



## HCLA SERIES – MINIATURE COMPENSATED LOW PRESSURE SENSORS

The HCLA pressure sensors perform precision digital signal conditioning and provide analog and digital output at the same time. The sensors are calibrated, temperature compensated and linearized and use a special compensation technique to achieve very high offset stability and virtually no position sensitivity. They are intended to be used with dry and non-corrosive gases. Miniature SMT and SIL housings allow for space-saving PCB-mounting and maximum OEM design flexibility. All HCLA pressure sensors can be modified according to customer specific requirements.

### Features

- Pressure ranges from 0 to 2.5 up to 0 to 75 mbar, 0 to  $\pm 2.5$  up to 0 to  $\pm 75$  mbar, differential or gage
- Output: 0.25 to 4.25 V and I<sup>2</sup>C-bus (SPI optional)
- Precision ASIC conditioning
- Calibrated and temperature compensated
- Miniature SMT and SIL housings

### Applications

- Medical devices
- Instrumentation
- HVAC
- Industrial controls
- Pneumatic controls
- Environmental controls

### Certificates

- RoHS and REACH compliant

### Media compatibility

To be used with non-corrosive, non-ionic working fluids such as clean dry air, dry gases and the like.

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### Maximum ratings

| Parameter                         |   | Min. | Typ. | Max.      | Unit     |
|-----------------------------------|---|------|------|-----------|----------|
| Supply voltage $V_S$              | HCLAxxx                                 | 4.5  |      | 5.5       | $V_{DC}$ |
|                                   | (optional)                              | 2.7  |      | 3.3       |          |
| Output current                    | Sink                                    |      |      | 1         | mA       |
|                                   | Source                                  |      |      | 1         |          |
| Lead specifications               | Average preheating temperature gradient |      |      | 2.5       | K/s      |
|                                   | Soak time                               |      |      | approx. 3 | min.     |
|                                   | Time above 217 °C                       |      |      | 50        | s        |
|                                   | Time above 230 °C                       |      |      | 40        |          |
|                                   | Time above 250 °C                       |      |      | 15        |          |
|                                   | Peak temperature                        |      |      | 260       | °C       |
|                                   | Cooling temperature gradient            |      |      | -3.5      | K/s      |
| Temperature ranges <sup>(1)</sup> | Compensated                             | -25  |      | +85       | °C       |
|                                   | Operating                               | -25  |      | +85       |          |
|                                   | Storage                                 | -40  |      | +125      |          |
| Humidity limits (non-condensing)  |   | 0    |      | 95        | %RH      |

### Pressure sensor characteristics

| Part no.     | Operating pressure | Proof pressure <sup>(1,3)</sup> | Burst pressure <sup>(2,3)</sup> | Unit | Output signal  |
|--------------|--------------------|---------------------------------|---------------------------------|------|----------------|
| HCLA02X5xxxB | 0 to $\pm 2.5$     | 250                             | 500                             | mbar | $2.25 \pm 2 V$ |
| HCLA12X5xxxB | 0 to $\pm 12.5$    | 250                             | 500                             |      |                |
| HCLA0025xxxB | 0 to $\pm 25$      | 500                             | 750                             |      |                |
| HCLA0050xxxB | 0 to $\pm 50$      | 750                             | 1200                            |      |                |
| HCLA0075xxxB | 0 to $\pm 75$      | 1200                            | 2000                            |      |                |
| HCLA02X5xxxU | 0 to 2.5           | 250                             | 500                             | mbar | 0.25 to 4.25 V |
| HCLA12X5xxxU | 0 to 12.5          | 250                             | 500                             |      |                |
| HCLA0025xxxU | 0 to 25            | 500                             | 750                             |      |                |
| HCLA0050xxxU | 0 to 50            | 750                             | 1200                            |      |                |
| HCLA0075xxxU | 0 to 75            | 1200                            | 2000                            |      |                |

## HCLA SERIES – MINIATURE COMPENSATED LOW PRESSURE SENSORS

### Performance characteristics

( $V_S=5.0 V_{DC}$ ,  $T_A=25\text{ °C}$ ; analog output signal is ratiometric to  $V_S$ , digital output signal is not ratiometric to  $V_S$ , pressure applied to high pressure port)

#### HCLA02X5xxx

| Characteristics                                   |        | Min. | Typ.  | Max.  | Unit      |
|---|--------|------|-------|-------|-----------|
| Non-linearity and hysteresis (BSL) <sup>(4)</sup> |        |      | ±0.05 | ±0.25 | %FSS      |
| Thermal effects (-25 to 85°C) <sup>(5)</sup>      | Offset |      |       | ±1.5  |           |
|   | Span   |      |       | ±2.0  |           |
| Response delay <sup>(6,7)</sup>                   |        |      | 0.5   |       | ms        |
| A/D resolution <sup>(7)</sup>                     |        |      | 12    |       | bit       |
| D/A resolution                                    |        |      |       | 11    | bit       |
| Current consumption (no load) <sup>(8)</sup>      |        |      | 5     |       | mA        |
| <b>Digital performance characteristics</b>        |        |      |       |       |           |
| Offset warm up shift <sup>(9)</sup>               |        |      | ±0042 |       | Count Hex |
| Offset position sensitivity (±1 g)                |        |      | ±0063 |       |           |
| Offset long term drift (one year)                 |        |      | ±0042 |       |           |
| <b>Analog performance characteristics</b>         |        |      |       |       |           |
| Offset warm up shift <sup>(9)</sup>               |        |      | ±10   |       | mV        |
| Offset position sensitivity (±1 g)                |        |      | ±15   |       |           |
| Offset long term drift (one year)                 |        |      | ±10   |       |           |

#### HCLA02X5xxxB

|  |             |      |      |      |           |
|--|-------------|------|------|------|-----------|
| Operating pressure range                   |             | -2.5 |      | +2.5 | mbar      |
| <b>Digital performance characteristics</b> |             |      |      |      |           |
| Zero pressure offset                       |             | 370A | 3999 | 3C28 | Count Hex |
| Full scale span FSS <sup>(10)</sup>        |             | 63D6 | 6666 | 68F5 |           |
| Output                                     | @ +2.5 mbar |      | 6CCC |      |           |
|  | @ -2.5 mbar |      | 0666 |      |           |
| <b>Analog performance characteristics</b>  |             |      |      |      |           |
| Zero pressure offset                       |             | 2.15 | 2.25 | 2.35 | V         |
| Full scale span FSS <sup>(10)</sup>        |             | 3.90 | 4.00 | 4.10 |           |
| Output                                     | @ +2.5 mbar |      | 4.25 |      |           |
|  | @ -2.5 mbar |      | 0.25 |      |           |

#### HCLA02X5xxxU

|  |  |      |      |      |           |
|--|--|------|------|------|-----------|
| Operating pressure range                   |  | 0    |      | +2.5 | mbar      |
| <b>Digital performance characteristics</b> |  |      |      |      |           |
| Zero pressure offset                       |  | 03D7 | 0666 | 08F6 | Count Hex |
| Full scale span FSS <sup>(10)</sup>        |  | 63D6 | 6666 | 68F5 |           |
| Full scale output                          |  |      | 6CCC |      |           |
| <b>Analog performance characteristics</b>  |  |      |      |      |           |
| Zero pressure offset                       |  | 0.15 | 0.25 | 0.35 | V         |
| Full scale span FSS <sup>(10)</sup>        |  | 3.90 | 4.00 | 4.10 |           |
| Full scale output                          |  |      | 4.25 |      |           |

## HCLA SERIES – MINIATURE COMPENSATED LOW PRESSURE SENSORS

### Performance characteristics

( $V_S=5.0 V_{DC}$ ;  $T_A=25\text{ }^\circ\text{C}$ ; analog output signal is ratiometric to  $V_S$ , digital output signal is not ratiometric to  $V_S$ , pressure applied to high pressure port)

#### HCLA12X5xxx

| Characteristics                                   |        | Min. | Typ.  | Max.  | Unit      |
|---|--------|------|-------|-------|-----------|
| Non-linearity and hysteresis (BSL) <sup>(4)</sup> |        |      | ±0.05 | ±0.25 | %FSS      |
| Thermal effects -25 to 85°C <sup>(5)</sup>        | Offset |      |       | ±1.0  |           |
|   | Span   |      |       | ±1.0  |           |
| Response delay <sup>(6,7)</sup>                   |        |      | 0.5   |       | ms        |
| A/D resolution <sup>(7)</sup>                     |        |      | 12    |       | bit       |
| D/A resolution                                    |        |      |       | 11    | bit       |
| Current consumption (no load) <sup>(8)</sup>      |        |      | 5     |       | mA        |
| <b>Digital performance characteristics</b>        |        |      |       |       |           |
| Offset warm up shift <sup>(9)</sup>               |        |      | ±0021 |       | Count Hex |
| Offset position sensitivity (±1 g)                |        |      | ±0021 |       |           |
| Offset long term drift (one year)                 |        |      | ±0021 |       |           |
| <b>Analog performance characteristics</b>         |        |      |       |       |           |
| Offset warm up shift <sup>(9)</sup>               |        |      | ±5    |       | mV        |
| Offset position sensitivity (±1 g)                |        |      | ±5    |       |           |
| Offset long term drift (one year)                 |        |      | ±5    |       |           |

#### HCLA12X5xxxB

|  |              |       |      |       |           |
|--|--------------|-------|------|-------|-----------|
| Operating pressure range                   |              | -12.5 |      | +12.5 | mbar      |
| <b>Digital performance characteristics</b> |              |       |      |       |           |
| Zero pressure offset                       |              | 370A  | 3999 | 3C28  | Count Hex |
| Full scale span FSS <sup>(10)</sup>        |              | 63D6  | 6666 | 68F5  |           |
| Output                                     | @ +12.5 mbar |       | 6CCC |       |           |
|  | @ -12.5 mbar |       | 0666 |       |           |
| <b>Analog performance characteristics</b>  |              |       |      |       |           |
| Zero pressure offset                       |              | 2.15  | 2.25 | 2.35  | V         |
| Full scale span FSS <sup>(10)</sup>        |              | 3.90  | 4.00 | 4.10  |           |
| Output                                     | @ +12.5 mbar |       | 4.25 |       |           |
|  | @ -12.5 mbar |       | 0.25 |       |           |

#### HCLA12X5xxxU

|  |  |      |      |       |           |
|--|--|------|------|-------|-----------|
| Operating pressure range                   |  | 0    |      | +12.5 | mbar      |
| <b>Digital performance characteristics</b> |  |      |      |       |           |
| Zero pressure offset                       |  | 03D7 | 0666 | 08F6  | Count Hex |
| Full scale span FSS <sup>(10)</sup>        |  | 63D6 | 6666 | 68F5  |           |
| Full scale output                          |  |      | 6CCC |       |           |
| <b>Analog performance characteristics</b>  |  |      |      |       |           |
| Zero pressure offset                       |  | 0.15 | 0.25 | 0.35  | V         |
| Full scale span FSS <sup>(10)</sup>        |  | 3.90 | 4.00 | 4.10  |           |
| Full scale output                          |  |      | 4.25 |       |           |

## HCLA SERIES – MINIATURE COMPENSATED LOW PRESSURE SENSORS

### Performance characteristics

(V<sub>S</sub>=5.0 V<sub>DC</sub>; T<sub>A</sub>=25 °C; analog output signal is ratiometric to V<sub>S</sub>, digital output signal is not ratiometric to V<sub>S</sub>, pressure applied to high pressure port)

#### HCLA0025

| Characteristics                                   | Min.   | Typ.  | Max.  | Unit      |
|---|--------|-------|-------|-----------|
| Non-linearity and hysteresis (BSL) <sup>(4)</sup> |        | ±0.05 | ±0.25 | %FSS      |
| Thermal effects -25 to 85°C <sup>(5)</sup>        | Offset |       | ±0.5  |           |
|   | Span   |       | ±1.0  |           |
| Response delay <sup>(6,7)</sup>                   |        | 0.5   |       | ms        |
| A/D resolution <sup>(7)</sup>                     |        | 12    |       | bit       |
| D/A resolution                                    |        |       | 11    | bit       |
| Current consumption (no load) <sup>(8)</sup>      |        | 5     |       | mA        |
| <b>Digital performance characteristics</b>        |        |       |       |           |
| Offset warm up shift <sup>(9)</sup>               |        | ±0021 |       | Count Hex |
| Offset position sensitivity (±1 g)                |        | ±0021 |       |           |
| Offset long term drift (one year)                 |        | ±0021 |       |           |
| <b>Analog performance characteristics</b>         |        |       |       |           |
| Offset warm up shift <sup>(9)</sup>               |        | ±5    |       | mV        |
| Offset position sensitivity (±1 g)                |        | ±5    |       |           |
| Offset long term drift (one year)                 |        | ±5    |       |           |

#### HCLA0025xxxB

|  |            |      |      |      |           |
|--|------------|------|------|------|-----------|
| Operating pressure range                   |            | -25  |      | +25  | mbar      |
| <b>Digital performance characteristics</b> |            |      |      |      |           |
| Zero pressure offset                       |            | 370A | 3999 | 3C28 | Count Hex |
| Full scale span FSS <sup>(10)</sup>        |            | 63D6 | 6666 | 68F5 |           |
| Output                                     | @ +25 mbar |      | 6CCC |      |           |
|  | @ -25 mbar |      | 0666 |      |           |
| <b>Analog performance characteristics</b>  |            |      |      |      |           |
| Zero pressure offset                       |            | 2.15 | 2.25 | 2.35 | V         |
| Full scale span FSS <sup>(10)</sup>        |            | 3.90 | 4.00 | 4.10 |           |
| Output                                     | @ +25 mbar |      | 4.25 |      |           |
|  | @ -25 mbar |      | 0.25 |      |           |

#### HCLA0025xxxU

|  |  |      |      |      |           |
|--|--|------|------|------|-----------|
| Operating pressure range                   |  | 0    |      | +25  | mbar      |
| <b>Digital performance characteristics</b> |  |      |      |      |           |
| Zero pressure offset                       |  | 03D7 | 0666 | 08F6 | Count Hex |
| Full scale span FSS <sup>(10)</sup>        |  | 63D6 | 6666 | 68F5 |           |
| Full scale output                          |  |      | 6CCC |      |           |
| <b>Analog performance characteristics</b>  |  |      |      |      |           |
| Zero pressure offset                       |  | 0.15 | 0.25 | 0.35 | V         |
| Full scale span FSS <sup>(10)</sup>        |  | 3.90 | 4.00 | 4.10 |           |
| Full scale output                          |  |      | 4.25 |      |           |

## HCLA SERIES – MINIATURE COMPENSATED LOW PRESSURE SENSORS

### Performance characteristics

( $V_S=5.0 V_{DC}$ ;  $T_A=25\text{ }^\circ\text{C}$ ; analog output signal is ratiometric to  $V_S$ , digital output signal is not ratiometric to  $V_S$ , pressure applied to high pressure port)

#### HCLA0050

| Characteristics                                   | Min.   | Typ.  | Max.  | Unit      |
|---|--------|-------|-------|-----------|
| Non-linearity and hysteresis (BSL) <sup>(4)</sup> |        | ±0.05 | ±0.25 | %FSS      |
| Thermal effects -25 to 85°C <sup>(5)</sup>        | Offset |       | ±0.5  |           |
|   | Span   |       | ±1.0  |           |
| Response delay <sup>(6,7)</sup>                   |        | 0.5   |       | ms        |
| A/D resolution <sup>(7)</sup>                     |        | 12    |       | bit       |
| D/A resolution                                    |        |       | 11    | bit       |
| Current consumption (no load) <sup>(8)</sup>      |        | 5     |       | mA        |
| <b>Digital performance characteristics</b>        |        |       |       |           |
| Offset warm up shift <sup>(9)</sup>               |        | ±0021 |       | Count Hex |
| Offset position sensitivity (±1 g)                |        | ±0021 |       |           |
| Offset long term drift (one year)                 |        | ±0021 |       |           |
| <b>Analog performance characteristics</b>         |        |       |       |           |
| Offset warm up shift <sup>(9)</sup>               |        | ±5    |       | mV        |
| Offset position sensitivity (±1 g)                |        | ±5    |       |           |
| Offset long term drift (one year)                 |        | ±5    |       |           |

#### HCLA0050xxxB

|  |            |      |      |      |           |
|--|------------|------|------|------|-----------|
| Operating pressure range                   |            | -50  |      | +50  | mbar      |
| <b>Digital performance characteristics</b> |            |      |      |      |           |
| Zero pressure offset                       |            | 370A | 3999 | 3C28 | Count Hex |
| Full scale span FSS <sup>(10)</sup>        |            | 63D6 | 6666 | 68F5 |           |
| Output                                     | @ +50 mbar |      | 6CCC |      |           |
|  | @ -50 mbar |      | 0666 |      |           |
| <b>Analog performance characteristics</b>  |            |      |      |      |           |
| Zero pressure offset                       |            | 2.15 | 2.25 | 2.35 | V         |
| Full scale span FSS <sup>(10)</sup>        |            | 3.90 | 4.00 | 4.10 |           |
| Output                                     | @ +50 mbar |      | 4.25 |      |           |
|  | @ -50 mbar |      | 0.25 |      |           |

#### HCLA0050xxxU

|  |  |      |      |      |           |
|--|--|------|------|------|-----------|
| Operating pressure range                   |  | 0    |      | +50  | mbar      |
| <b>Digital performance characteristics</b> |  |      |      |      |           |
| Zero pressure offset                       |  | 03D7 | 0666 | 08F6 | Count Hex |
| Full scale span FSS <sup>(10)</sup>        |  | 63D6 | 6666 | 68F5 |           |
| Full scale output                          |  |      | 6CCC |      |           |
| <b>Analog performance characteristics</b>  |  |      |      |      |           |
| Zero pressure offset                       |  | 0.15 | 0.25 | 0.35 | V         |
| Full scale span FSS <sup>(10)</sup>        |  | 3.90 | 4.00 | 4.10 |           |
| Full scale output                          |  |      | 4.25 |      |           |

## HCLA SERIES – MINIATURE COMPENSATED LOW PRESSURE SENSORS

### Performance characteristics

( $V_S=5.0 V_{DC}$ ;  $T_A=25\text{ }^\circ\text{C}$ ; analog output signal is ratiometric to  $V_S$ , digital output signal is not ratiometric to  $V_S$ , pressure applied to high pressure port)

#### HCLA0075xxx

| Characteristics                                   | Min.   | Typ.  | Max.  | Unit      |
|---|--------|-------|-------|-----------|
| Non-linearity and hysteresis (BSL) <sup>(4)</sup> |        | ±0.05 | ±0.25 | %FSS      |
| Thermal effects -25 to 85°C <sup>(5)</sup>        | Offset |       | ±0.5  |           |
|   | Span   |       | ±1.0  |           |
| Response delay <sup>(6,7)</sup>                   |        | 0.5   |       | ms        |
| A/D resolution <sup>(7)</sup>                     |        | 12    |       | bit       |
| D/A resolution                                    |        |       | 11    |           |
| Current consumption (no load) <sup>(8)</sup>      |        | 5     |       | mA        |
| <b>Digital performance characteristics</b>        |        |       |       |           |
| Offset warm up shift <sup>(9)</sup>               |        | ±0021 |       | Count Hex |
| Offset position sensitivity (±1 g)                |        | ±0021 |       |           |
| Offset long term drift (one year)                 |        | ±0021 |       |           |
| <b>Analog performance characteristics</b>         |        |       |       |           |
| Offset warm up shift <sup>(9)</sup>               |        | ±5    |       | mV        |
| Offset position sensitivity (±1 g)                |        | ±5    |       |           |
| Offset long term drift (one year)                 |        | ±5    |       |           |

#### HCLA0075xxxB

|  |            |      |      |      |           |
|--|------------|------|------|------|-----------|
| Operating pressure range                   |            | -75  |      | +75  | mbar      |
| <b>Digital performance characteristics</b> |            |      |      |      |           |
| Zero pressure offset                       |            | 370A | 3999 | 3C28 | Count Hex |
| Full scale span FSS <sup>(10)</sup>        |            | 63D6 | 6666 | 68F5 |           |
| Output                                     | @ +75 mbar |      | 6CCC |      |           |
|  | @ -75 mbar |      | 0666 |      |           |
| <b>Analog performance characteristics</b>  |            |      |      |      |           |
| Zero pressure offset                       |            | 2.15 | 2.25 | 2.35 | V         |
| Full scale span FSS <sup>(10)</sup>        |            | 3.90 | 4.00 | 4.10 |           |
| Output                                     | @ +75 mbar |      | 4.25 |      |           |
|  | @ -75 mbar |      | 0.25 |      |           |

#### HCLA0075xxxU

|  |  |      |      |      |           |
|--|--|------|------|------|-----------|
| Operating pressure range                   |  | 0    |      | 75   | mbar      |
| <b>Digital performance characteristics</b> |  |      |      |      |           |
| Zero pressure offset                       |  | 03D7 | 0666 | 08F6 | Count Hex |
| Full scale span FSS <sup>(10)</sup>        |  | 63D6 | 6666 | 68F5 |           |
| Full scale output                          |  |      | 6CCC |      |           |
| <b>Analog performance characteristics</b>  |  |      |      |      |           |
| Zero pressure offset                       |  | 0.15 | 0.25 | 0.35 | V         |
| Full scale span FSS <sup>(10)</sup>        |  | 3.90 | 4.00 | 4.10 |           |
| Full scale output                          |  |      | 4.25 |      |           |

**I<sup>2</sup>C Bus**

**Introduction**

The HCLA is capable to generate a digital output signal. The device runs a cyclic program, which will store a corrected pressure value with 12 bit resolution about every 250 μs within the output registers of the internal ASIC. In order to use the sensor for digital signal readout, it should be connected to a bidirectional I<sup>2</sup>C-bus.

According to the I<sup>2</sup>C-bus specification, the bus is controlled by a master device, which generates the clock signal, controls the bus access and generates START and STOP conditions. The HCLA is designed to work as a slave, hence it will only respond to requests from a master device.

**Digital I<sup>2</sup>C interface**

The HCLA complies with the following protocol (Fig. 1):

**Bus not busy:** During idle periods both data line (SDA) and clock line (SCL) remain HIGH.

**START condition (S):** HIGH to LOW transition of SDA line while clock (SCL) is HIGH is interpreted as START condition. START conditions are always generated by the master. Each initial request for a pressure value has to begin with a START condition.

**STOP condition (P):** LOW to HIGH transition of SDA line while clock (SCL) is HIGH determines STOP condition. STOP conditions are always generated by the master. More than one request for the current pressure value can be transmitted without generation of intermediate STOP condition.

**DATA valid (D):** State of data line represents valid data when, after START condition, data line is stable for duration of HIGH period of clock signal. Data on line must be changed during LOW period of clock signal. There is one clock pulse per bit of data.

**Acknowledge (A):** Data is transferred in pieces of 8 bits (1 byte) on serial bus, MSB first. After each byte receiving device whether master or slave – is obliged to pull data line LOW as acknowledge for reception of data. Master must generate an extra clock pulse for this purpose. When acknowledge is missed, slave transmitter becomes inactive. It is on master either to send last com-mand again or to generate STOP condition in that case.

**Slave address:** The I<sup>2</sup>C-bus master-slave concept requires a unique address for each device. The HCLA has a preconfigured slave address (1111000xb). By factory programming it is possible to define a

secondary slave address additional to the general one. According to I<sup>2</sup>C specification 127 different addresses are available. The sensor will then listen to both slave addresses. After generating a START condition the master sends the address byte containing a 7 bit address followed by a data direction bit (R/W). A "0" indicates a transmission from master to slave (WRITE), a "1" indicates a data request (READ).

**DATA operation:** The sensor starts to send 2 data bytes containing the current pressure value as a 15 bit information placed in the output registers.

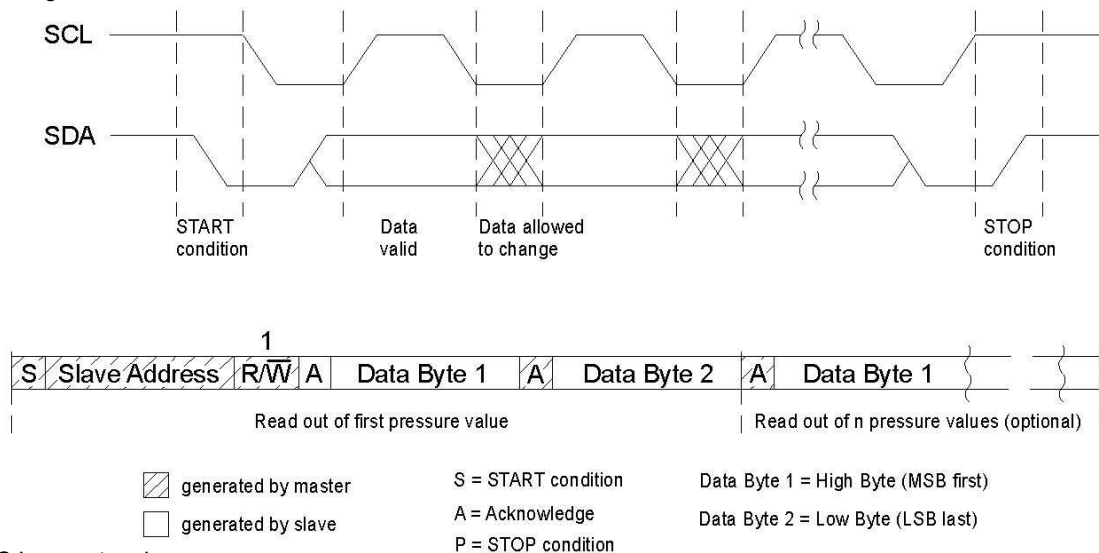


Fig. 1: I<sup>2</sup>C bus protocol



**I<sup>2</sup>C Interface parameters**

| Parameter  | Symbol              | Min. | Typ. | Max. | Unit    |
|--|---------------------|------|------|------|---------|
| Input high level   |                     | 90   |      | 100  | % of Vs |
| Input low level  |                     | 0    |      | 10   |         |
| Output low level   |                     |      |      | 10   |         |
| Pull-up resistor   |                     | 500  |      |      | Ω       |
| Load capacitance @ SDA                                     | C <sub>SDA</sub>    |      |      | 400  | pF      |
| Input capacitance @ SDA/SCL                                | C <sub>i2C_IN</sub> |      |      | 10   |         |
| SCL clock frequency  | F <sub>SCL</sub>    | 100* |      | 400  | kHz     |
| Bus free time between STOP and START condition             | t <sub>BUF</sub>    | 1.3  |      |      | μs      |
| Hold time (repeated) START condition, to first clock pulse | t <sub>HD,STA</sub> | 0.8  |      |      |         |
| LOW period of SCL  | t <sub>LOW</sub>    | 1.3  |      |      |         |
| HIGH period of SCL   | t <sub>HIGH</sub>   | 0.6  |      |      |         |
| Setup time repeated START condition                        | t <sub>SU,STA</sub> | 1    |      |      |         |
| Data hold time   | t <sub>HD,DAT</sub> | 0    |      |      |         |
| Data setup time  | t <sub>SU,DAT</sub> | 0.2  |      |      |         |
| Rise time of both SDA and SCL                              | t <sub>R</sub>      |      |      | 0.3  |         |
| Fall time of both SDA and SCL                              | t <sub>F</sub>      |      |      | 0.3  |         |
| Setup time for STOP condition                              | t <sub>SU,STO</sub> | 0.6  |      |      |         |

\*recommended

**Note:** TE Connectivity recommends communication speeds of at least 100 kHz (max. 400 kHz). Please contact us for further information.

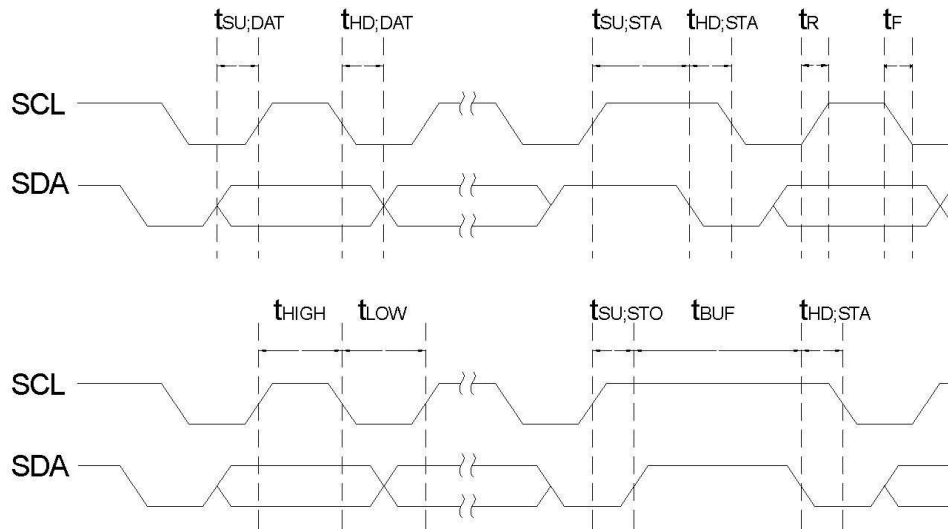
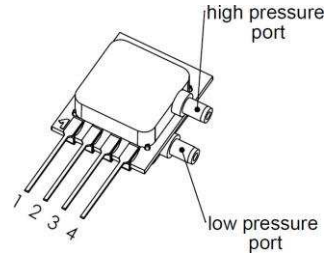
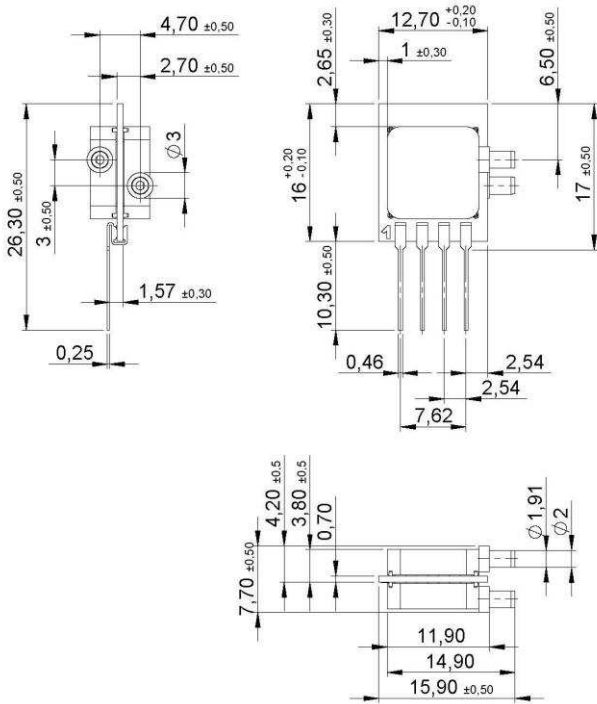


Fig. 2: Timing characteristics

# HCLA SERIES – MINIATURE COMPENSATED LOW PRESSURE SENSORS

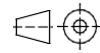
## Dimensional drawing

### HCLAxxDxxx (SIL, 2 ports same side)



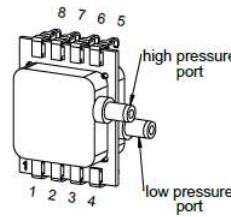
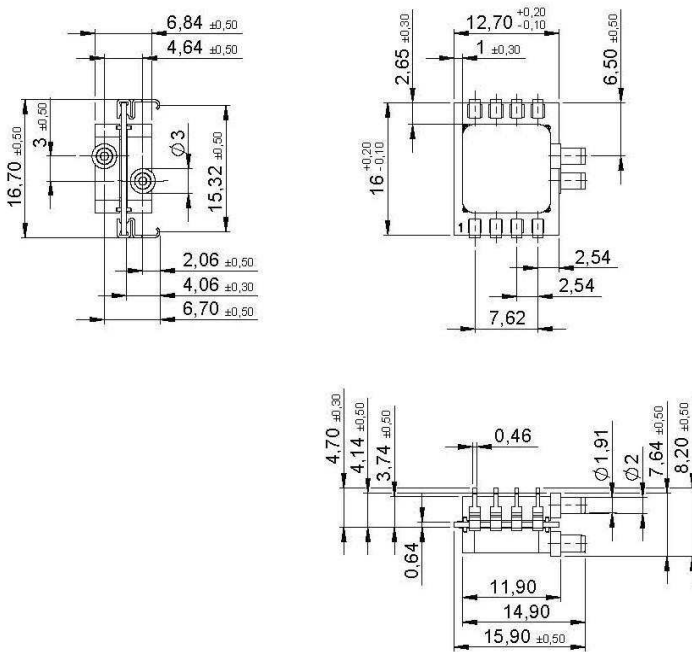
| Pin | connection |
|-----|------------|
| 1   | +Vs        |
| 2   | GND        |
| 3   | Vout       |
| 4   | I / C *    |

\* Internal connection. Do not connect for any reason



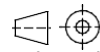
first angle projection  
dimensions in mm

### HCLAxExxxx (SMD, 2 ports same side)



| Pin | connection |
|-----|------------|
| 1   | +Vs        |
| 2   | GND        |
| 3   | Vout       |
| 4   | I / C *    |
| 5   | SCL        |
| 6   | I / C *    |
| 7   |            |
| 8   | SDA        |

\* Internal connection. Do not connect for any reason

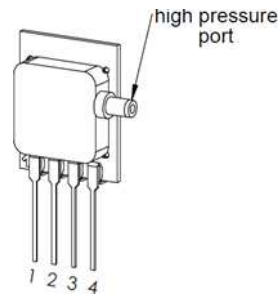
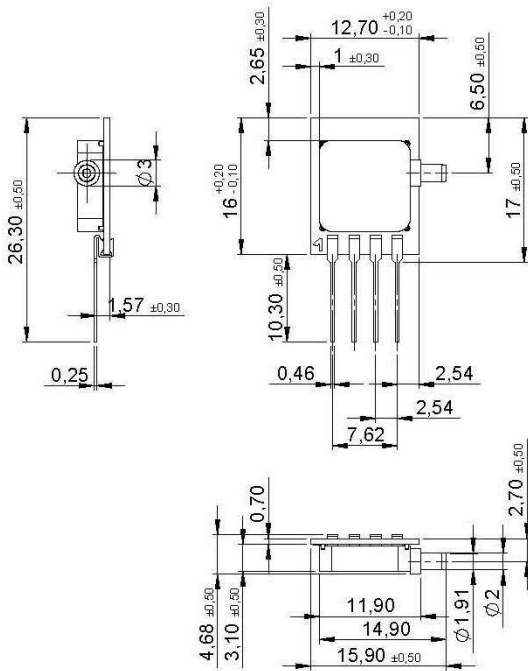


first angle projection  
dimensions in mm

# HCLA SERIES – MINIATURE COMPENSATED LOW PRESSURE SENSORS

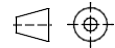
## Dimensional drawing

### HCLAxxxGxxx (SIL, single port)



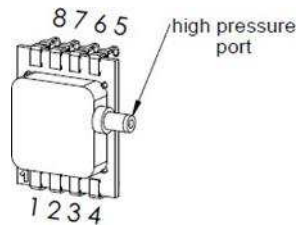
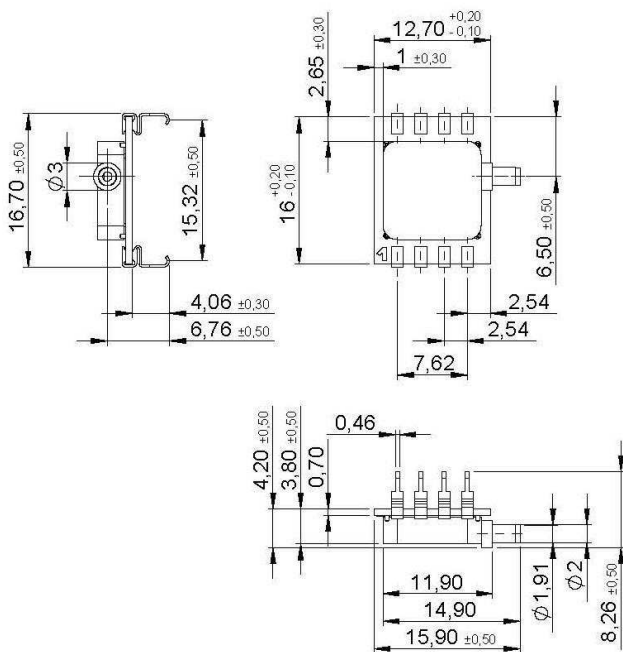
| Pin | connection |
|-----|------------|
| 1   | +Vs        |
| 2   | GND        |
| 3   | Vout       |
| 4   | I / C *    |

\* Internal connection. Do not connect for any reason



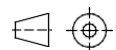
first angle projection  
dimensions in mm

### HCLAxxxHxxx (SMD, single port)



| Pin | connection |
|-----|------------|
| 1   | +Vs        |
| 2   | GND        |
| 3   | Vout       |
| 4   | I / C *    |
| 5   | SCL        |
| 6   | I / C *    |
| 7   |            |

\* Internal connection. Do not connect for any reason

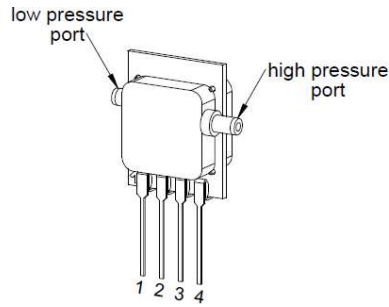
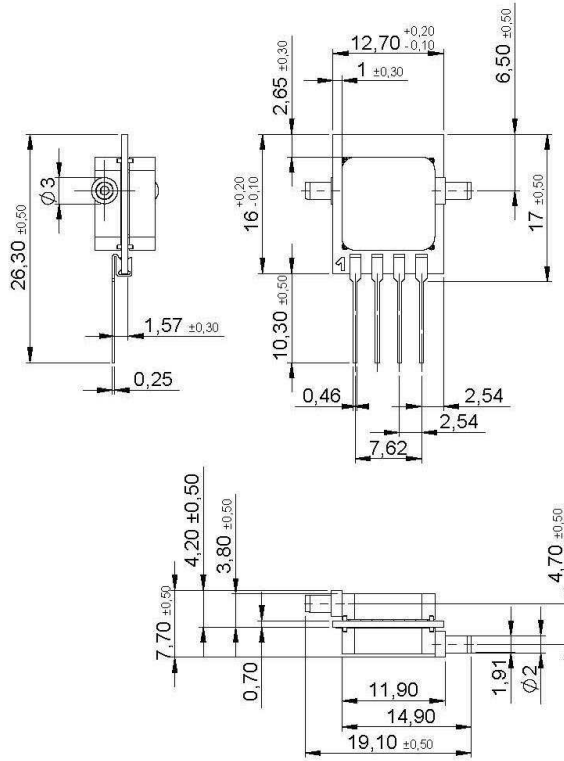


first angle projection  
dimensions in mm

# HCLA SERIES – MINIATURE COMPENSATED LOW PRESSURE SENSORS

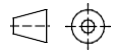
## Dimensional drawing

### HCLAxxxPxxx (SIL, 2 ports opposite side)



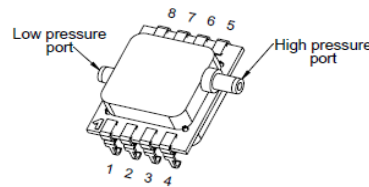
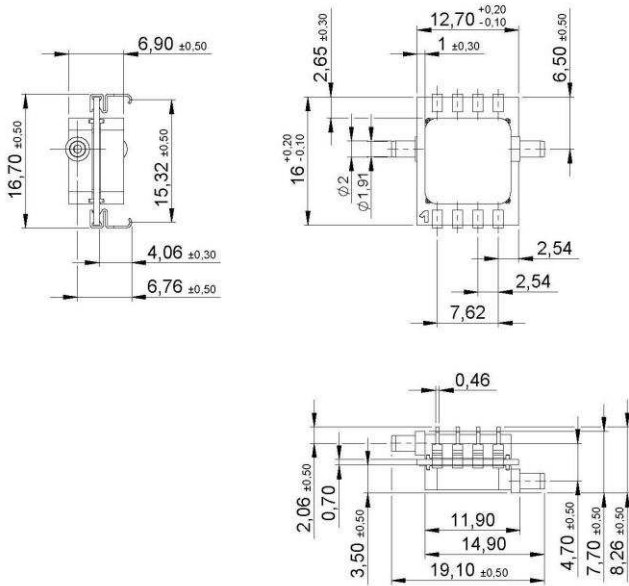
| Pin | connection |
|-----|------------|
| 1   | +Vs        |
| 2   | GND        |
| 3   | Vout       |
| 4   | I / C *    |

\* Internal connection. Do not connect for any reason



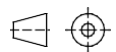
first angle projection  
dimensions in mm

### HCLAxxxQxxx (SMD, 2 ports opposite side)



| Pin | connection |
|-----|------------|
| 1   | +Vs        |
| 2   | GND        |
| 3   | Vout       |
| 4   | I / C *    |
| 5   | SCL        |
| 6   | I / C *    |
| 7   |            |
| 8   | SDA        |

\* Internal connection. Do not connect for any reason

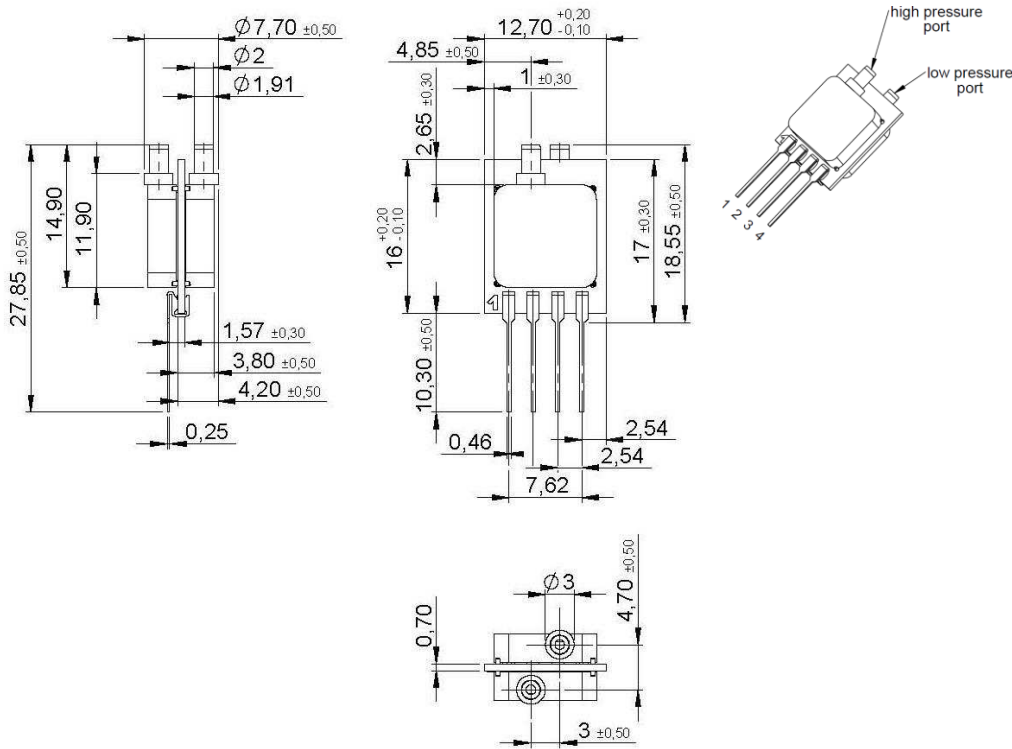


first angle projection  
dimensions in mm

# HCLA SERIES – MINIATURE COMPENSATED LOW PRESSURE SENSORS

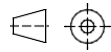
## Dimensional drawing

HCLAxxxTxxx (SIL, 2 ports top side)



| Pin | connection |
|-----|------------|
| 1   | +Vs        |
| 2   | GND        |
| 3   | Vout       |
| 4   | I / C *    |

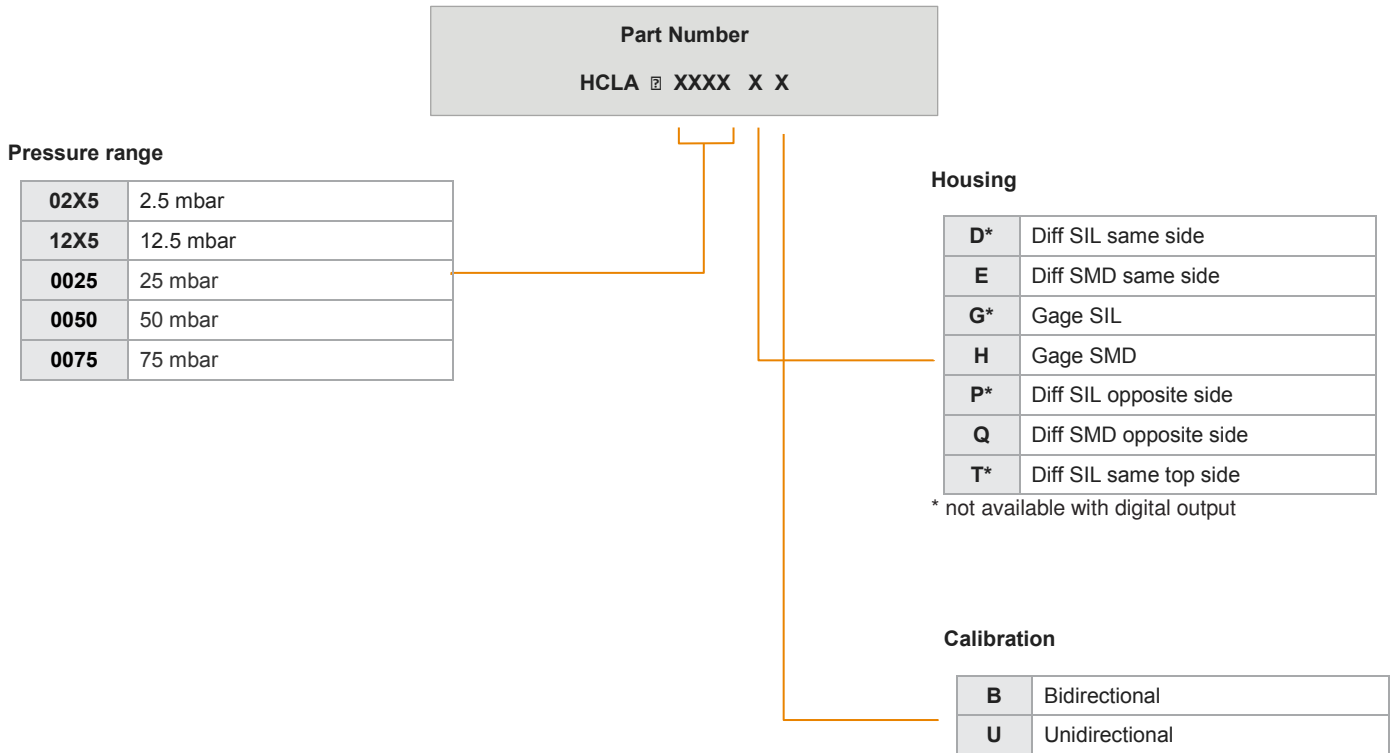
\* Internal connection. Do not connect for any reason



first angle projection  
dimensions in mm

# HCLA SERIES – MINIATURE COMPENSATED LOW PRESSURE SENSORS

## Part numbering key



Order code example: HCLA02X5EB

**Note:** Not all possible sensor configurations are active products. MOQ may apply.

Custom specific pressure ranges and mechanical or electronic sensor modifications are widely available. Please contact your local sensors representative.

## HCLA SERIES – MINIATURE COMPENSATED LOW PRESSURE SENSORS

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### Ordering information (standard configurations)

| Description | TE Part Number | Pressure Range | Housing                | Calibration    |
|-------------|----------------|----------------|------------------------|----------------|
| HCLA02X5EU  | 2002984        | 2.5 mbar       | Diff SMD same side     | Unidirectional |
| HCLA02X5QU  | 2002998        | 2.5 mbar       | Diff SMD opposite side | Unidirectional |
| HCLA02X5TU  | 2003030        | 2.5 mbar       | Diff SIL same top side | Unidirectional |
| HCLA12X5EB  | 2002983        | 12.5 mbar      | Diff SMD same side     | Bidirectional  |
| HCLA0075EB  | 2003000        | 75 mbar        | Diff SMD same side     | Bidirectional  |

**Note:**

The above product listings are examples of possible product configurations. More standard product configurations are available on request.

In addition, custom specific pressure and temperature ranges as well as mechanical or electronic sensor modifications are widely available.

Please note, not all possible sensor configurations are active products. MOQ may apply. Please contact your local sensors representative to learn more.