

# Cavity Pressure Sensor

## Unisens with front $\varnothing 6$ mm

Type 6152B...

Patent No. US 6,212,963

Quartz sensor for cavity pressures up to 2 000 bar for injection molding of plastics.

- ideally suited for industrial applications
- sensor front can be machined to adapt to the cavity wall (except for coated and sealed gap versions of the sensor)
- exchangeable cable

### Description

The sensor Type 6152B... consists of the Unisens quartz sensor for cavity pressure Type 6157C... with exchangeable cable, fitted in a rugged adapter. The sensor Type 6157C... 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 ( $\text{pC} = \text{Picocoloumb}$ ). This is converted into a voltage  $0 \dots 10 \text{ V}$  in the amplifier and is then available as an amplifier output.

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.

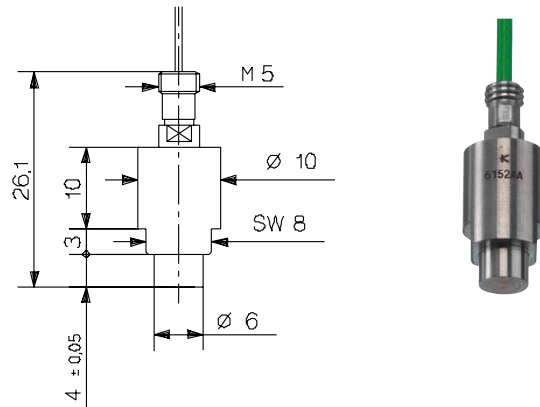
For multi cavity applications, sensor Type 6152B... without the single-wire connector Type 1839 or the coax cable variants with MiniKoax should be used. For 4-channel applications, sensor Type 6152B... with multi channel connector type 1722A4... is used and for 8-channel applications with the multi channel connector Type 1722A8... .

This sensor is available with several types of connecting cables (see page 2 and 3).

### Application

This diaphragm-free sensor measures cavity pressures up to 2 000 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 6152BC..., 6152BD... and 6152BW... with a coated front.

With low viscosity melts (e.g. thermosets, SMC/BMC), the silicone-filled Types 6152BV... and 6152BW... should be used.

### Technical data

Range	bar	0 ... 2000
Overload	bar	2500
Uniform sensitivity	pC/bar	-9,4
Linearity, all ranges	% FSO	$\leq \pm 1$
Operating temperature range		
Mold (Sensor, Cable)		
6152BA.../BC.../BV.../BW...	CC	200
6152BB.../BD...	$^{\circ}\text{C}$	300
Melt (at front of sensor)	$^{\circ}\text{C}$	$<450$
Connector	$^{\circ}\text{C}$	0 ... 200*
Insulation resistance		
at 20 $^{\circ}\text{C}$	$\Omega$	$>10^{13}$
at 200 $^{\circ}\text{C}$	$\Omega$	$>10^{12}$

\* 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.

**Sensor with coaxial cable**

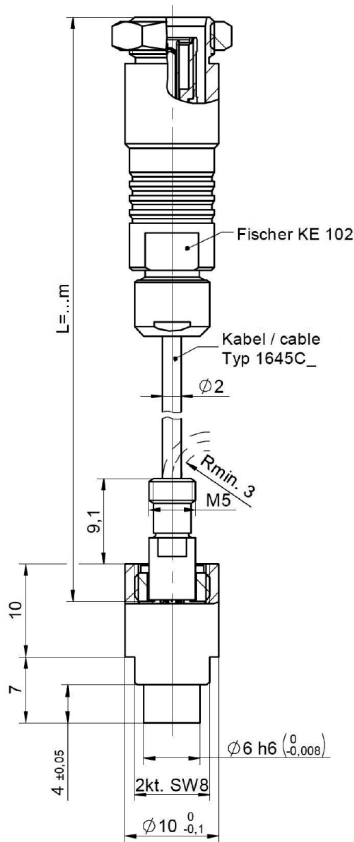


Fig. 1: Pressure sensor Type 6152B with coaxial cable

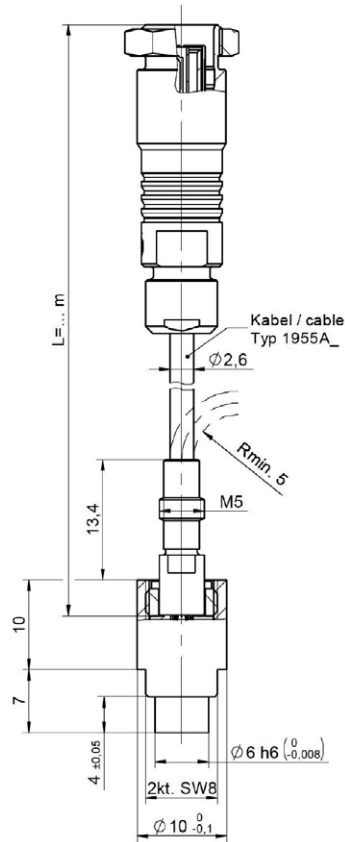


Fig. 2: Pressure sensor Type 6152B for high temperature applications with coaxial cable

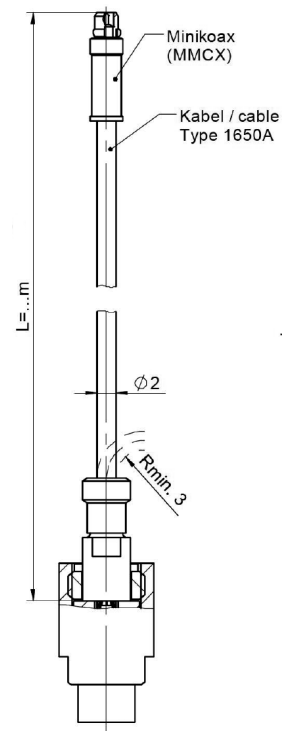


Fig. 3: Sensor Type 6152B with coaxial cable and MiniCoax connector

**Fig. 1: Pressure sensor Type 6152B with coaxial cable.**

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

**Fig. 2: Pressure sensor Type 6152B for high temperature applications with coaxial cable.**

Sensor including an exchangeable steel-braided thermoset plastic cable (Polyimide) with connector for operating temperatures up to 300 °C (Connector 200 °C).

**Fig 3: Sensor Type 6152B with coaxial cable and MiniCoax connector.**

Sensor Type 6152B...M... can be connected with coax cables to the multi channel connectors Type 1722A4MB or Type 1722A8MB.

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**Sensor with Single-Wire-Cable**

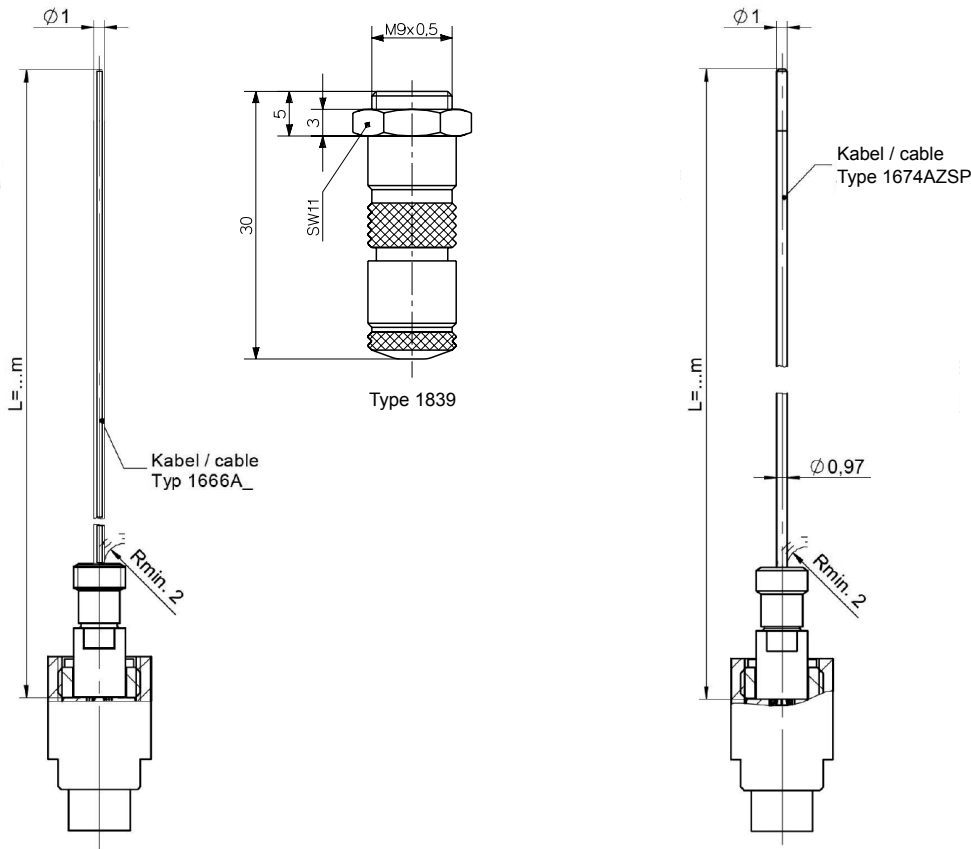


Fig. 4: Pressure sensor Type 6152B with single-wire cable

Fig. 5: Sensor Type 6152B with Single-Wire cable and crimp pin

**Fig. 4: Pressure sensor Type 6152B with single-wire cable.**

Alternative version of the sensor with single-wire technique for simplified and flexible installation in the mold. The sensor Type 6152B...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. Sensor can be connected to the multi channel connectors Type 1722A4SB /MB and 1722A8SB/MB, as well as Types 1708... and 1710... .

**Fig 5: Sensor Type 6152B with Single-Wire cable and crimp pin.**

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

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**Installation examples**

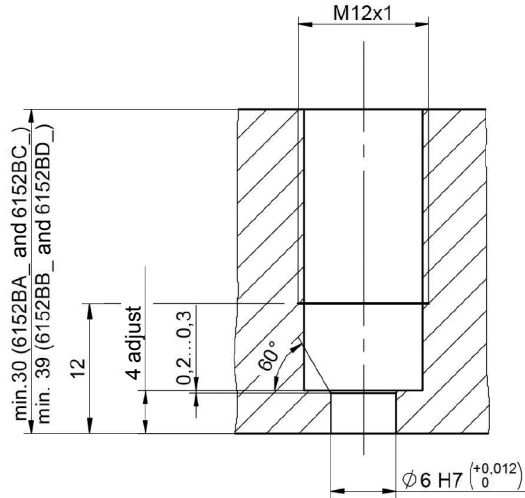


Fig. 6: Installation with mounting nut Type 6453

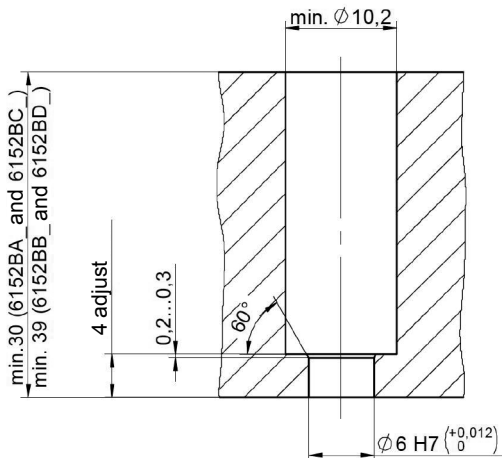


Fig. 7: Installation with spacer sleeve Type 6462

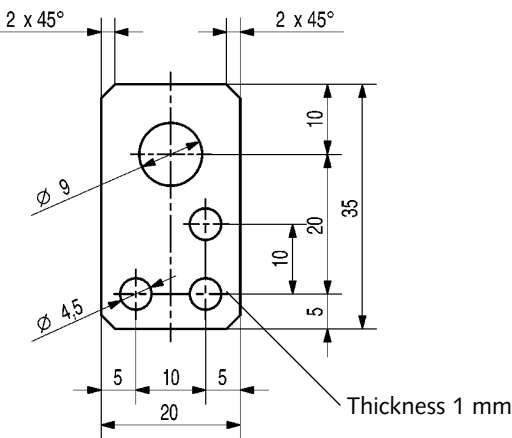


Fig. 8: Mounting plate (Art. No. 65005208)

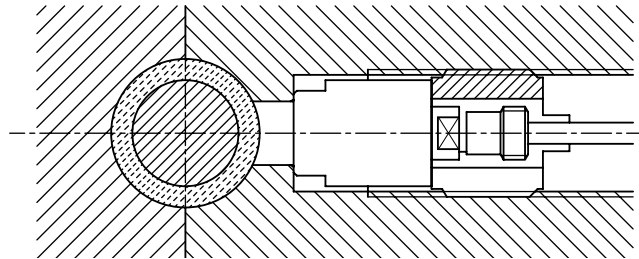


Fig. 9: Sensor with machined front (Types 6152BA... and 6152BB only)

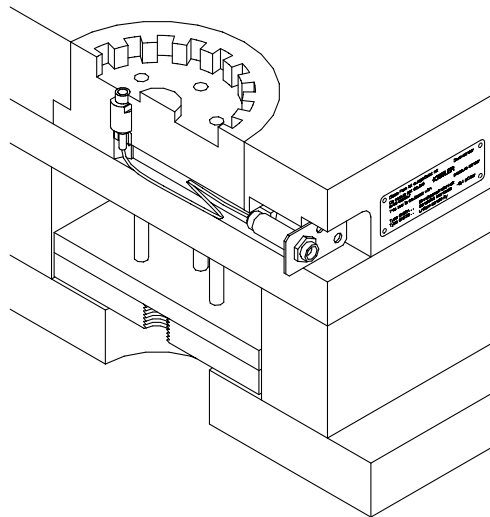


Fig. 10: Sensor, cable, mounting plate (Art. No. 65005208) and identification label

**Mounting**

The sensor is normally fixed 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 adapted 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 and sensors with silicone filled gap!). Full details may be found in the operating instructions.

The sensor is center aligned in the 6 H7 bore.

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**Accessories**

- |  |                               |
|--|-------------------------------|
| • Sensor   | 6152BA, BB, BC,<br>BD, BV, BW |
| • O-ring, diameter 2,5x0,65 mm,<br>(for variants up to 200 °C) | 1100A57                       |
| • O-ring, diameter 2,5x0,65 mm,<br>(for variants up to 300 °C) | 1100A67                       |
| • 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<br>L = 1,5 m   | 1666A2        |
| • Single-Wire cable with M4 connector<br>L = 5 m   | 1666A4        |
| • Single-Wire cable with M4 connector<br>and crimp pin Type 65003747 pre-installed<br>L = min 0,04 up to max 1,5 m | 1674AZSP      |
| • Connector (for Single-Wire variants<br>with connector)   | 1839          |
| • Crimp pin for Single-Wire<br>(Connection Types 1712... and 1714...)  | 65003747      |
| • Coaxial cable 0 ... 200 °C<br>with M4 connector and Fischer connector  | Type 1645C... |
| • Coaxial cable 0 ... 200 °C with M4<br>connector and MiniCoax connector   | 1650A4P...    |
| • High temperature coaxial cable with<br>M4 connector and Fischer connector<br>0 ... 300 °C                        | 1955A...      |
| • Mounting plate for connector Type 1839<br>or coaxial cable with Fischer connector                                | 65005208      |

**Accessories (optionally orderable)**

**Mounting tools**

- |  |         |
|--|---------|
| • Extraction tool for variants up to 200 °C                              | 1315A   |
| • Extraction tool for variants up to 300 °C                              | 1362A   |
| • Fixation for Fischer connector   | 1401    |
| • Socket wrench for mounting for<br>mounting nut Type 6453               | 1383B   |
| • Tools for cable exchange<br>(inkl. fork wrench SW4/SW5 65007801)       | 1300A32 |
| • Cam wrench for mounting nut<br>(for disassembly of sensor from sleeve) | 1352    |
| • Screw tab M12x1  | 1355    |
| • Dummy sensor   | 6552    |

**Multichannel connectors and contact elements**

- |  |           |
|--|-----------|
| • 4-channel connector up to 120 °C<br>(for MiniCoax and single-wire cable)                               | 1722A4... |
| • 8-channel connector up to 120 °C<br>(for MiniCoax and single-wire cable)                               | 1722A8... |
| • 4-channel connector up to 200 °C<br>(for single-wire cable)  | 1708      |
| • 8-channel connector up to 200 °C<br>(for single-wire cable)  | 1710      |
| • Contact elements 1-channel<br>for single-wire types  | 1712...   |
| • Contact elements 4-channel<br>for single-wire types  | 1714...   |
| • Crimpset with tools<br>(Mounting of crimp pin 65003747 for<br>connection to Types 1712... and 1714...) | 1381A0    |

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**Ordering key**

**Sensor Type**

up to 200 °C	<b>A</b>
up to 200 °C, sensor front coated	<b>C</b>
up to 300 °C	<b>B</b>
up to 300 °C, sensor front coated	<b>D</b>
up to 200 °C, gap between sensor adapter filled with silicone	<b>V</b>
up to 200 °C, sensor front coated and gap between sensor adapter filled with silicon	<b>W</b>

**Sensor and mounting**

Unisens	<b>U</b>
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**Mounting type**

Mounting with mounting nut Type 6453	<b>M</b>
Mounting with spacer sleeve Type 6462	<b>S</b>

Reserve	<b>R</b>
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**Cable**

Single-wire-cable (PTFE), only sensor Type A,C,V and W	<b>S</b>
Coaxial cable (PFA D2), only sensor Type A,C,V and W	<b>K</b>
High temperature cable, only sensor Type B and D	<b>H</b>
without cable	<b>X</b>

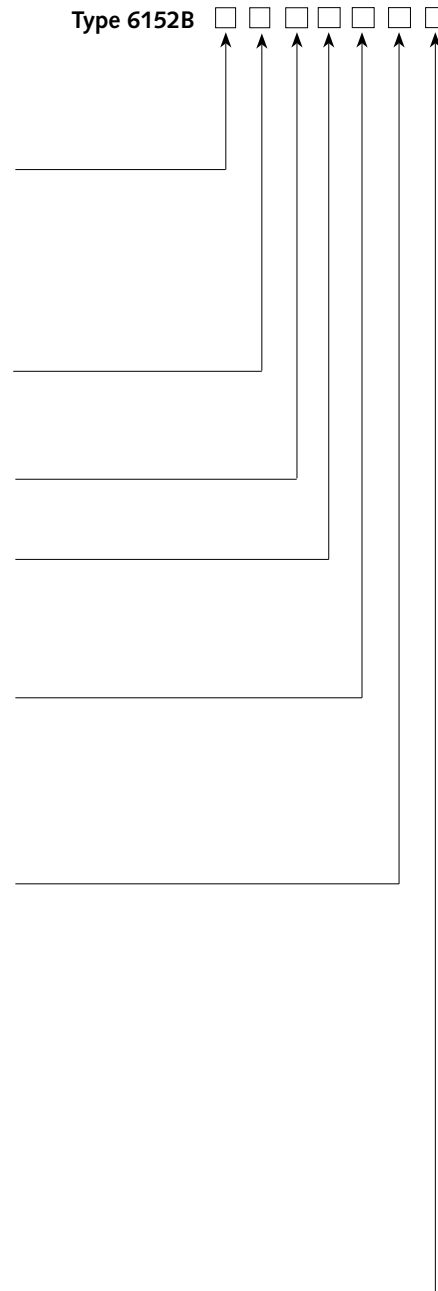
**Connector**

Fischer KE102 (cable K and H)	<b>F</b>
MiniKoax (cable K)	<b>M</b>
with connector type 1839 in scope of delivery (cable S)	<b>E</b>
without connector type 1839 in scope of delivery (cable S)	<b>G</b>

**Cable design**

No cable	<b>XXX</b>
L = 0,2 m, only cable K, connector F or M (coaxial)	<b>0,2</b>
L = 0,4 m, cable K, connector F or M (coaxial) cable H, connector F (coaxial)	<b>0,4</b>
L = 0,6 m, only cable K, connector F or M (coaxial)	<b>0,6</b>
L = 0,8 m, only cable K, connector F or M (coaxial)	<b>0,8</b>
L = 1,0 m, only cable K, connector F (coaxial)	<b>1,0</b>
L = 1,2 m, only cable K, connector F or M (coaxial)	<b>1,2</b>
L = 1,5 m, cable K, connector F or M cable S, connector E or G	<b>1,5</b>
L = 1,6 m, only cable K, connector F or M (coaxial)	<b>1,6</b>
L = 2,0 m, only cable K, connector F or M (coaxial)	<b>2,0</b>
L = 2,5 m, only cable K, connector F or M (coaxial)	<b>2,5</b>
L = 3,0 m, only cable K, connector F or M (coaxial)	<b>3,0</b>
L=5,0 m, only cable S (Single-Wire)	<b>5,0</b>
L = 0,10 ... 5 m, only cable K or H (coaxial)	<b>-sp</b>
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	<b>Zsp</b>

Type 6152B



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