

AMS 4711

Ready-to-use pressure sensor with 0...5V output



Analog - Digitale
Mikromechanische
Sensorsysteme

GENERAL DESCRIPTION

AMS 4711 is a new series of miniaturized pressure sensors with high precision measurement capability combined with an output signal voltage of 0...5V. The sensors are calibrated and compensated in a wide temperature range of -25...+85°C and are suitable for industrial applications.

The sensor comes in a robust plastic package and is ready for use. No additional components are required. Pressure is applied via two side ports and the electrical connection is realized with a sensor M5 plug and screw connector. The package of the AMS 4711 provides a dust- and water-tight protection conform to IP67.

The sensors in the AMS 4711 series are available for various applications and pressure ranges: differential (relative) devices in pressure ranges from 0...5mbar up to 0...2bar, absolute (and barometric) pressure variants for 0...1bar and 0...2bar. Bidirectional differential devices for positive and negative pressure are available from -5/+5mbar up to -1/+1bar for over- and under pressure measurement. Pressure ranges with other values (also in PSI) are available on request.

FEATURES

- Differential / gage / bidirectional and absolute / barometric versions
- Pressure ranges: 5mbar up to 2bar
- Output signal voltage 0...5V
- Calibrated and temperature-compensated
- High accuracy at room temperature
- Low total error at -25...+85°C
- High overpressure range
- Supply voltage: 8...36V
- Compact and robust package
- M5 sensor connector
- Dust- and water-tight (IP67)
- Ready for use
- RoHS compliant

APPLICATIONS

- Static pressure sensing
- Dynamic pressure sensing
- Barometric sensing
- Measurement of vacuum
- Measurement of levels
- Gas flow measurement
- HVAC

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PRESSURE RANGES

Sensor type (code)	Pressure type	Pressure range in mbar	Burst pressure in bar	Pressure range in PSI	Burst pressure in PSI
Ultra low pressure					
AMS 4711-0005-D	differential / relative	0...5	5	0...0,073	73
AMS 4711-0010-D	differential / relative	0...10	5	0...0,145	73
AMS 4711-0005-D-B	bidirectional differential	-5/+5	5	-0,073/+0,073	73
AMS 4711-0010-D-B	bidirectional differential	-10/+10	5	-0,145/+0,145	73
Low pressure					
AMS 4711-0020-D	differential / relative	0...20	5	0...0,290	73
AMS 4711-0050-D	differential / relative	0...50	5	0...0,725	73
AMS 4711-0100-D	differential / relative	0...100	5	0...1,450	73
AMS 4711-0020-D-B	bidirectional differential	-20/+20	5	-0,290/+0,290	73
AMS 4711-0050-D-B	bidirectional differential	-50/+50	5	-0,725/+0,725	73
AMS 4711-0100-D-B	bidirectional differential	-100/+100	5	-1,450/+1,450	73
Standard pressure					
AMS 4711-0200-D	differential / relative	0...200	5	0...2,901	73
AMS 4711-0350-D	differential / relative	0...350	5	0...5,076	73
AMS 4711-1000-D	differential / relative	0...1000	5	0...14,50	73
AMS 4711-2000-D	differential / relative	0...2000	5	0...29,01	73
AMS 4711-0200-D-B	bidirectional differential	-200/+200	5	-2,901/+2,901	73
AMS 4711-0350-D-B	bidirectional differential	-350/+350	5	-5,076/+5,076	73
AMS 4711-1000-D-B	bidirectional differential	-1000/+1000	5	-14,50/+14,50	73
AMS 4711-1000-A	absolute	0...1000	5	0...14,50	73
AMS 4711-2000-A	absolute	0...2000	5	0...29,01	73
AMS 4711-1200-B	barometric	700...1200	5	10,15...17,4	73

Table 1: AMS 4711 standard pressure ranges (other ranges on request)

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SPECIFICATIONS

All parameters are measured at room temperature (25°C) while applying supply voltage $V_{CC} = 24V$ and load resistor $R_L = 10k\Omega$, unless otherwise stated.

Parameter	Minimum	Typical	Maximum	Units
Analog output signal				
@ specified minimum pressure (see "Pressure range")	0	< 0,01	0,03	V
@ specified maximum pressure (see "Pressure range")		5		V
Full span output (FSO) ¹⁾		5		V
without pressure (bidirectional differential)		2,5		V
Accuracy ²⁾ @ T = 25°C				
Ultra low pressure sensors		±1,0	±1,5	%FSO
Low pressure sensors		±0,5	±1,0	%FSO
Standard pressure sensors		±0,5	±1,0	%FSO
Total accuracy ³⁾ @ T = -25...85°C				
Ultra low pressure sensors		±1,5	±2,5	%FSO
Low pressure sensors		±1,0	±2,0	%FSO
Standard pressure sensors		±0,7	±1,5	%FSO
Linearity ⁴⁾	-0,3		+0,3	%FSO
Resolution			0,05	%FSO
Supply voltage (V_{CC} to ground)	8	24	36	V
Current consumption			5	mA
Response time (10%...90% rise time)		1	2	ms
Load resistor R_L	2			kΩ
Capacitive load			50	nF
Dependency on supply voltage			0,02	%FSO/V
Pressure changes	10 ⁶			
Compensated operating temperature range	-25		85	°C
Storage temperature range	-40		100	°C
Weight without cable		20		gram
Media compatibility	See notes ⁵⁾ ⁶⁾			
Protection classification ⁷⁾	IP67			

Table 2: Specifications of AMS 4711

NOTES OF TABLE 2

- 1) The Full Span Output (FSO) is the algebraic difference between the output signal at the specified minimum pressure and the output signal at the specified maximum pressure (see "Pressure range" in Table 1).
- 2) Accuracy is defined as the maximum deviation of the measurement value from the ideal characteristic curve at room temperature (RT) in %FSO including the adjustment error (offset and span), nonlinearity, pressure hysteresis and repeatability. Nonlinearity is the measured deviation at half maximum pressure from the best fit straight line (BFSL) across the entire pressure range. Pressure hysteresis is the maximum deviation of the output value at any pressure within the specified range when this pressure is cycled to and from the minimum or maximum rated pressure. Repeatability is the maximum deviation of the output value at any pressure within the specified range after 10 pressure cycles.

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- 3) The total accuracy is defined as the overall error, i.e. the maximum deviation of the measurement value from the ideal characteristic curve in %FSO across the entire temperature range (-25 ... 85°C).
- 4) Defined as best fit straight line (BFSL)
- 5) Compatibility of media applied at Port 1: fluids and gases non-corrosive to ceramics, silicon, Pyrex, RTV silicone rubber and Zytel PA66.
- 6) Compatibility of media applied at Port 2: clean, dry gases, non-corrosive to ceramics, silicon, RTV silicone rubber, gold, tin and Zytel PA66 (alkaline or acidic liquids can destroy the sensor).
- 7) With tubes applied at Port 1 and Port 2

DESCRIPTION OF FUNCTION

AMS 4711 consist of a piezoresistive silicon sensing element and an integrated signal conditioning circuit (ASIC) assembled in a robust plastic package.

The physical pressure, which is applied at the package pressure ports (see Figure 2) is measured at AMS 4711's piezoresistive pressure sensing element where the pressure is converted into a differential voltage signal which is almost proportional to the pressure. This voltage signal is corrected and conditioned by the ASIC. At the output a standardized signal voltage V_A from 0...5V (or $2.5V \pm 2.5V$ for bidirectional differential sensors) is available, which corresponds to the applied pressure p (see Figure 1).

Calibration and temperature compensation is one process of the AMS 4711 production. The temperature compensated range is within the entire temperature range of operation (-25...85 °C). For this reason the specified total accuracy of AMS 4711 is finally presented as error over all.

DIAGRAM

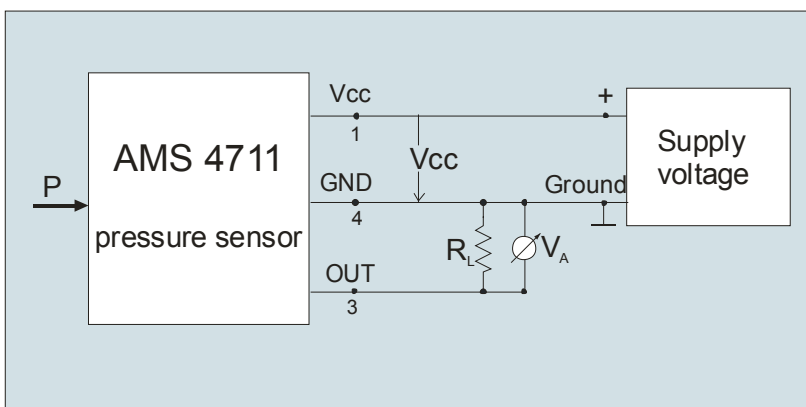


Figure 1: Electrical connection of AMS 4711

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STARTING UP

AMS 4711 can be screw mounted in a fast and easy way using the two through bores (\varnothing 3.2mm) at the edge of the package, which also provides a dust- and water-tight protection and a maintenance-free lifetime.

The sensors are connected up electrically by the integrated M5 plug and screw connector (series 707 from Binder GmbH) with a suitable cable with female M5 sensor connector (see additional equipment). Pin 1 (Vcc), Pin 3 (OUT) and Pin 4 (GND) are connected as shown in *Figure 1 and Figure 2*. Pin 1 (Vcc) is directly connected to the +pole of the supply voltage and Pin 4 (GND) is connected to Ground. PIN 3 can be directly connected to a Voltmeter to measure the output signal voltage V_A (versus Ground) or via load resistor R_L to Ground.

The AMS 4711 output signal voltage V_A (0...5V) at Pin 3 (OUT) is directly proportional to the applied pressure.

The pressure connection is made using the two pressure ports (hose connectors) of the sensors package. Depending on the type of sensor and measuring pressure one or two of the pressure ports are connected up to the measuring media / volume. For the pressures at port 1 and port 2 (for definition see *Figure 2*) the following requirements have to be fulfilled (according to the definition p_1 = pressure at port 1 and p_2 = pressure at port 2):

for differential / relative pressure sensors (label AMS 4711-XXXX-**D**):

$p_1 > p_2$

for bidirectional differential sensors (label AMS 4711-XXXX-**D-B**):

$p_1 > p_2$ or $p_1 < p_2$ possible

for absolute pressure sensors (label AMS 4711-XXXX-**A**) and

barometric pressure sensors (label AMS 4711-XXXX-**B**):

p_2 = measuring pressure.

The maximum pressures and the guidelines governing media compatibility must be taken into account here (see "Specifications", notes 5 and 6).

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PACKAGE DIMENSIONS AND PINOUT

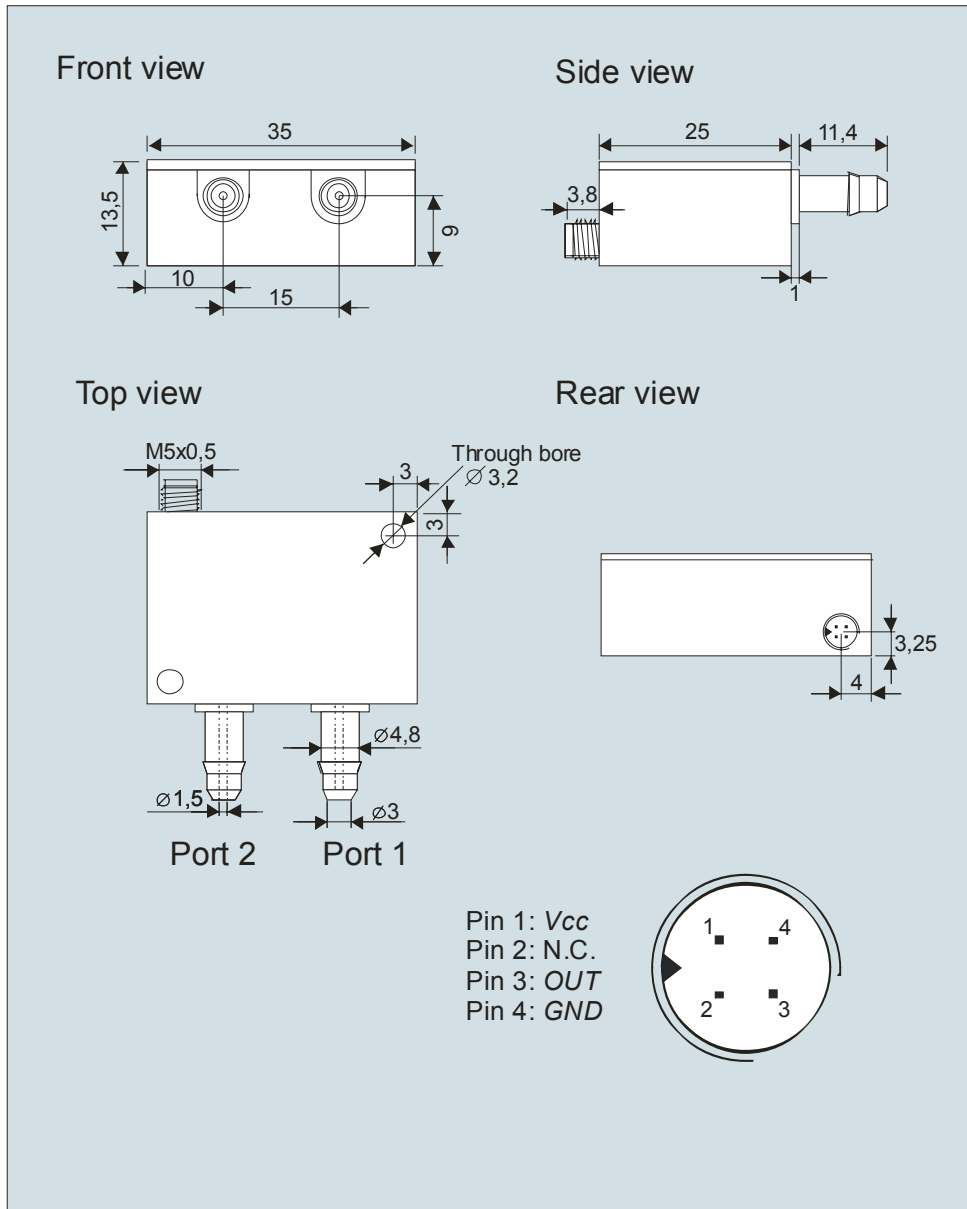


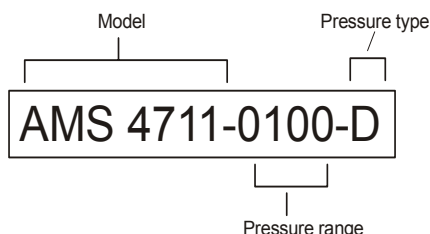
Figure 2: Dimensions of AMS 4711 package

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INFORMATION FOR ORDERING

Ordering code:



Pressure range:

Pressure range code	PSI	mbar	kPa
0005	5	0,073	0,5
0010	10	0,145	1
0020	20	0,290	2
0050	50	0,725	5
0100	100	1,450	10
0200	200	2,901	20
0350	350	5,076	35
1000	1000	14,50	100
1200	1200	17,40	120
2000	2000	29,01	200

Table 3: Pressure ranges

Pressure type:

Pressure type code	Available pressure ranges
D differential / relative (gage)	0...5 mbar to 0...2000 mbar
D-B bidirectional differential	-5 / +5 mbar to -1000 / +1000 mbar
A absolute	0...1000 mbar and 0...2000 mbar
B barometric	700...1200 mbar

Table 4: Pressure types

ADDITIONAL EQUIPMENT

A 3-wire cable of 2 m length with M5 sensor connector (female) series 707 from Binder GmbH is offered for an extra charge.

Wiring:

- Brown - Vcc
- Blue - Out
- Black - GND

AMSYS reserves the right to amend any dimensions, technical data or other information contained herein without prior notification.