PRESSURE SENSOR MODULE WITH VOLTAGE OUTPUT AND I²C-BUS

Characteristic features

- **Digital I²C and analogue interface 0 … 5 V**
- **Calibrated and ready-to-use**
- **Wide application spectrum**
- **Ceramic or piezo resistive measuring cells**
- **Environment resistant and long term stable**
- **Miniaturised dimensions**
- **Optimal price-performance ratio**
- **Customised product variants and OEM-designs possible**

Typical areas of application

- **Building instrumentation**
- **Ventilation control**
- **Fill condition measurement**
- **Filter monitoring**
- **Automation technology**
- **Customised solutions**

Features

The HYGROSENS pressure modules combine modern sensor technology with flexible signal processing of an ASIC.

The module has a calibrated, analoge voltage output of 0 … 5 V and also a digital I²C-interface, which can directly communicate with a micro-controller. By a precise calibration at 7 measuring points, one can achieve an outstanding precision and a very low temperature residual error.

The completely processed, calibrated, pressure measured values are made ready with high resolution which makes simple integration possible with customer specific products. The calibrated and standard output signal guarantees simple integration of sub-system in development phase and enables shortest time-to-market product developments.

The probes are ideally suitable for measurement of static and dynamic relative pressure in liquids and gases. Typical application areas emerge in the field of pneumatics, hydraulics as well as in industrial applications.

Besides the standard variants, customer specific models are also available e.g. with other operating voltage, special calibration, ratiometric voltage output and also with digital output signal. Further information on OEM-models are available on enquiry!

Technical data

Pressure sensor module	**DRMOD-I2C**
Measuring principle	Pressure measuring cells, ceramic or piezo resistive
Signal processing	Digital in ASIC: Linearisation, Temperature compensation
Measuring range	See table
Residual error Linearity/ Hysteresis	Piezo resistive < ± 0.3% Ceramic < ± 0.2%
Temperature co-efficient	TCO < ±0.02% FS / K TCG < ±0.02% FS / K
Operating voltage	6 … 15 V
Current consumption	< 5 mA
Temperature application range	-40 ... +100°C
Voltage output	0 … 5 V for pressure
I²C-Interface	100 / 400 kHz, address 0x78
Electrical connection	5-pin RM 2.54mm
Media connection	Hose connection 6/4 mm
Rights reserved for change in technical data due to technological advancements!	

For further information, please visit our website: www.hygrosens.com

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Released 06/2009

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DRMOD-I2C

Standard model

The module is configured as follows:

- Operating voltage range 6 to 15 V / 3 mA
- Calibrated at 8.0 V
- I²C Interface for pressure
- Voltage output 0 ... 5 V
- Temperature measurement with PT1000

Application notes

Supply with 5 V is possible, if analogue output is not used.

The calibration at factory is done at 8 V. The specified technical data is valid at this operating voltage. Other configurations and special calibration as per customer requirements are possible.

While connecting the measuring probes over longer routes, the used I²C-Bus external to the device should not be used internally, in order to avoid coupling of interferences to the device internal communication. The EMV-guidelines are to be followed and shielded lines are recommended.

A RESET of the pressure sensor can be initiated by a short time interruption of the operating voltage. If the operating voltage can be switched off, then the pullup resistance of the I²C bus must be connected to the switched voltage.

To simplify your product development, a communication board and an USB-I2C-adapter is available- please send us your enquiry!

Operating voltage

Standard supply is 6 to 12 V operating voltages which are stabilised in the module to 5 V. The 5 V operating voltage also serves as the reference level for the digital I²C communication.

Voltage output

On PIN1, the measured pressure is given out as analoge voltage signal. The voltage range of 0 ... 5 V represents the measuring range: 0V corresponds to the smallest measured value or lower limit, 5V represents the measured range limit or upper limit.

The connection impedance should not be less than the minimum value of 10 kOhm. The output impedance is around 50 Ohm. The output is protected against short circuit transients. External voltage at the output can lead to a damage of the ASIC and should be certainly avoided.

I²C-Interface

The communication corresponds to the standard I²C protocol. All technical specification of the protocol can be obtained from the documentation “Serial Interface of HYGROSENS ASIC“. The documentation is available on request or can be downloaded from our website.

The standard address of the component is 0x78, the component can always be communicated with this address. The address is to be understood as a 7 bit address, left justified and with masked R/W-Bit is the Read-address 0xF1.

Additionally, a second address can also be programmed during configuration ex factory, through which the pressure sensor can be addressed.

From this address 0x78 (7 bit address), 2 Bytes can be read. The following assignment is applicable:

Data		
0x78	Byte_0	MSB pressure
	Byte_1	LSB pressure

Scaling of measured value

The pressure is transferred as 15 bit value (bit 0 – 14). From the 15 bit measured values, approx. 12 bit are used as resolution, the three least significant bits can be ignored.

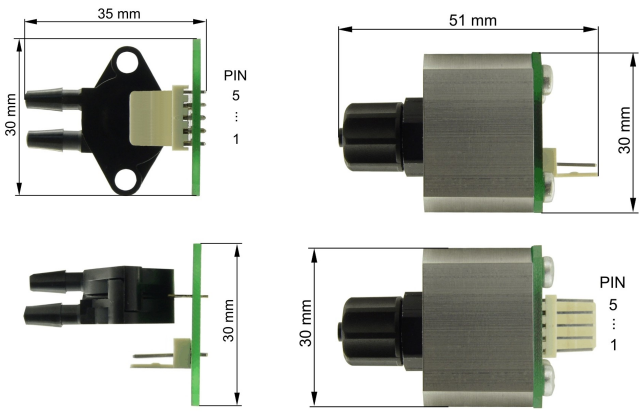
The most significant bit (15) is always 0 during normal operation and in case of error, it is set to 1. Further notes on the error codes are available in the write-up “Serial Interface of HYGROSENS ASIC“.

Following scaling is applicable for the measured values:

Pressure	
Numeric value over I²C Interface	0x 0000 ... 7FFF dec. 0 ... 32767
Physical value	As per model
Scaling	P =V / 32768 * measuring range

Pin strip connection layout

Pin	Title	Function
1	OUT	Voltage output
2	SDA	Serial data I²C
3	SCL	Serial pulse I²C
4	GND	Ground
5	VDD	Operating voltage 6 ... 12 V



Piezo resistive pressure sensor module

Article No.	Ordering No.	Measuring range	Measuring principle
DRMOD-I2C-PD0B1	50 23 75	0 ... 10 kPa, 0 ... 100 mbar	Differential pressure, piezo resistive
DRMOD-I2C-PD0B5	50 23 76	0 ... 50 kPa, 0 ... 500 mbar	Differential pressure, piezo resistive
DRMOD-I2C-PD1B1	50 23 77	0 ... 100 kPa, 0 ... 1 bar	Differential pressure, piezo resistive
DRMOD-I2C-PD2B	50 23 86	0 ... 200 kPa, 0 ... 2 bar	Differential pressure, piezo resistive
DRMOD-I2C-PA1B1	50 23 87	100 ... 110 kPa, 100 ... 1100 mbar	Absolute pressure, piezo resistive
DRMOD-I2C-PA2B	50 23 98	0 ... 200 kPa, 0 ... 2 bar	Absolute pressure, piezo resistive

Ceramic sensor module

Article No.	Ordering No.	Measuring range	Measuring principle
DRMOD-I2C-RV0	50 23 99	-1 ... 0 bar	Relative pressure, ceramic
DRMOD-I2C-RV1	50 24 00	-1 ... 1 bar	Relative pressure, ceramic
DRMOD-I2C-R1B6	50 24 10	0 ... 1.6 bar	Relative pressure, ceramic
DRMOD-I2C-R2B5	50 24 13	0 ... 2.5 bar	Relative pressure, ceramic
DRMOD-I2C-R4B	50 24 26	0 ... 4 bar	Relative pressure, ceramic
DRMOD-I2C-R6B	50 24 39	0 ... 6 bar	Relative pressure, ceramic
DRMOD-I2C-R10B	50 24 47	0 ... 10 bar	Relative pressure, ceramic
DRMOD-I2C-R16B	50 24 52	0 ... 16 bar	Relative pressure, ceramic

Relative pressure sensors measures the pressure against the atmospheric ambient pressure. The sensors have only one pressure connection, the second side of the measuring diaphragm is exposed to the environment through an opening in the housing.

Differential pressure sensors have a pressure connection on each side of the sensor diaphragm. Therefore the difference is measured between the two pressures. Through the diaphragm can be theoretically used in both directions, in practice this is not allowed due to internal structure. A connection must be defined for the higher of the two pressures. An additional static pressure against the environment is not permitted.

In **absolute pressure sensors**, one side of the diaphragm is evacuated in vacuum and sealed. Absolute pressure sensors have only one connection and measure the absolute pressure (against vacuum).

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Released 06/2009