Multi-Cavity Monitoring System

for Mold Cavity Pressure Measurement

Complete modular monitoring system for multi-cavity injection molds consisting of cavity pressure sensors and charge amplifier.

- Made for use in industrial environment
- Sensor connection with cut and grip technique
- Cable length individually adjustable

Description

The sensors available in single-wire technology for this system are the Types 6152A, 6157B, 6159A, 6167A, 6169A, 6182A and 6183A.

The pressure is applied directly to the entire front of the sensor and is transferred to the quartz measuring element, which produces a charge proportional to the pressure. All parts of the sensor are corrosion resistant.

The single-wire cable of the sensors with its very small cross-sectional area offers flexibility for installation purposes. The electrical shielding in the single-wire technology is provided by the mold. The open cable end is connected using cut and grip technique to the multi-channel charge amplifier mounted on the mold. This renders a plug connection completely unnecessary and the length of the single-wire cable can be selected on site. The number of measuring channels is selected according to the number of cavities (8, 16, 24 or 32 channels).

In the case of molds with a large number of cavities, it is also possible to combine various charge amplifiers. For a 48-cavity mold, for example, two 24-channel charge amplifiers can be installed.

Application

The sensors measure mold cavity pressures and is particularly suitable for industrial applications for monitoring, open and closed loop control in the injection molding process. The measuring range of the injection molding process and the operating temperature range is dependent on the type of sensor and must be taken from the technical data.
Installation
The sensor is normally secured with the mounting nut in the fitting hole; a distance sleeve can also be used for that purpose. Installation using a distance sleeve is mainly recommended for miniaturized single-wire sensors (6182A and 6183A). 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. Full details can be found in the operating instructions.

The single-wire cable must be installed completely in the mold and the multi-channel charge amplifier must be installed directly on the mold.

The single-wire cables for the mold cavity pressure sensors are connected directly to the individual charge amplifier modules by means of an insulation-piercing connection technique. The individual cable lengths can be adapted to the mold conditions.

Installing single-wire cables with multi-channel charge amplifier

Mold Cavity Pressure Sensors
Only single-wire sensors are used for the multi-cavity system. The technical data together with additional installation instructions for single-wire sensors should be taken from the data sheet relevant to the basic sensor type. The multi-cavity system requires the single-wire cable to be directly installed with the multi-channel charge amplifier Type 5048A... . For this reason, the connector (Art. No. 5.511.322) and mounting plate (Art. No. 3.520.328) listed in the data sheet for the sensor basic type are not included in the parts supplied with the multi-cavity system.

Data sheets:
03.6152A
03.6157B
03.6159A
03.6167A
03.6169A
03.6182AE
03.6183AE

Processing the measured data
Two software tools are available for automatic processing of the measured data.

Kistler Dataflow Type 2805A... for process optimization, monitoring and documentation.

Kistler Multiflow Type 2809A... for automatic balancing of multi-cavity molds which are equipped with hot runners.

Data sheets:
Kistler Dataflow DB19.2805
Kistler Multiflow DB19.2809
## Technical Data

### Type 5048A...

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring range of the channels (Basic type)</td>
<td>pC: -2'500 ... +2'500</td>
</tr>
<tr>
<td>Error</td>
<td>%: &lt;1</td>
</tr>
<tr>
<td>Output voltage of the channels and sum signal</td>
<td>V: -5 ... +5</td>
</tr>
<tr>
<td>Output voltage limitation under no-load conditions</td>
<td>V: &gt;± 7</td>
</tr>
<tr>
<td>Output current per channel</td>
<td>mA: &lt;±2</td>
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<tr>
<td>Output resistance</td>
<td>Ω: 100</td>
</tr>
<tr>
<td>Output offset</td>
<td>mV: ± 8</td>
</tr>
<tr>
<td>Frequency range (-3 dB)</td>
<td>kHz: ±0 ... ±10</td>
</tr>
<tr>
<td>Drift</td>
<td>pC/s: &lt;0,1</td>
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<tr>
<td></td>
<td>mV/s: &lt;0,2</td>
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<tr>
<td>Reset/Operate transient</td>
<td>pC: &lt;2</td>
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<tr>
<td>Input insulation</td>
<td>Ω: &gt;10(^{11})</td>
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<tr>
<td>Operate input (Electrically isolated from supply and charge amplifier)</td>
<td>V: &lt;0,5</td>
</tr>
<tr>
<td>Reset: Input open or Operate:</td>
<td>V / mA: 3 ... 30 / 0,3 ... 3</td>
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<tr>
<td>Operate output output voltage for Operate</td>
<td>V: ±4,7</td>
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<tr>
<td>for Reset</td>
<td>V: ±0</td>
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<tr>
<td>output current</td>
<td>mA: 0,7 ... 1</td>
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<tr>
<td>Output resistance</td>
<td>Ω: 4</td>
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<tr>
<td>Supply (Electrically isolated from Reset/Operate and charge amplifier)</td>
<td>Supply voltage V DC: 18 ... 30</td>
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<tr>
<td>Power consumption W: ≈4</td>
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<tr>
<td>Connections</td>
<td>Supply and control inputs Type MIL KPT02E8-4P</td>
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<tr>
<td>Output signal</td>
<td>Type MIL KPT02E20-41S</td>
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<tr>
<td>Charge inputs</td>
<td>P.c.b. pieced insulation terminal, Phoenix contact IDC-0,5-DL</td>
</tr>
<tr>
<td>Repeat connections p.c.b. pierced insulation terminals for the same conductor type (a new conductor point must be used) max.</td>
<td>50</td>
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<tr>
<td>General Data</td>
<td>Operating temperature range °C: 0 ... 60</td>
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<tr>
<td>min. / max. temperature °C: -10 / 70</td>
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<tr>
<td>Dimensions LxWxH</td>
<td>Type 5048A08... (8-channel) mm: 137x122x81</td>
</tr>
<tr>
<td></td>
<td>Type 5048A16... (16-channel) mm: 249x202x111</td>
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<tr>
<td></td>
<td>Type 5048A24... (24-channel) mm: 249x202x111</td>
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<tr>
<td></td>
<td>Type 5048A32... (32-channel) mm: 249x202x111</td>
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<tr>
<td>Weight</td>
<td>Type 5048A08... (8-channel) kg: ≈1,5</td>
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<tr>
<td></td>
<td>Type 5048A16... (16-channel) kg: ≈2,8</td>
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<tr>
<td></td>
<td>Type 5048A24... (24-channel) kg: ≈2,8</td>
</tr>
<tr>
<td></td>
<td>Type 5048A32... (32-channel) kg: ≈2,8</td>
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</tbody>
</table>
Dimensions

8-channel charge amplifiers Type 5048A...

Multi-channel charge amplifiers Type 5048A… (16, 24 or 32 channels)
Multi-Cavity Monitoring System for Mold Cavity Pressure Measurement, Type 6829A...

**MIL 41-pole equipment plug for charge amplifier Type 5048A...**

<table>
<thead>
<tr>
<th>A</th>
<th>OUT</th>
<th>CH2</th>
<th>M</th>
<th>OUT</th>
<th>CH31</th>
<th>Z</th>
<th>OUT</th>
<th>CH12</th>
<th>k</th>
<th>OUT</th>
<th>GND</th>
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<tr>
<td>B</td>
<td>OUT</td>
<td>CH4</td>
<td>N</td>
<td>OUT</td>
<td>CH27</td>
<td>a</td>
<td>OUT</td>
<td>CH16</td>
<td>m</td>
<td>NC</td>
<td>-</td>
</tr>
<tr>
<td>C</td>
<td>OUT</td>
<td>CH6</td>
<td>P</td>
<td>OUT</td>
<td>CH25</td>
<td>b</td>
<td>OUT</td>
<td>CH22</td>
<td>n</td>
<td>NC</td>
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<tr>
<td>D</td>
<td>OUT</td>
<td>CH10</td>
<td>R</td>
<td>OUT</td>
<td>CH21</td>
<td>c</td>
<td>OUT</td>
<td>CH26</td>
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<td>E</td>
<td>OUT</td>
<td>CH14</td>
<td>S</td>
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<td>OUT</td>
<td>CH32</td>
<td>q</td>
<td>OUT</td>
<td>CH17</td>
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<td>F</td>
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<td>CH18</td>
<td>T</td>
<td>OUT</td>
<td>CH13</td>
<td>e</td>
<td>OUT</td>
<td>OPERATE</td>
<td>r</td>
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<tr>
<td>G</td>
<td>OUT</td>
<td>CH20</td>
<td>U</td>
<td>OUT</td>
<td>CH9</td>
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<td>OUT</td>
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<tr>
<td>H</td>
<td>OUT</td>
<td>CH24</td>
<td>V</td>
<td>OUT</td>
<td>CH7</td>
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<td>J</td>
<td>OUT</td>
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<td>W</td>
<td>OUT</td>
<td>CH5</td>
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<td>OUT</td>
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<td>K</td>
<td>OUT</td>
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<td>OUT</td>
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<td>Y</td>
<td>OUT</td>
<td>CH8</td>
<td>j</td>
<td>OUT</td>
<td>CH3</td>
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</tr>
</tbody>
</table>

A + Exct. 18 ... 30 V DC  
B – Exct. (GND)  
C – Operate (GND)  
D + Operate

**MIL 4-pole equipment plug for charge amplifier Type 5048A...**
Ordering Key

Sensor-/Charge Amplifier

Sensor basic type *

- Type 6152AA with single-wire cable: 01
- Type 6152AAA with single-wire cable: 02
- Type 6152AC with single-wire cable: 03
- Type 6152ACA with single-wire cable: 04
- Type 6157BA with single-wire cable: 05
- Type 6157BC with single-wire cable: 06
- Type 6159A with single-wire cable: 07
- Type 6159AU6 with single-wire cable: 08
- Type 6167A with single-wire cable: 09
- Type 6169A with single-wire cable: 10
- Type 6182A: 11
- Type 6183A: 12

* The sensor basic type is supplied together with single-wire cable for multi-cavity applications.

Number of sensors

- Minimum 4 Sensors: 04
- Maximum 32 Sensors: 32

Multi-channel charge amplifier Type 5048

- 8 measuring channels: A
- 16 measuring channels: B
- 24 measuring channels: C
- 32 measuring channels: D

Amplifier measuring range

- 2'500 pC: 1
- 5'000 pC: 2
- 10'000 pC: 3
- 20'000 pC: 4
- Other measuring ranges on request: 9

Spare parts

Sensors and cables must be ordered separately. Cable Type number for sensors (6152...): Art. No. 7.620.315. Cable Type number for (6159...): Art. No. 7.620.314. The sensors 6182A and 6183A will be delivered with integrated cable. When ordering please specify the average sensitivity or the serial number of the system. The Type number of the amplifier will be provided on request.
Multi-Cavity Monitoring System for Mold Cavity Pressure Measurement, Type 6829A...

Scope of Delivery with Included Accessories
• Charge amplifier 5048A (According to order)
• Sensors Type and number according to order
• Identification plate 3.520.907
• Cable for
  6152AA, 6152AAA, 6152AC, 6152ACA, 6157BA, 6157BC 7.620.315
  6159A, 6159AU6, 6167A, 6169A, 6182A, 6183A 7.620.314
  none
• Mounting nut for
  6152AA, 6152AAA, 6152AC, 6152ACA 6453
  6157BA, 6157BC, 6159A, 6159AU6, 6167A, 6169A, 6182A, 6183A 6457
  none
• Spacer sleeve for
  6182A, 6183A 3.710.057
• Checking tool for
  6182A 3.050.243
  6183A 3.050.241

Note: Cable, mounting nut, spacer sleeve and checking tools will be included according to the number of ordered sensors.

Optional Accessories
• Connection Cable for Charge Amplifier with open ends 1700A59
• Connection Cable for Charge Amplifier with connector for Dataflow Type 2805A...
  up to 16 channels (Charge Amplifier order A and B) 1200A83
  up to 32 channels (Charge Amplifier C and D) 1200A77 and 1200A83
• Connection Cable for Reset/Operate and excitation voltage with open ends 1700A62

Ordering Key Example:
Multi-cavity mold with 16 sensors of the Type 6182A. The 16 sensors determine the multi-channel charge amplifier with 16 measuring channels.

The amplifier measuring range is selected as follows:
• The sensitivity of the sensor must be taken from the data sheet concerned: in this example, the sensitivity is E = 2,5 pC/bar for the sensor 6182A.
• Based on the injection molding application, the pressure range to be observed is selected up to 2000 bar. The maximum pressure range of the sensor listed in the data sheet must be noted!

The amplifier measuring range is calculated as:
2,5 pC/bar x 2000 bar = 5000pC

The system selected now has the article number:
6829A 11E 16B2