120 °C	Ω	$\geq 10^{12}$

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Force sensor Type 9204BE
Indirect measuring sensor with replaceable single-wire cable. Suitable for mounting as complete module in the ejector plate.

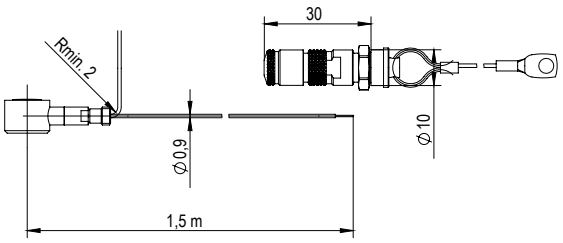


Fig. 1: Force Sensor Type 9204BE with cable and connector

Force sensor Type 9204B0,2/0,4/0,6/0,8/sp
Indirect measuring sensor with replaceable coaxial connecting cable in lengths of 0,2/0,4/0,6/0,8 m or special lengths.

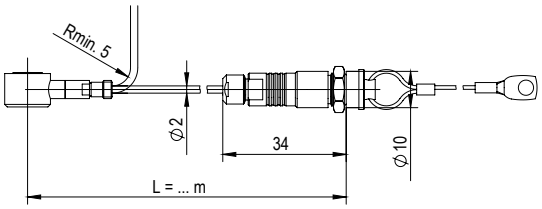


Fig. 2: Force Sensor Type 9204B0,2/0,4/0,6/0,8/sp with cable and connector

Computation of sensitivity for the pressure measurement
The front face of the ejector pin must be taken into account when mounting the force sensor for pressure measurement. The nominal sensor sensitivity (pC/N) is converted into a corresponding pressure sensitivity using the following formula.

Calculated pressure sensitivity [pC/bar] =
Nominal force sensitivity [pC/N] · area of ejector pin [mm²] · 0,1

The measuring range of the sensor must be taken into account when choosing the ejector pins. The larger the ejector pin area the higher the force on the sensor.

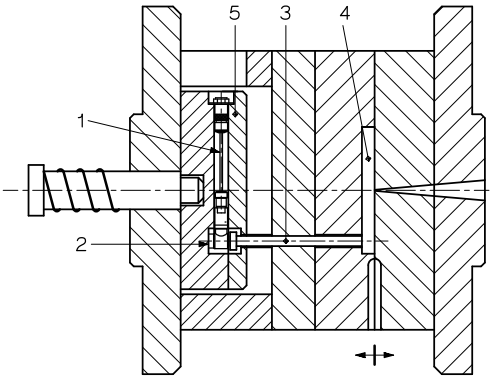
The following table shows the calculated sensitivity with the nominal sensitivity of the Type 9204B... and the maximum pressure for a selection of ejector pins.

Diameter ejector pin [mm]	Sensivity [pC/bar]	Masimum pressure [bar]
1,6	–0,32	>3 000
2	–0,50	
2.5	–0,78	
3	–1,13	
4	–2,01	
5	–3,14	
6	–4,52	
8	–8,04	2 000
10	–12,56	1 300
12	–18,09	900
14	–24,62	650

Mounting
The PinSens force sensor has a precision ground face. The bearing surface of the ejector pin must also be finely machined, flat, rigid and exactly parallel. The sensor can be mounted with a M2,5-screw and a spring washer. Once mounted the sensor must not have any preload. A clearance of 0,03 ... 0,05 mm is recommended.

When using the single-wire technology, it must be ensured that the single-wire cable is kept in the ejector plate and that the Type 1839 connector is also mounted in this plate. When installing the connector in a different plate, electrical shielding by the mold must be ensured.

Principle of function



1 Force sensor
2 Thrust washer
3 Ejector pin
4 Cavity
5 Ejector plate

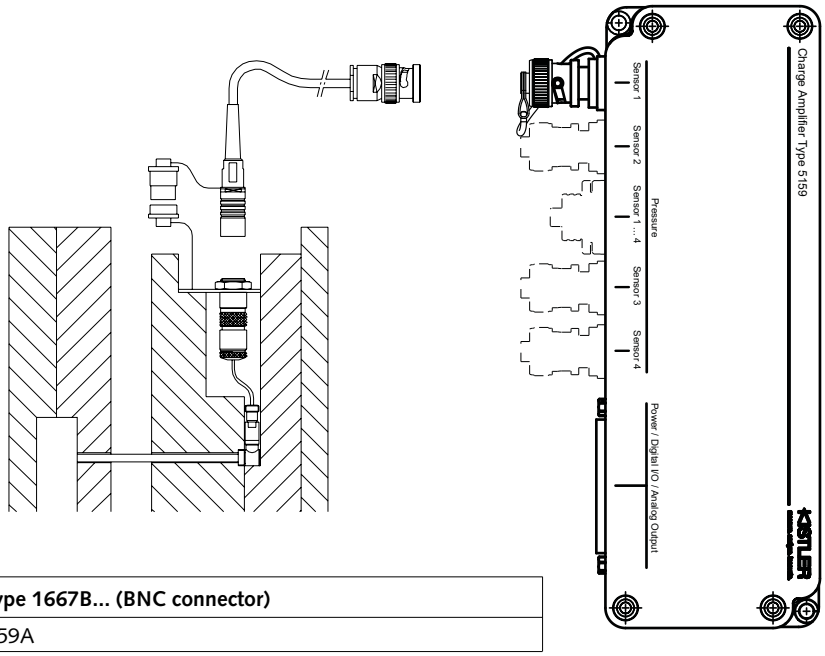
Fig. 3: Force sensor for indirect measurement of mold cavity pressure behind an ejector pin in the mold using the example of the Type 9211.

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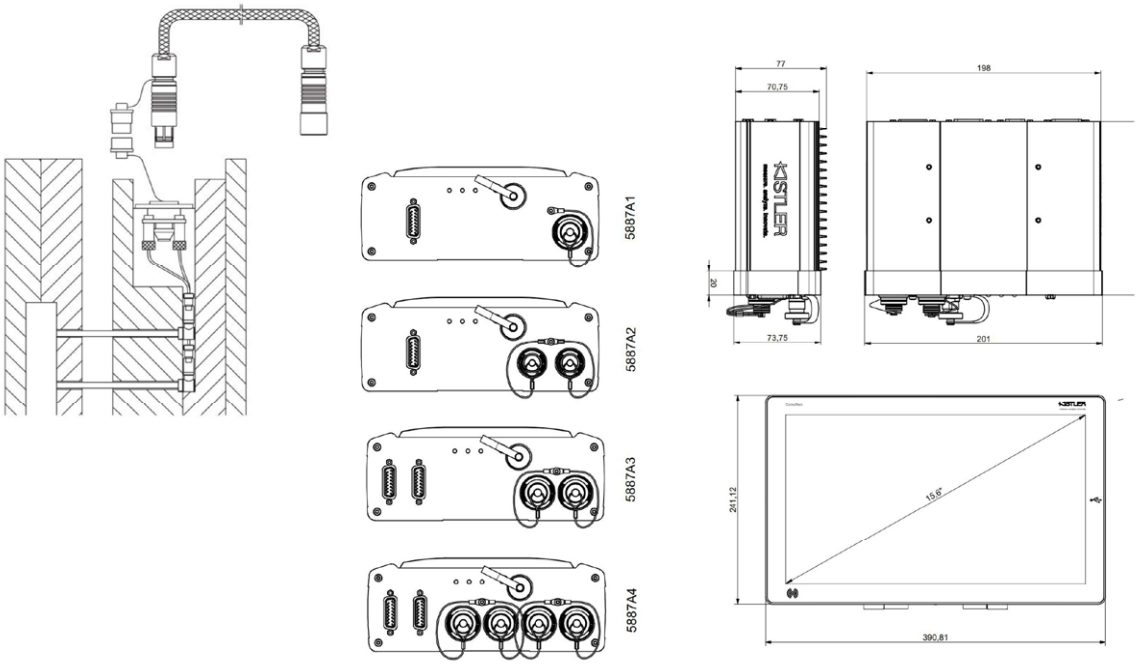
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Cable and amplifier for measuring chains with sensor Type 9204B...



Cabel Type 1667B... (BNC connector)
Type 5159A

Fig. 4: Sensor Type 9204B... with charge amplifier Typ 5159A



4-Kanal Kabel Typ 1995A... auf Stecker Typ 1722A4...	8-Kanal Kabel Typ 1997A... auf Stecker Typ 1722A8...
Typ 5887A1	Typ 5887A2
	Typ 5887A3
	Typ 5887A4

Fig 5: Sensor Type 9204B... with monitoring system ComoNeo Type 5887...

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Mounting examples

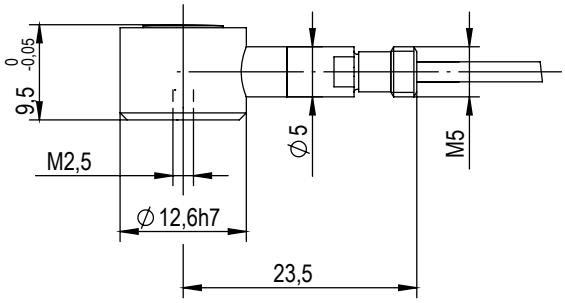


Fig. 6: Sensor Type 9204

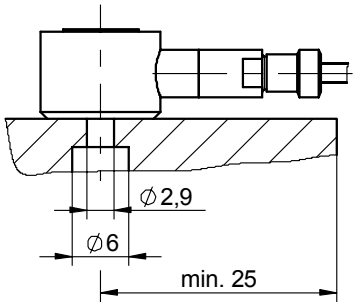


Fig. 7 : Mounting in retaining plate

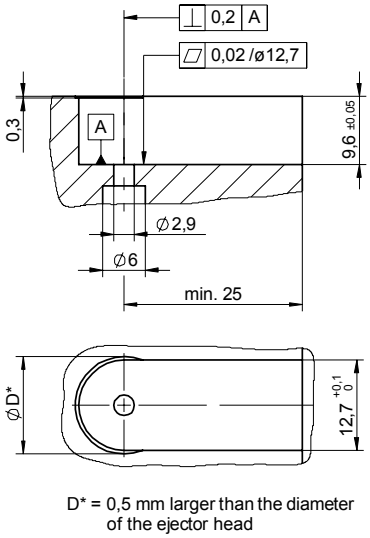
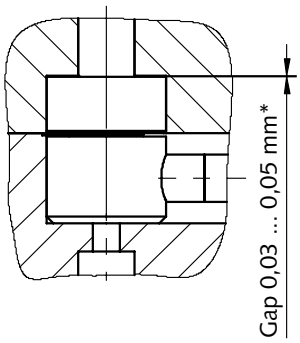


Fig. 8: Mounting bore



* Sensor should not be preloaded. Consider this value as a minimum during construction and realisation of the mold. Depending on deformation, it could be necessary to have a bigger gap. Check clearance before mounting the sensor.

Fig. 9: Mounting sensor Type 9213 with ejector pin

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Accessories included

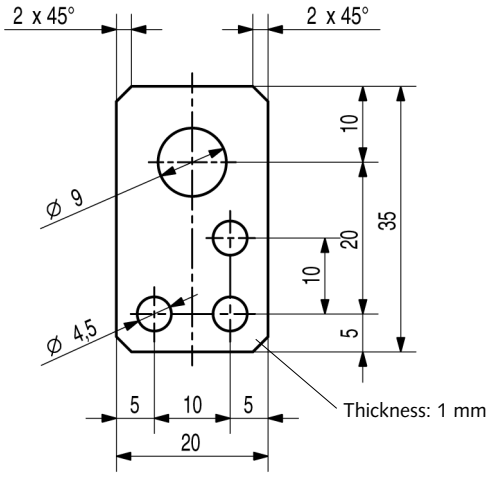


Fig. 10: Mounting plate Mat. No. 65005208

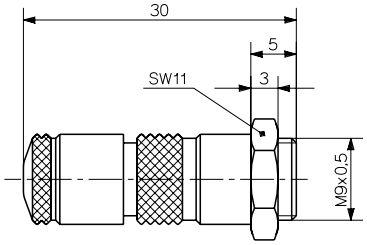


Fig. 11: Single-wire connector Type 1839

Accessories included	**Type/Mat. No.**
PinSens force sensor Type 9204B	
with single-wire cable	
• Connector	1839
• Mounting plate	65005208
• Cheese-head screw	65012816
• Spring washer	65013328
• Identification plate	65005190
Miniature force sensor Type 9204B0,2/0,4/0,6/0,8/sp	
with coaxial cable and connector	
• Mounting plate	65005208
• Cheese-head screw	65012816
• Spring washer	65013328
• Identification plate	65005190

Optional accessories	**Type/Mat. No.**
High temperature extension cable	
Fluoropolymer with BNC connector	
• Length 2 m	1667B2
• Length 5 m	1667B5
• Length 10 m	1667B10
• Special length (between 0,5 m and 8 m)	1667Bsp

High temperature extension cable with metal tubing and BNC connector	**Type/Mat. No.**
• Length 2 m	1661A2
• Length 5 m	1661A5
• Length 10 m	1661A10
• Special length (between 0,5 m and 8 m)	1661Asp
• 4-channel connector	1708
• 8-channel connector	1710
• Sensor Tester for cavity pressure sensors	5495C
Single-wire connection cable	
Single-wire M4 x 0.35 pos.	
• Length 1.5 m	1666A2
• Length 5.0 m	1666A4
• Single-wire crimped pin	
• Length 1.5 m	1666AZ2
• Length 5.0 m	1666AZ4

Ordering key

Type 9204B □

Single-wire cable, L = 1,5 m	**E**
Coaxial Cable	**0,2**
Coaxial Cable	**0,4**
Coaxial Cable	**0,6**
Coaxial Cable	**0,8**
Coaxial cable with special length, specify length L in m (L_{min} = 0,1 m / L_{max} = 5 m)	**-sp**
Sensor Type 9204BG without connector	**G**

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