

Cavity Pressure Sensor

HighSens with front $\varnothing 6$ mm

Type 6172B...

Patent No. US 6,212,963

The quartz sensor for low pressure processes for injection molding of plastics with cavity pressures up to 200 bar.

- Ideally suited for industrial applications
- Sensor front can be machined to adapt to the cavity wall (except for coated and silicone filled gap versions of the sensor)
- Exchangeable cable

Description

The sensor Type 6172B... consists of the HighSens quartz sensor for mold cavity pressure Type 6177B... with exchangeable cable, fitted in a rugged adapter. The sensor Type 6177B... with 4 mm front diameter comes flush with the adapter front with an annular gap of $<10 \mu\text{m}$ and measures the pressure directly.

The pressure acts over the entire front of the sensor and is transmitted to the quartz measuring element, which produces a proportional electric charge ($\text{pC} = \text{Picocolomb}$). This is converted into a 0 ... 10 V output from a standard charge amplifier.

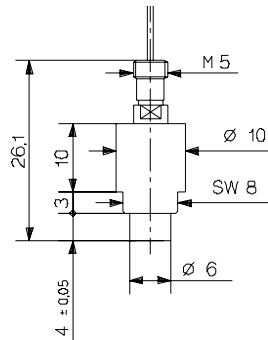
All parts of the sensor are corrosion resistant. The exchangeable cable is screwed to the sensor with a tight seal. The connector is self-locking and splash-proof.

For multi cavity applications, sensor Type 6172B... without the single-wire connector Type 1839 should be used. For 4-channel applications, sensor Type 6172B... with multi channel connector type 1722A4... is used and for 8-channel applications with the multi channel connector Type 1722A8... .

This sensor is available with several types of connecting cables (see page 2).

Application

This diaphragm-free sensor measures mold cavity pressures up to 200 bar during injection molding. It is particularly suitable for optimizing, monitoring and controlling the injection molding process of thermoplastics, elastomers, thermosets and SMC.



For abrasive melts (e.g. filled with glass fibers or carbon fibers, thermosets, BMC/SMC), these sensors are available as Types 6172BC... and 6152BW... with a coated front.

With low viscosity melts (e.g. thermosets, SMC/BMC, IC sheaths), the silicone-filled Types 6172BV... and 6172BW... must be used.

Technical Data

Range	bar	0 ... 200
Overload	bar	300
Sensitivity	pC/bar	-45
Linearity, all ranges	% FSO	$\leq \pm 1$
Operating temperature range		
Mold (Sensor, Cable)	$^{\circ}\text{C}$	0 ... 200
Melt (at front of sensor)	$^{\circ}\text{C}$	< 450
Connector	$^{\circ}\text{C}$	0 ... 200*
Insulation resistance		
at 20 $^{\circ}\text{C}$	T Ω	> 100
at 300 $^{\circ}\text{C}$	T Ω	$> 0,01$

* During machine down time, the mold temperature may rise to 240 $^{\circ}\text{C}$ without damaging the sensor; however, this may lead to measuring errors

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Sensor variants

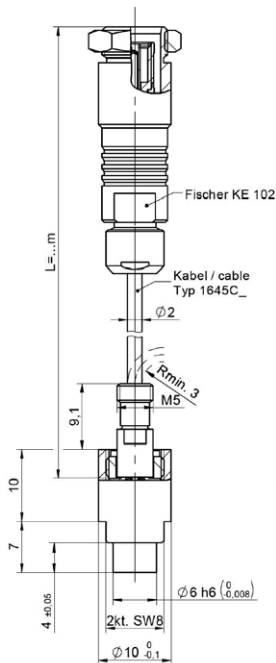


Fig. 1: Pressure sensor Type 6172B with coaxial cable

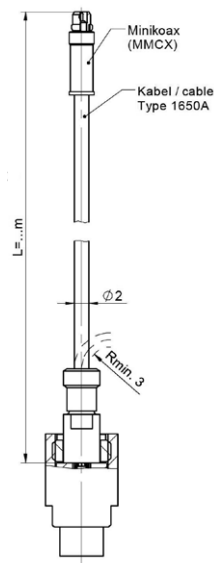


Fig 2: Sensor Type 6172B with coaxial cable and minicoax connector

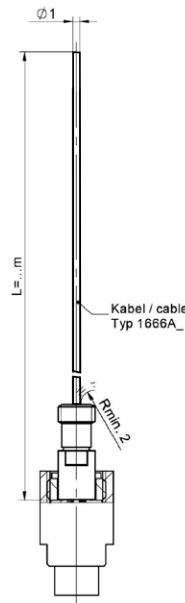


Fig. 3: Pressure sensor Type 6172B with single-wire cable

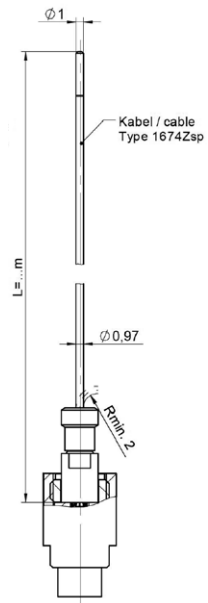


Fig 4: Sensor Typ 6172B with single-wire cable and crimp pin

Fig. 1: Pressure sensor Type 6172B with coaxial cable

Sensor including an exchangeable high temperature cable with a connector for operating temperatures up to 200 °C.

Fig 2: Sensor Type 6172B with coaxial cable and minicoax connector

Sensor Type 6172B...M... can be connected with coax cables to the multi channel connectors Type 1722A4MB or 1722A8MB.

Fig. 3: Pressure sensor Type 6172B with single-wire cable

Alternative version of the sensor with single-wire technique for simplified and flexible installation in the mold. The sensor Type 6172B...S... is equipped with a single-wire cable with a very small cross-section. The single-wire cable is exchangeable and can be cut to length as required by the user. With the single-wire technique the electrical shielding is provided by the mold. Both the cable and the connector therefore have to be completely integrated into the mold. For easy installation a connector is supplied which is self locking and splash proof. Sensor can be connected to the multi channel connectors Type 1722A4SB /MB or 1722A8SB/MB.

Fig 4: Sensor Typ 6172B with single-wire cable and crimp pin

With this variant the sensor can be connected to the contact elements type 1712... and 1714.... The contact elements can be used for exchangeable cavity platens.

Installation

The sensor is normally installed in the mounting bore with the mounting nut Type 6453, but a spacer sleeve Type 6462 can also be used.

The sensor front forms part of the cavity wall. The sensor must therefore be shaped so that its front comes exactly flush and leaves no impression on the molded part. The front can be further machined up to 0,5 mm (except with a coated front!). Full details may be found in the operating instructions.

The sensor is center aligned in the 6 H7 bore.

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Cable and amplifier for measuring chains with sensor Type 6172B...

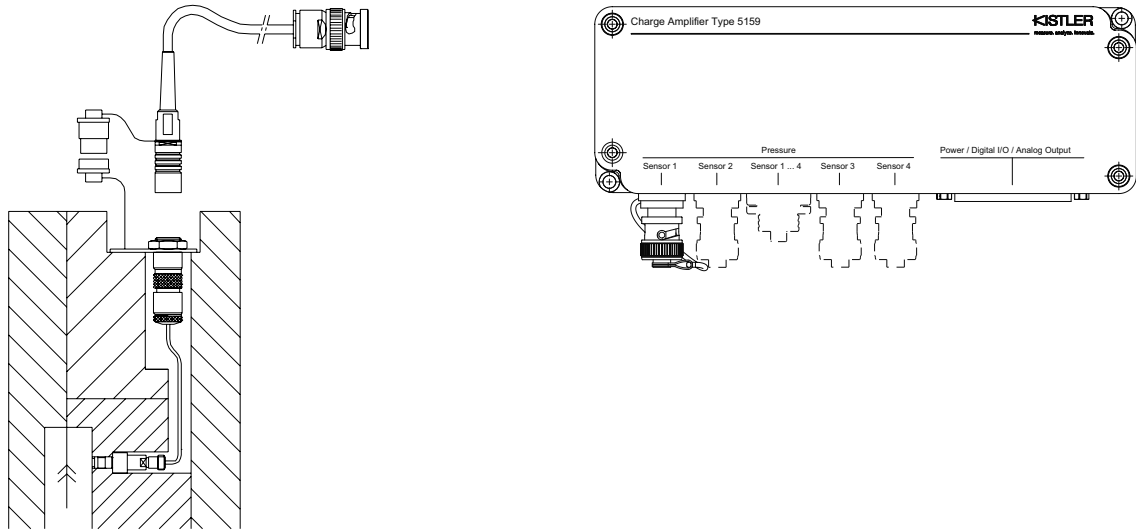
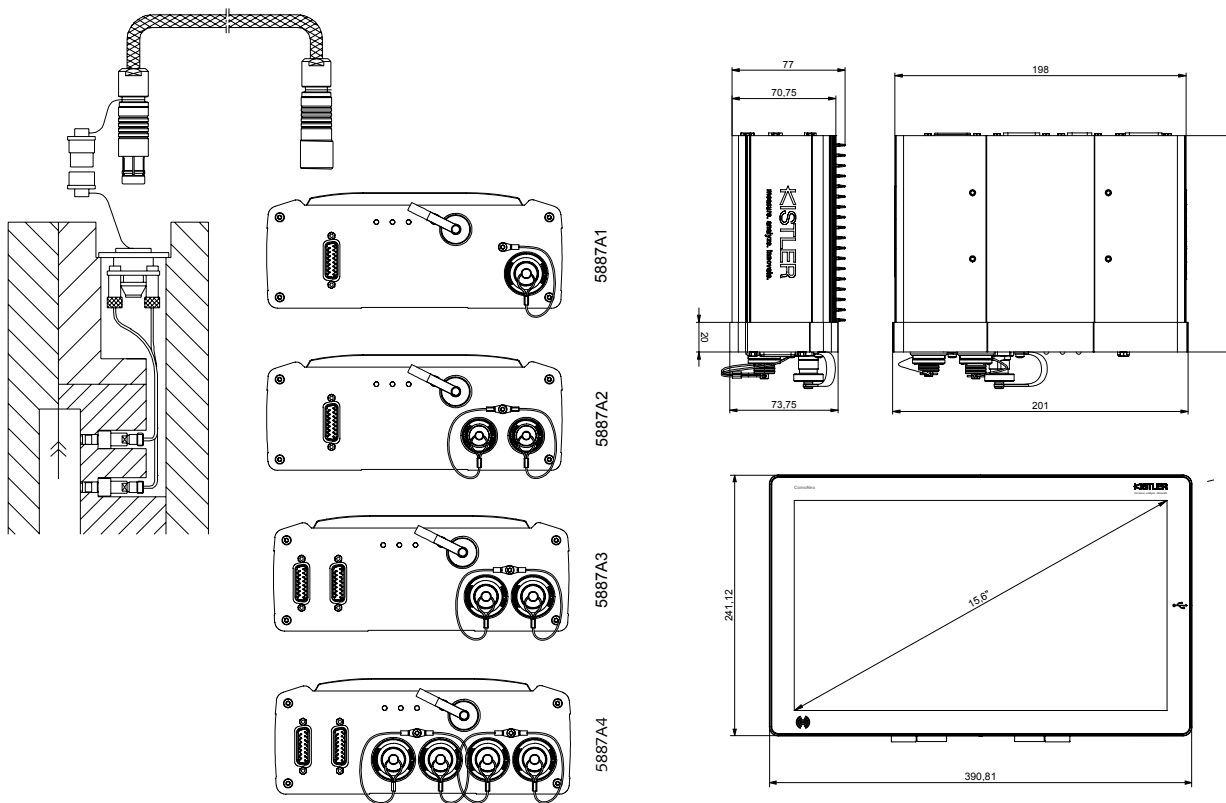


Fig. 5: Sensor Type 6172B... with charge amplifier Type 5159A



4-channel cable Type 1995A... on connector Type 1722A4...	8-channel cable Type 1997A... on connector Type 1722A8...
Type 5887A1	Type 5887A2
	Type 5887A3
	Type 5887A4

Fig. 6: Sensor Type 6172B... with ComoNeo monitoring system ComoNeo Typ 5887...

Installation Examples

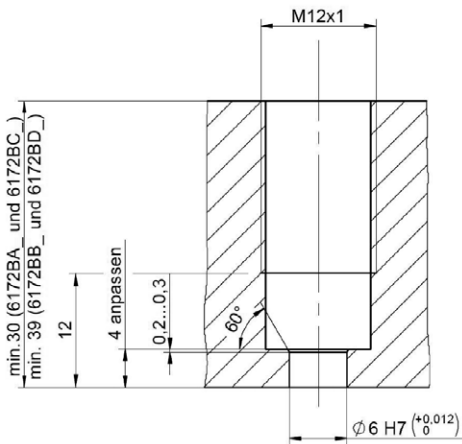


Fig. 7: Installation with mounting nut Type 6453

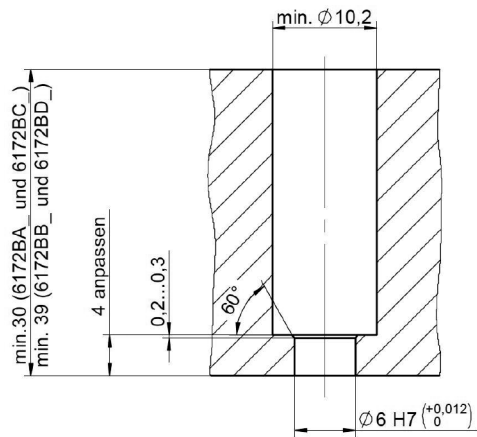


Fig. 8: Installation with spacer sleeve Type 6462

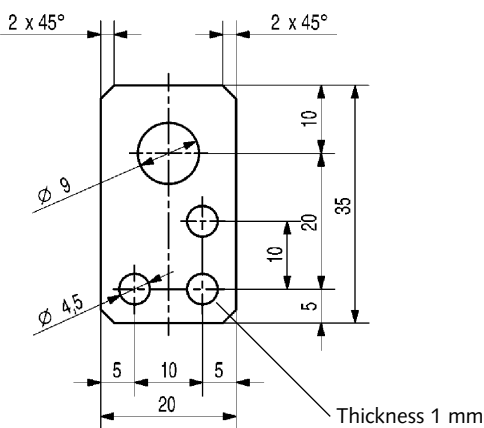


Fig. 9: Mounting plate (Art. No. 65005208)

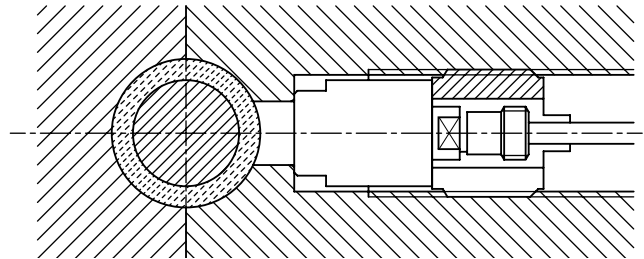


Fig. 10: Sensor with machined front Type 6172BA... only

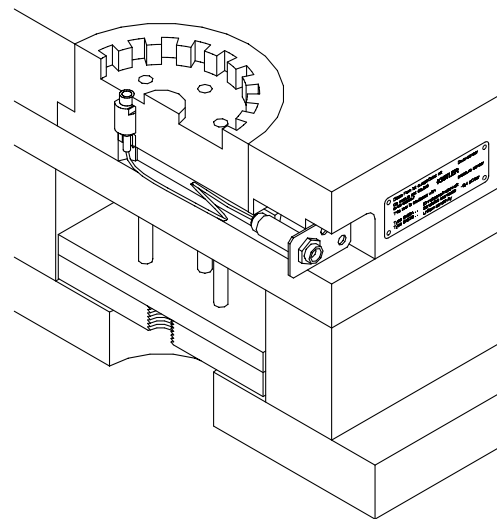


Fig. 11: Sensor, cable, connector, mounting plate (Art. No. 65005208) and identification label

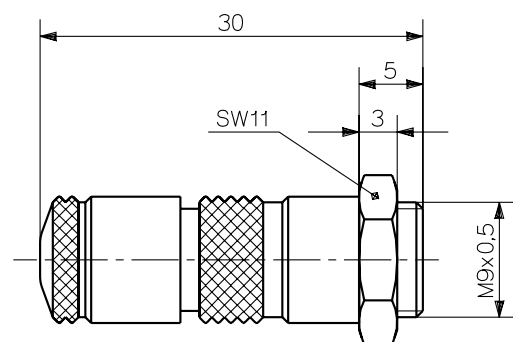


Fig. 12: Single-wire Fischer connector Type 1839

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Accessories

- Sensor
- O-ring, diameter 2,5x0,65 mm, (for variants up to 200 °C)
- Identification plate

Accessories according to selected variant

- Mounting nut 6453
- Spacer sleeve (L = 100 mm) 6462

Cable and connectors

- Single-Wire cable with M4 connector L = 1,5 m 1666A2
- Single-Wire cable with M4 connector L = 5 m 1666A4
- Connector (for Single-Wire variants with connector) 1839
- Crimp pin for Single-Wire (Connection 1712 und 1714) 65003747
- Coaxial cable 0 ... 200 °C with M4 connector and Fischer connector 1645C...
- Coaxial cable 0 ... 200 °C with M4 connector and Fischer connector 1650A4P...
- Mounting plate for connector 65005208

Mat. Nr./Typ

6152BA, BC,
BV, BW
1100A57

Accessories (optionally orderable)

Mounting tools

- Extraction tool for variants up to 200°C 1315A
- Fixation for Fischer connector 1401
- Socket wrench for mounting with mounting nut Type 6453 1383B
- Tools for cable exchange (inkl. fork wrench SW4/SW5 65007801) 1300A32
- Cam wrench for mounting nut (for disassembly of sensor from sleeve) 1352
- Screw tab M12x1 1355
- Dummy sensor 6552

Multi channel connectors and contact elements

- 4-channel connector up to 120 °C (for MiniCoax and single-wire cable) 1722A4...
- 8-channel connector up to 120 °C (for MiniCoax and single-wire cable) 1722A8...
- 4-channel connector 120 ... 200 °C (for single-wire cable) 1708...
- 8-channel connector 120 ... 200 °C (for single-wire cable) 1710...
- Contact elements 1-channel for single-wire types 1712...
- Contact elements 4-channel for single-wire types 1714...
- Crimpset with tools 1381A0

Ordering key

Sensor Type

up to 200 °C	A
up to 200 °C, sensor front coated	C
up to 200 °C, gap between sensor adapter filled with Silicone	V
up to 200° C, sensor front coated and gap between sensor adapter filled with Silicone	W

Sensor and mounting

Highsens	H
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Mounting

Mounting with mounting nut Type 6453	M
Mounting with spacer sleeve Type 6462	S

Reserve	R
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Cable

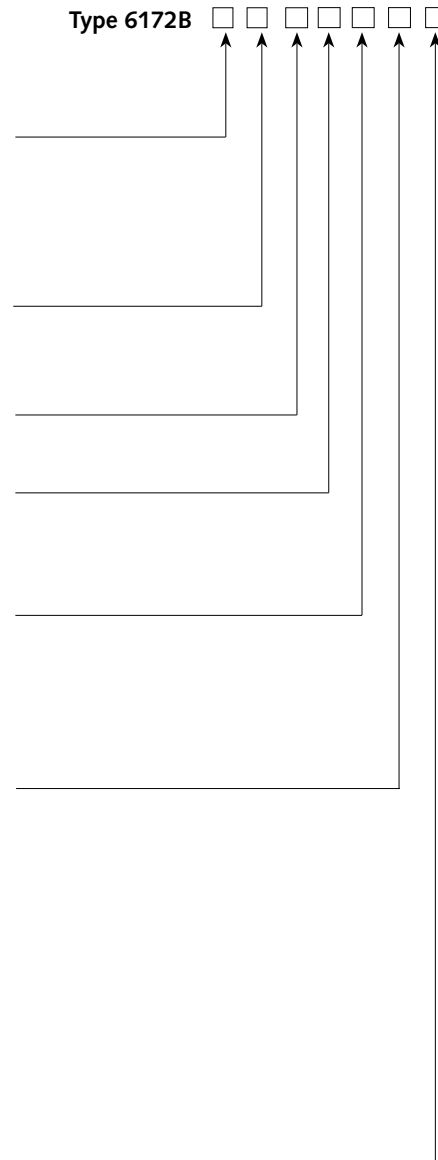
Single-wire-cable (PTFE)	S
Coaxial cable (PFA D2)	K
without cable	X

Connector

Fischer KE102 (cable K)	F
MiniKoax (cable K)	M
with connector Type 1839 in scope of delivery (cable S)	E
without connector Type 1839 in scope of delivery (cable S)	G

Cable design

No cable	XXX
L = 0,2 m, only cable K, connector F or M (coaxial)	0,2
L = 0,4 m, cable K, connector F or M (coaxial)	0,4
L = 0,6 m, only cable K, connector F or M (coaxial)	0,6
L = 0,8 m, only cable K, connector F or M (coaxial)	0,8
L = 1,0 m, only cable K, connector F (coaxial)	1,0
L = 1,2 m, only cable K, connector F or M (coaxial)	1,2
L = 1,2 m, only cable K, connector F or M (coaxial) cable S, connector E or G 1,5	1,5
L = 1,6 m, only cable K, connector F or M (coaxial)	1,6
L = 2,0 m, only cable K, connector F or M (coaxial)	2,0
L = 2,5 m, only cable K, connector F or M (coaxial)	2,5
L = 3,0 m, only cable K, connector F or M (coaxial)	3,0
L=5,0 m, only cable S (Single-Wire)	5,0
L = 0,10 ... 5 m, only cable K (coaxial)	-sp
Single-Wire cable, M4 – crimp pin, L= 0,04 ... 1,5 m contact element Type 1712... and 1714...), only for cable S and connector G	Zsp



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