

Mold Cavity Pressure Sensor

HighSens with front $\varnothing 4$ mm

Type 6177A...

Patent No. US 6,212,963

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 versions of the sensor)
- exchangeable cable

Description

The HighSens quartz sensor for mold cavity pressure Type 6177A... has a front diameter of 4 mm. An O-ring seals the annular gap of $<10 \mu\text{m}$ between sensor and mounting bore and thereby also center aligns the sensor in the bore.

The pressure acts over the entire front of the sensor and is transmitted to the quartz measuring element, which produces a proportional electric charge (pC = Picocoloumb). 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.

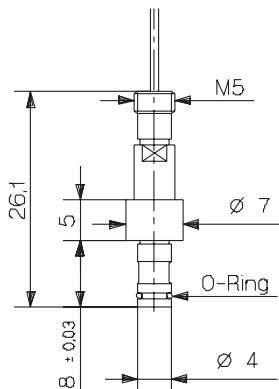
For multi cavity applications the sensor Type 6177A is used without the single-wire connector Typ 1839. The Multi Cavity Set Type 6829A... and the Multi Sensor System Type 6831A... are described in the appropriate data sheets.

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 6177AC... with a hardcoated front.



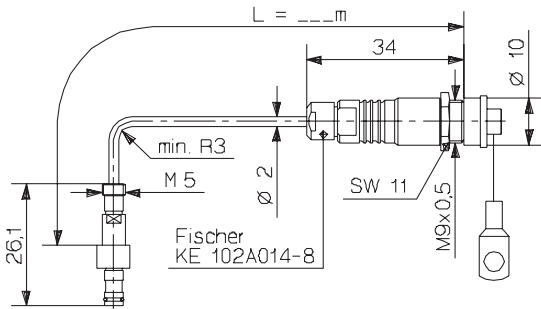
Technical Data

Range	bar	0 ... 200
Overload	bar	300
Sensitivity	pC/bar	-45
Linearity, all ranges	% FSO	± 1
Operating temperature range		
Mold (sensor, cable)	$^{\circ}\text{C}$	200
Melt (at the front of the 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 up to 240 $^{\circ}\text{C}$, without causing any damage to the sensor. Note that measuring errors may temporarily result.

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Pressure Sensor Type 6177A...



Installation

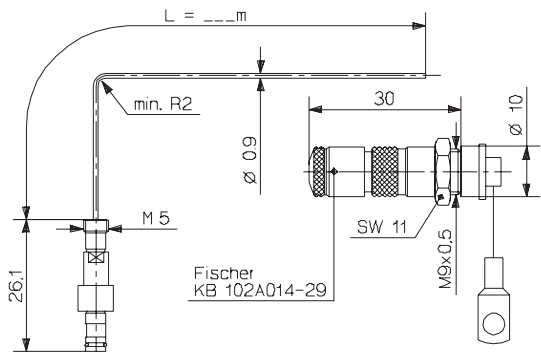
The sensor is normally installed in the mounting bore with the mounting nut Type 6457, but a spacer sleeve Type 6459 can also be used.

The sensor front forms part of the cavity wall. The sensor should therefore be shaped so that its front comes exactly flush with the cavity wall. Its front can be machined up to 0,5 mm (except with a coated front!). Full details can be found in the operating instructions.

The sensor is center aligned in the 4 H7 bore.

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

Pressure Sensor Type 6177A...E



Alternative version of the sensor with single-wire technique for simplified and flexible installation in the mold. The sensor Type 6177A...E 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.

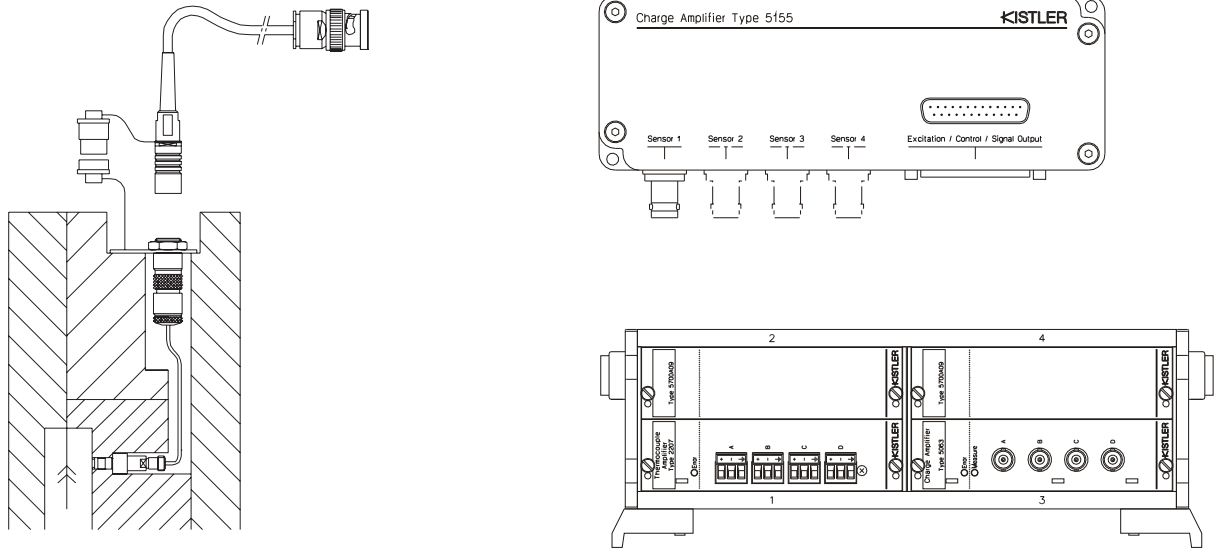
Special Versions

Coated front (abrasion protection)

- Type 6177AA... with coated front: Type 6177AC...

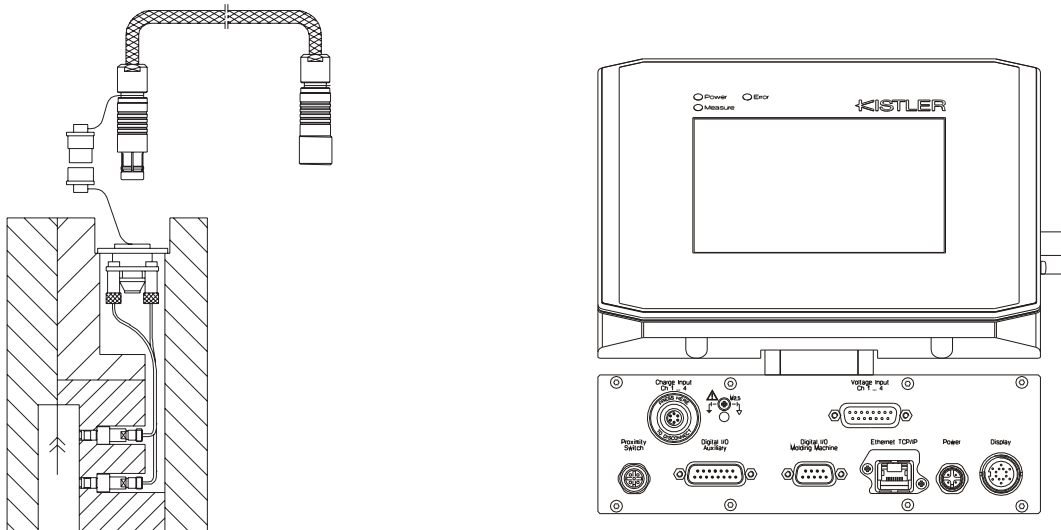
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Cable and Amplifier for Measuring Chain with Sensor Type 6177A...



Cable Type 1667B... (BNC connector)	Cable Type 1672B... (TNC connector)
Type 5039Axx2	Type 5039Axx1
Type 5049Axx2	Type 5049Axx1
Type 5155Axx2x/Axx4x/Axx8x	Type 5155Axx1x/Axx3x/Axx7x
Type 5063A1 in Type 2859A.../2865A...	

Fig. 1: Sensor Type 6177A... with Charge Amplifier Typ 5155A... or Signal Conditioner Type 2859/2865A...



4-Channel Cable Type 1995A... to Connector Type 1708A..	8-Channel Cable Type 1997A... on Connector Type 1710A...
Type 2869A0xx	Type 2869A2xx
Type 2869A1xx	

Fig. 2: Sensor Type 6177A... with Monitoring System CoMo® Injection Typ 2869A...

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This information corresponds to the current state of knowledge. Kistler reserves the right to make technical changes. Liability for consequential damage resulting from the use of Kistler products is excluded.

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Installation Examples

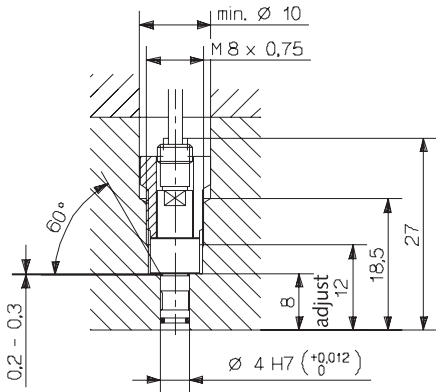


Fig. 3: Installation with mounting nut Type 6457

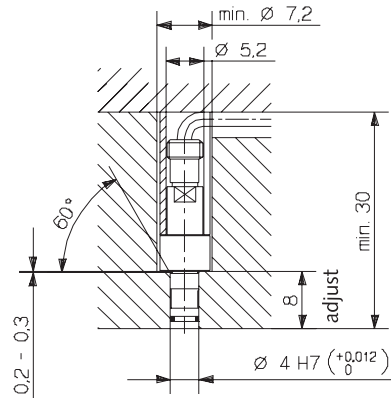


Fig. 4: Installation with spacer sleeve Type 6459

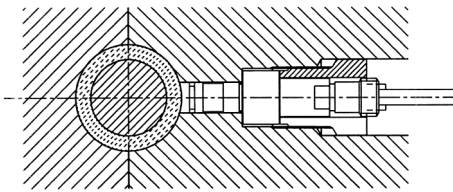


Fig. 5: Sensor with machined front face

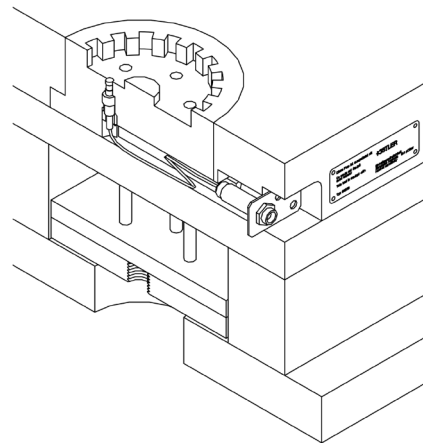


Fig. 6: Sensor, cable, connector, mounting plate (Art. No. 3.520.328) and identification label (Art. No. 3.520.899)

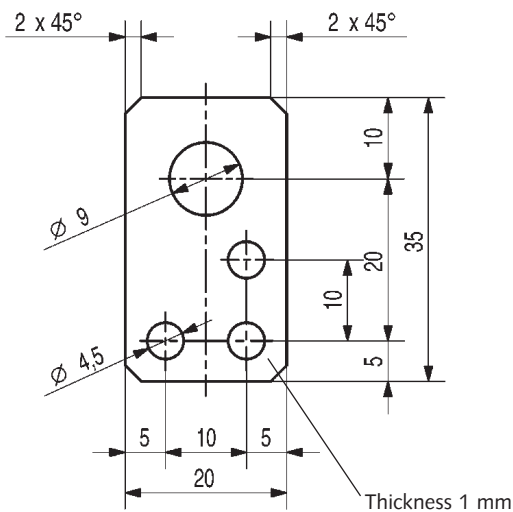


Fig. 7: Mounting plate (Art. No. 3.520.328)

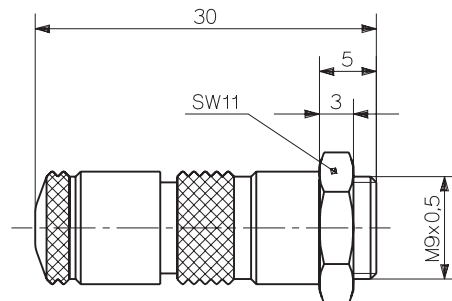


Fig. 8: Single-Wire Fischer connector Type 1839

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Accessories Included

	Art. No./Type
• Mounting nut	6457
• Mounting plate (for sensor with cable only)	3.520.328
• Identification label	3.520.899
• Connector (for single-wire technique only) Type 6177A...E	1839
• O-ring, diameter 2,5x0,65 mm	1100A57

Optional Accessories

	Art. No./Type
• O-ring tool for exchanging the cable	1364
• High temperature Viton extension cable Fischer SE102A014 – BNC pos., Length 2 m	1667B2
Length 5 m	1667B5
• Steel braided high temperature extension cable Fischer SE102A014 – TNC pos., Viton®, Length 2 m	1672B2
Length 5 m	1672B5
• Dummy sensor	6545
• Spacer sleeve	6459
• Coaxial cable (green) 0 ... 200 °C as replacement cable for sensors	1645C...
• 4 channel connector for Type 6177A...G and G1	1708A...
• 8 channel connector for Type 6177A...G and G1	1710A...

- Steel-braided two-wire-Teflon cable
0 ... 200 °C as a wear resistant substitute
for Type 6145C... 1963A...
- Single-wire cable with M4 connector 1,5 m
(green) 1666A2
- Single-wire cable with M4 connector 5 m
(green) 1666A4

Set of Accessories Type 1300A81 Consisting of:

	Art. No.
• Step drill, diameter 7,2/3,85	5.210.156
• Countersink	5.210.158
• Twist drill, diameter 10 mm	5.210.159
• Reamer, diameter 4 H7	5.210.155
• Tap M8x0,75	5.210.161
• Finishing tool	7.110.296
• Hexagonal socket wrench	5.210.118
• Lapping tool	7.110.298
• Limit plug gage, diameter 4 H7	5.210.162
• Checking tool	7.110.300
• Clamp	3.050.175
• Fork wrench SW4/SW5	5.210.164

Mounting Accessories

	Type
• Mounting wrench	1383
• Mounting wrench (for sensors with steel braided cables)	1362A
• Extraction tool	1315A
• Mounting piece for connector	1401

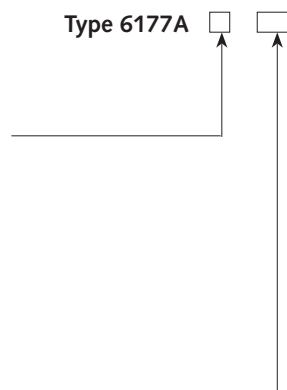
Ordering Key

Sensor

Cable up to 200 °C	A
Cable up to 200 °C, Sensor front coated	C

Cable

Coaxial cable, L in m	0,2/0,4/ 0,6/0,8
Coaxial cable with special lengths, specify L in m (L _{min} = 0,1 m / L _{max} = 5 m)	sp
With single-wire cable available only for Type 6177A...E (L = 1,5 m)	E
With single-wire cable available only for Type 6177A...E (L = 5 m)	E1
Type 6177A...E (L = 1,5 m) without connector	G
Type 6177A...E1 (L = 5 m) without connector	G1



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