

# HMA Series

## Amplified pressure sensors

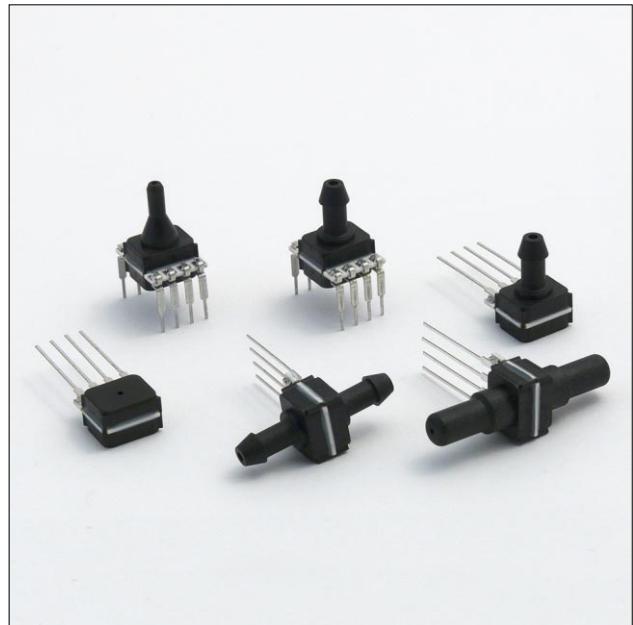
### FEATURES

- 100 mbar to 10 bar, 1 to 150 psi gage or differential pressure
- Increased media compatibility<sup>1</sup>
- Analog output
- Precision ASIC signal conditioning
- Calibrated and temperature compensated<sup>2</sup>
- SIL and DIP housings
- RoHS compliant
- Quality Management System according to ISO 13485:2003 and ISO 9001:2008

### MEDIA COMPATIBILITY<sup>1,2</sup>

High pressure port: To be used with gases and liquids which are compatible with the wetted materials (high temperature polyamide, ceramic  $Al_2O_3$ , epoxy, fluorosilicone, glass, silicon).

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



### SPECIFICATIONS

#### Maximum ratings

|                      |                             |
|----------------------|-----------------------------|
| Supply voltage $V_s$ |                             |
| HMA...3              | 2.7 ... 4.2 V <sub>DC</sub> |
| HMA...5              | 4.2 ... 5.5 V <sub>DC</sub> |
|                      | max. 6.5 V <sub>DC</sub>    |

|                |      |
|----------------|------|
| Output current |      |
| Sink           | 1 mA |
| Source         | 1 mA |

#### Environmental

|                      |                 |
|----------------------|-----------------|
| Temperature ranges   |                 |
| Compensated          | -20 ... +85 °C  |
| Operating            | -20 ... +85 °C  |
| Storage <sup>3</sup> | -40 ... +125 °C |

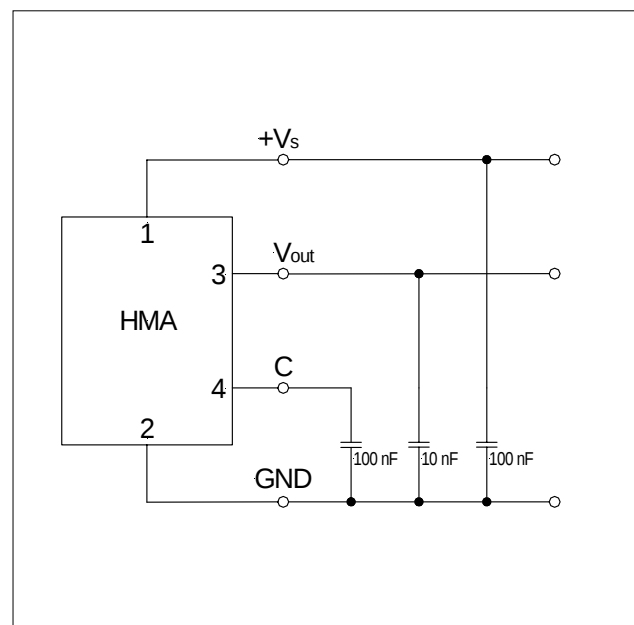
|                                                                               |                         |
|-------------------------------------------------------------------------------|-------------------------|
| Humidity limits (non-condensing)                                              | ...95 %RH <sup>10</sup> |
| (100 % condensing or direct liquid media on high pressure port <sup>1</sup> ) |                         |

|           |                                 |
|-----------|---------------------------------|
| Vibration | max. 10 g, 10...2000 Hz, random |
|           | (EN 60068-2-64)                 |

|                  |                  |
|------------------|------------------|
| Mechanical shock | max. 50 g, 11 ms |
|                  | (EN 60068-2-27)  |

|                         |                |
|-------------------------|----------------|
| Lead solder temperature | max. 270 °C    |
|                         | (JESD22-B106D) |

### ELECTRICAL CONNECTION



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### PRESSURE SENSOR CHARACTERISTICS

(T<sub>A</sub>=25 °C, RH=50 %)

| Part no.    | Operating pressure | Proof pressure <sup>4</sup> |
|-------------|--------------------|-----------------------------|
| HMAM100U... | 0...100 mbar       | 2 bar                       |
| HMAM100B... | 0...±100 mbar      | 2 bar                       |
| HMAM250U... | 0...250 mbar       | 2 bar                       |
| HMAM250B... | 0...±250 mbar      | 2 bar                       |
| HMAB001U... | 0...1 bar          | 5 bar                       |
| HMAB001B... | 0...±1 bar         | 5 bar                       |
| HMAB2x5U... | 0...2.5 bar        | 10 bar                      |
| HMAB005U... | 0...5 bar          | 14 bar                      |
| HMAB010U... | 0...10 bar         | 14 bar                      |
| HMAP001U... | 0...1 psi          | 30 psi                      |
| HMAP001B... | 0...±1 psi         | 30 psi                      |
| HMAP100U... | 0...100 psi        | 200 psi                     |

Other pressure ranges (e.g. 500 mbar, 5 psi, 150 psi) are available on request. Please contact First Sensor.

### PERFORMANCE CHARACTERISTICS<sup>2</sup>

(V<sub>S</sub>=5.0 V<sub>DC</sub>, T<sub>A</sub>=25 °C, RH=50 %, analog output signal is ratiometric to V<sub>S</sub> in the range of V<sub>S</sub> =4.2...5.5 V)

All HMA...H5 devices (V<sub>S</sub> = 5.0)

| Characteristics                           | Min. | Typ. | Max.  | Units |
|-------------------------------------------|------|------|-------|-------|
| Non-linearity (-20...85 °C) <sup>6</sup>  |      |      | ±0.25 | %FSS  |
| Accuracy <sup>7</sup>                     |      |      | ±0.25 |       |
| Total accuracy (-20...85 °C) <sup>8</sup> |      |      | ±1.5  |       |
| Response delay <sup>9</sup>               |      | 0.5  |       | ms    |
| A/D resolution                            |      | 12   |       | bit   |
| D/A resolution                            |      |      | 11    |       |
| Current consumption                       |      | 5.3  |       | mA    |

All HMA...U...H5 (unidirectional devices)

| Characteristics                    | Min. | Typ. | Max. | Units |
|------------------------------------|------|------|------|-------|
| Zero pressure offset               | 0.44 | 0.50 | 0.56 | V     |
| Full scale span (FSS) <sup>5</sup> |      | 4.00 |      |       |
| Full scale output                  | 4.44 | 4.50 | 4.56 |       |

All HMA...B...H5 (bidirectional devices)

| Characteristics                    | Min. | Typ. | Max. | Units |
|------------------------------------|------|------|------|-------|
| Zero pressure offset               | 2.44 | 2.50 | 2.56 | V     |
| Full scale span (FSS) <sup>5</sup> |      | 4.00 |      |       |
| Output at max. specified pressure  | 4.44 | 4.50 | 4.56 |       |
| Output at min. specified pressure  | 0.44 | 0.50 | 0.56 |       |

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### PERFORMANCE CHARACTERISTICS<sup>2</sup>

( $V_s = 3.0 V_{DC}$ ,  $T_A = 25^\circ C$ , RH=50 %, analog output signal is ratiometric to  $V_s$  in the range of  $V_s = 2.7...4.2 V$ )

#### All HMA...H3 devices ( $V_s = 3.0$ )

| Characteristics                           | Min. | Typ. | Max.  | Units |
|-------------------------------------------|------|------|-------|-------|
| Non-linearity (-20...85 °C) <sup>6</sup>  |      |      | ±0.25 | %FSS  |
| Accuracy <sup>7</sup>                     |      |      | ±0.25 |       |
| Total accuracy (-20...85 °C) <sup>8</sup> |      |      | ±1.5  |       |
| Response delay <sup>9</sup>               |      | 0.5  |       | ms    |
| A/D resolution                            |      | 12   |       | bit   |
| D/A resolution                            |      |      | 11    |       |
| Current consumption                       |      | 4.5  |       | mA    |

#### All HMA...U...H3 (unidirectional devices)

| Characteristics                    | Min.  | Typ. | Max.  | Units |
|------------------------------------|-------|------|-------|-------|
| Zero pressure offset               | 0.264 | 0.30 | 0.336 | V     |
| Full scale span (FSS) <sup>5</sup> |       | 2.40 |       |       |
| Full scale output                  | 2.664 | 2.70 | 2.736 |       |

#### All HMA...B...H3 (bidirectional devices)

| Characteristics                    | Min.  | Typ. | Max.  | Units |
|------------------------------------|-------|------|-------|-------|
| Zero pressure offset               | 1.464 | 1.50 | 1.536 | V     |
| Full scale span (FSS) <sup>5</sup> |       | 2.40 |       |       |
| Output at max. specified pressure  | 2.664 | 2.70 | 2.736 |       |
| Output at min. specified pressure  | 0.264 | 0.30 | 0.336 |       |

#### Specification notes:

1. All wetted materials are selected to give a high level of media compatibility. Media compatibility refers to media inside the pressure port and lid. Improved media compatibility on high pressure port (backward side of sensor chip) since media has no contact to electronic components. Nevertheless tests with the media used in the specific application are recommended.
2. Sensor is calibrated in air, changes in sensor behaviour based on physical effects caused by the specific media can occur. Weight of the media and wetting forces can influence the sensor characteristics.
3. Storage temperature of the sensor without package.
4. Proof pressure is the maximum pressure which may be applied without causing durable shifts of the electrical parameters of the sensing element.
5. Full Scale Span (FSS) is the algebraic difference between the output signal for the highest and lowest specified pressure.
6. Non-linearity is the measured deviation based on Best Fit Straight Line (BFSL).
7. Accuracy is the combined error from non-linearity and hysteresis. Hysteresis is the maximum output difference at any point within the operating pressure range for increasing and decreasing pressure.
8. Total accuracy is the combined error from offset and span calibration, non-linearity, pressure hysteresis, and temperature effects. Calibration errors include the deviation of offset and full scale from nominal values.
9. Max. delay time between pressure change at the pressure die and signal change at the output.
10. Tested 1h, up to 85 °C.

Sensors are electronic components and should be handled only in ESD safe environments.



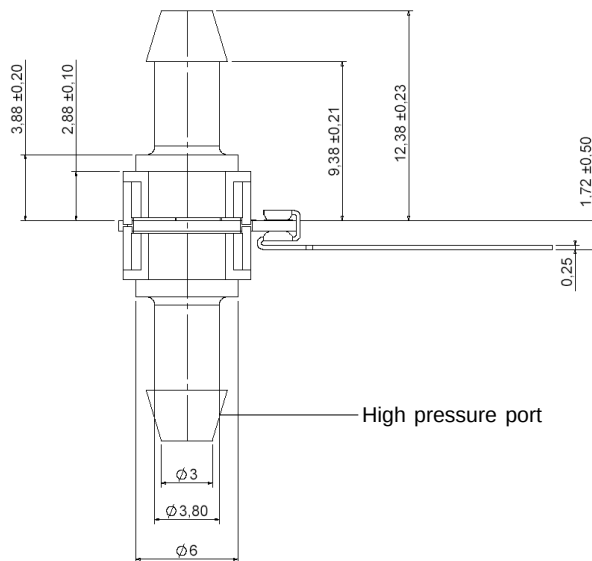
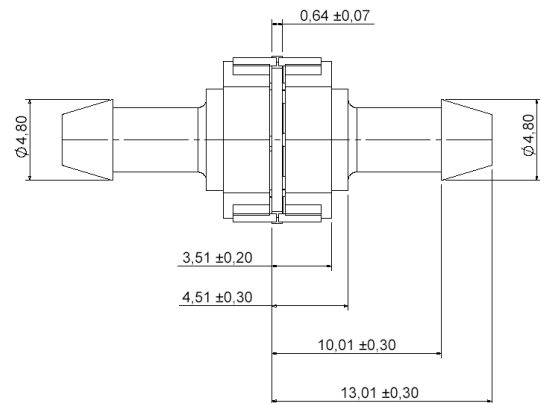
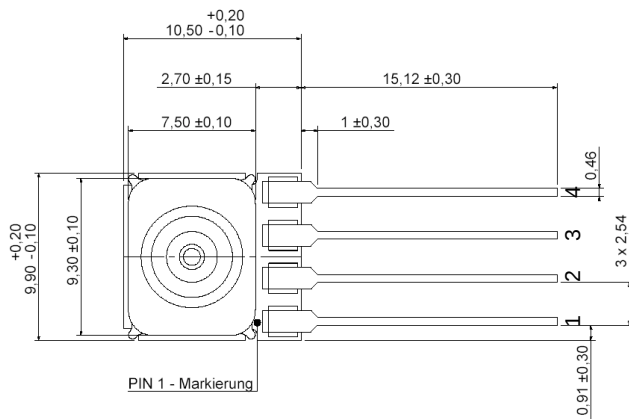


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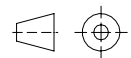
## Amplified pressure sensors

### PHYSICAL DIMENSIONS AND ELECTRICAL CONNECTION (cont.)

#### HMA...U7... (SIL, 2 ports axial opposite side, barbed)



| Pin | Connection |
|-----|------------|
| 1   | +Vs        |
| 2   | GND        |
| 3   | +Vout      |
| 4   | C          |



first angle projection

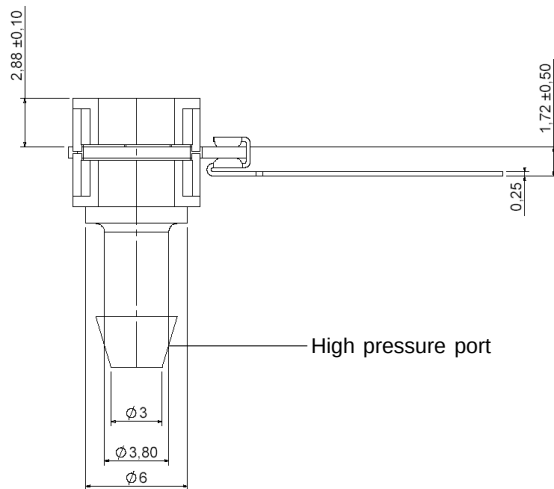
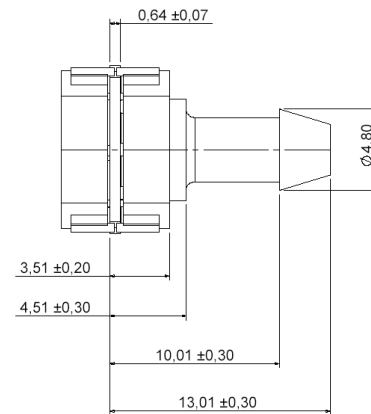
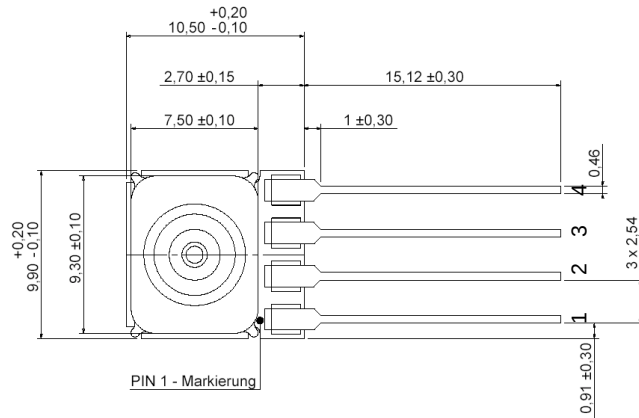
dimensions in mm

# HMA Series

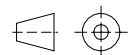
## Amplified pressure sensors

### PHYSICAL DIMENSIONS AND ELECTRICAL CONNECTION (cont.)

#### HMA...X7... (SIL, 1 port axial, barbed)



| Pin | Connection |
|-----|------------|
| 1   | +Vs        |
| 2   | GND        |
| 3   | +Vout      |
| 4   | C          |



first angle projection

dimensions in mm





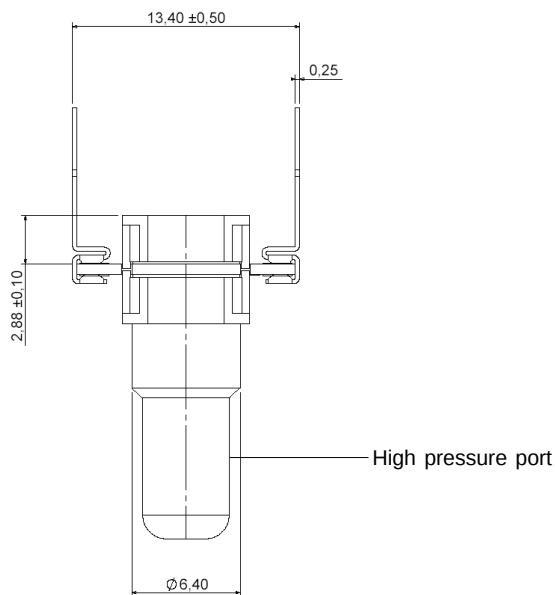
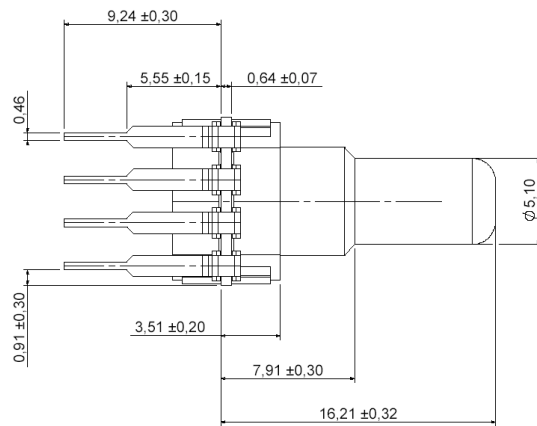
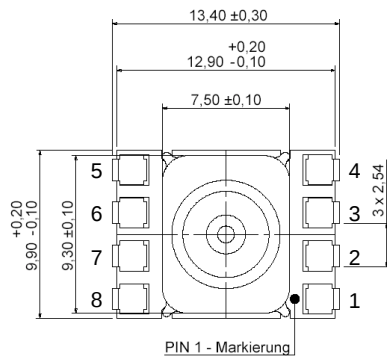


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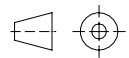
### PHYSICAL DIMENSIONS AND ELECTRICAL CONNECTION (cont.)

#### HMA...Z6... (DIP, 1 port axial, straight big)



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

\* Internal connection.  
Do not connect for  
any reason



first angle projection

dimensions in mm

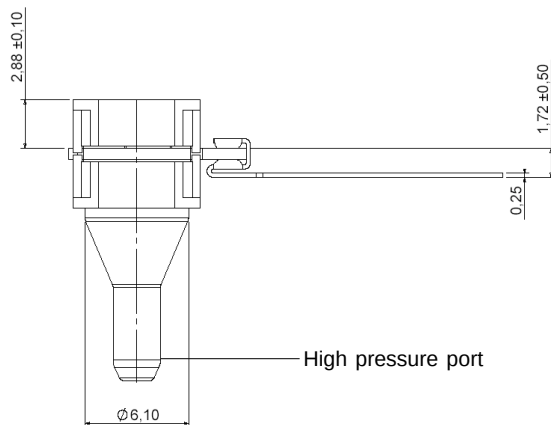
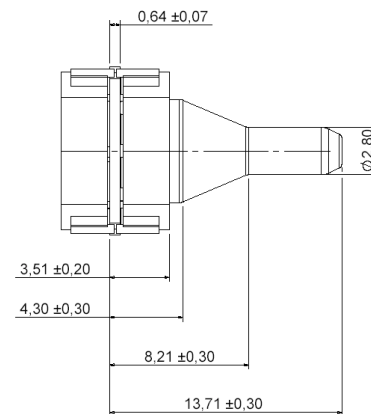
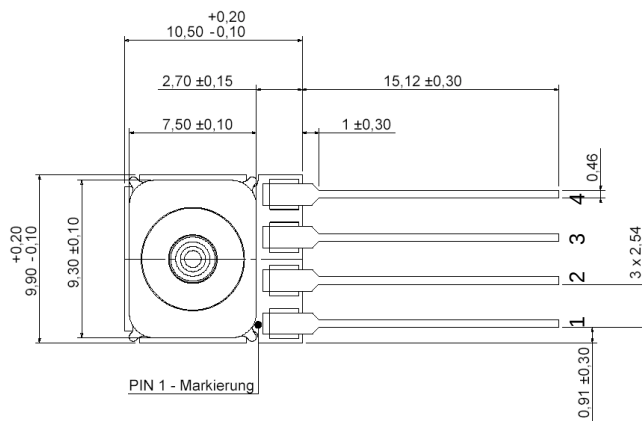


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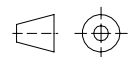
## Amplified pressure sensors

### PHYSICAL DIMENSIONS AND ELECTRICAL CONNECTION (cont.)

#### HMA...X5... (SIL, 1 port axial, needle big)



| Pin | Connection |
|-----|------------|
| 1   | +Vs        |
| 2   | GND        |
| 3   | +Vout      |
| 4   | C          |



first angle projection

dimensions in mm



# HMA Series

## Amplified pressure sensors

### NOMENCLATURE

| Options  | Series | Pressure range |          | Calibration |               | Housing                                                |                                  | Porting |         | Grade |            | Voltage |     |     |
|----------|--------|----------------|----------|-------------|---------------|--------------------------------------------------------|----------------------------------|---------|---------|-------|------------|---------|-----|-----|
|          | HMA    | M100           | 100 mbar | B           | Bidirectional | U                                                      | SIL, 2 ports axial opposite side | (1)     | no port | H     | High       | (3)     | 3 V |     |
|          |        | M250           | 250 mbar |             | U             |                                                        | Unidirectional                   |         | (7)     |       | Barbed     |         | 5   | 5 V |
|          |        | B001           | 1 bar    |             | (W)           |                                                        | DIP, 2 ports axial opposite side |         | (5)     |       | Needle big |         |     |     |
|          |        | B2x5           | 2.5 bar  |             | (6)           |                                                        | Straight big                     |         |         |       |            |         |     |     |
|          |        | B005           | 5 bar    |             | X             |                                                        | SIL, 1 port axial                |         |         |       |            |         |     |     |
|          |        | B010           | 10 bar   |             | Z             |                                                        | DIP, 1 port axial                |         |         |       |            |         |     |     |
|          |        | P001           | 1 psi    |             |               |                                                        |                                  |         |         |       |            |         |     |     |
|          |        | P100           | 100 psi  |             |               |                                                        |                                  |         |         |       |            |         |     |     |
|          |        |                |          |             |               | ( ) available on request. Please contact First Sensor. |                                  |         |         |       |            |         |     |     |
| Example: | HMA    | M100           | U        |             | U             | 7                                                      |                                  | H       |         | 5     |            |         |     |     |

### LABEL INFORMATION

| Digit | 1      | 2 | 3 | 4              | 5                                                 | 6        | 7                                                                                                   | 8                                                                                                                                                     | 9                                                                   | 10 | 11                           | 12 | 13 | 14 |  |  |  |
|-------|--------|---|---|----------------|---------------------------------------------------|----------|-----------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|----|------------------------------|----|----|----|--|--|--|
|       | Series |   |   | Pressure range | Pressure unit /<br>pressure mode /<br>calibration | Housing  | Porting                                                                                             | Grade/<br>voltage                                                                                                                                     | Production code                                                     |    |                              |    |    |    |  |  |  |
| Char  | M      | A | - | HMA            | 6                                                 | 1 psi    | U bar,<br>gage/differential,<br>unidirectional<br><br>B bar,<br>gage/differential,<br>bidirectional | U SIL,<br>2 ports axial<br>opposite side<br><br>W DIP,<br>2 ports axial<br>opposite side<br><br>X SIL,<br>1 port, axial<br><br>Z DIP,<br>1 port axial | 1 no port<br><br>7 Barbed<br><br>5 Needle big<br><br>6 Straight big | -  | High, 5 V<br><br>/ High, 3 V |    |    |    |  |  |  |
|       |        |   |   |                | 7                                                 | 100 mbar |                                                                                                     |                                                                                                                                                       |                                                                     |    |                              |    |    |    |  |  |  |
|       |        |   |   |                | 8                                                 | 250 mbar |                                                                                                     |                                                                                                                                                       |                                                                     |    |                              |    |    |    |  |  |  |
|       |        |   |   |                | A                                                 | 1 bar    |                                                                                                     |                                                                                                                                                       |                                                                     |    |                              |    |    |    |  |  |  |
|       |        |   |   |                | B                                                 | 2.5 bar  |                                                                                                     |                                                                                                                                                       |                                                                     |    |                              |    |    |    |  |  |  |
|       |        |   |   |                | C                                                 | 5 bar    |                                                                                                     |                                                                                                                                                       |                                                                     |    |                              |    |    |    |  |  |  |
|       |        |   |   |                | L                                                 | 100 psi  |                                                                                                     |                                                                                                                                                       |                                                                     |    |                              |    |    |    |  |  |  |
|       |        |   |   |                | M                                                 | 10 bar   |                                                                                                     |                                                                                                                                                       |                                                                     |    |                              |    |    |    |  |  |  |

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В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

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