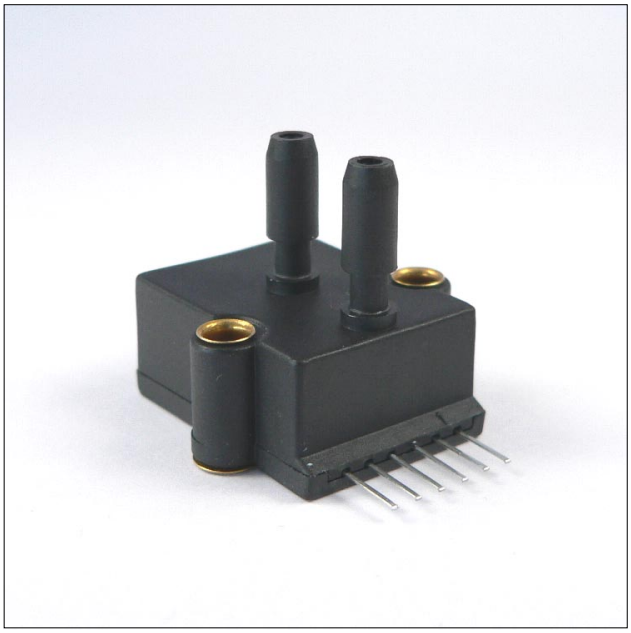
RCE Series
Digital pressure sensors

FEATURES

- **0...±10 mbar to 0...5 bar, 0...±4 inch H_2O to 0...100 psi, absolute, gage or differential pressure**
- **Barometric pressure ranges**
- **SPI bus and analog output**
- **Precision ASIC conditioning**
- **Calibrated and temperature compensated**
- **Total accuracy ±1.0 %FSS**
- **Sensortechnics PRO services**



MEDIA COMPATIBILITY

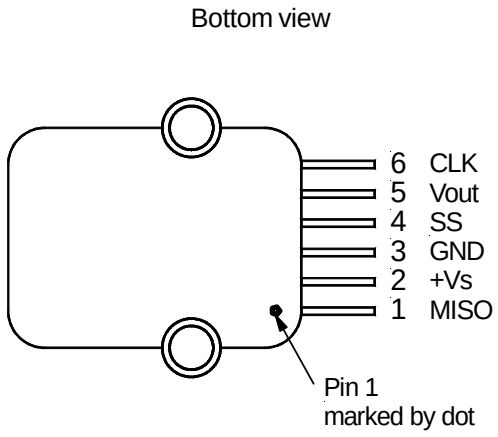
To be used with non-corrosive, non-ionic working fluids such as clean dry air, dry gases and the like.

SPECIFICATIONS

Maximum ratings

Supply voltage V_S	4.75 V to 5.25 V_{DC} max. 6.50 V_{DC}
Output current	
Sink	1 mA
Source	1 mA
Maximum pressure on any port[5]	10 bar
Lead specifications	
Average preheating temperature gradient	2.5 K/s
Soak time	ca. 3 min
Time above 217°C	50 s
Time above 230°C	40 s
Time above 250°C	15 s
Peak temperature	260°C
Cooling temperature gradient	-3.5 K/s
Temperature ranges	
Compensated	0 to +85 °C
Operating	-10 to +85 °C
Storage	-20 to +105 °C

ELECTRICAL CONNECTION



Note: MOSI is internally connected to high level. No external port is available.

Caution!
The sensor is not reverse polarity protected. Incorrect applications of excitation voltage or ground to the wrong pin can cause electrical failure. Application of supply voltage above the maximum can cause electrical failure.

PRESSURE RANGES SPECIFICATIONS

Part number	Pressure range	Burst pressure[1]
RCE0611AR	600...1100 mbar	2 bar
RCEM025DU	0...25 mbar	0.2 bar
RCEM050DU	0...50 mbar	0.35 bar
RCEM100DU	0...100 mbar	0.35 bar
RCEM250DU	0...250 mbar	1 bar
RCEM500DU	0...500 mbar	1 bar
RCEB001(A,D)U	0...1 bar	2 bar
RCEB002(A,D)U	0...2 bar	5 bar
RCEB005(A,D)U	0...5 bar	10 bar
RCEM010DB	0...±10 mbar	0.2 bar
RCEM025DB	0...±25 mbar	0.2 bar
RCEM050DB	0...±50 mbar	0.35 bar
RCEM100DB	0...±100 mbar	0.35 bar
RCEM250DB	0...±250 mbar	1 bar
RCEM500DB	0...±500 mbar	1 bar
RCEB001DB	0...±1 bar	2 bar
RCE1216AR	12...16 psi	30 psi
RCEH010DU	0...10 inch H_2O	3 psi
RCEP001DU	0...1 psi	5 psi
RCEP005DU	0...5 psi	15 psi
RCEP015(A,D)U	0...15 psi	30 psi
RCEP030(A,D)U	0...30 psi	70 psi
RCEP100(A,D)U	0...100 psi	150 psi
RCEH004DB	0...±4 inch H_2O	3 psi
RCEH010DB	0...±10 inch H_2O	3 psi
RCEP001DB	0...±1 psi	5 psi
RCEP005DB	0...±5 psi	15 psi
RCEP015DB	0...±15 psi	30 psi

Specification notes:

1. If maximum burst pressure is exceeded, even momentarily, the package may leak or burst, or the pressure sensing die may fracture.
2. Full Scale Span (FSS) is the algebraic difference between the output signal for the highest and lowest specified pressure.
3. Total accuracy is the combined error from offset and span calibration, linearity, pressure hysteresis, and temperature effects. Linearity is the measured deviation based on a straight line. Hysteresis is the maximum output difference at any point within the operating pressure range for increasing and decreasing pressure. Calibration errors include the deviation of offset and full scale from nominal values.
4. Delay time between sampling and signal change at the output.
5. Maximum pressure on any port is the maximum operating plus common-mode pressure for differential pressure devices which can be applied without damaging the sensor. Common Mode Pressure is the pressure applied to both sides of the diaphragm simultaneously.

PERFORMANCE CHARACTERISTICS

(V_s = 5.0 V, T_A = 25 °C, analog output signal is **ratiometric** to V_S, digital output signal is **not ratiometric** to V_S)

All devices

Characteristics	Min.	Typ.	Max.	Units
Total accuracy (0 to 85°C)[3]			±1.0	%FSS
Response delay[4]		500		µs
Current consumption @ no load		5		mA
SPI-clock frequency			640	kHz
Input - high level	0.9		1	Vs
Input - low level	0		0.1	
Output - low level			0.1	
Pull-up resistor	500			Ω

All RCE...(U,R)

Characteristics	Min.	Typ.	Max.	Units
DIGITAL PERFORMANCE CHARACTERISTICS				
Offset at lowest specified pressure	1700	2000	2300	counts
Full scale span (FSS)[2]		30000		
Full scale output	31700	32000	32300	
ANALOGUE PERFORMANCE CHARACTERISTICS				
Offset at lowest specified pressure	0.26	0.31	0.35	V
Full scale span (FSS)[2]		4.58		
Full scale output	4.84	4.88	4.93	

All RCE...B

Characteristics		Min.	Typ.	Max.	Units
DIGITAL PERFORMANCE CHARACTERISTICS					
Zero pressure offset		16700	17000	17300	counts
Full scale span (FSS)[2]			30000		
Output	at max. specified pressure	31700	32000	32300	
	at min. specified pressure	1700	2000	2300	
ANALOGUE PERFORMANCE CHARACTERISTICS					
Zero pressure offset		2.55	2.59	2.64	V
Full scale span (FSS)[2]			4.58		
Output	at max. specified pressure	4.84	4.88	4.93	
	at min. specified pressure	0.26	0.31	0.35	

SPI - SERIAL PERIPHERAL INTERFACE

Introduction

The RCE is capable to generate a digital output signal. The device runs a cyclic program, which will store a corrected sensor value with 12-bit resolution about every 250 µs within the output registers of the internal ASIC. This cyclic program runs independent from the bus communication. In order to use the RCE pressure sensor for digital signal readout, it should be connected to a SPI Master device.

SPI specifies four signals: The clock (CLK) is generated by the master and input to all slaves. MOSI carries data from master to slave. MISO carries data from slave back to master. A slave select line (SS) allows individual selection of a slave device.

SPI Modes

A pair of parameters called clock polarity (CPOL) and clock phase (CPHA) determine the edges of the clock signal on which the data are driven and sampled. Each of the two parameters has two possible states, which allows for four possible combinations, all of which are incompatible with one another.

In general the RCE series supports all combinations of clock phase (CPHA) and polarity (CPOL). By default it is programmed to CPHA = 0 and CPOL = 0, which means that data transmission starts with the rising first clock edge (see Fig 1).

Slave select

The falling edge of the SS line indicates the beginning of the transfer. Additionally the SS line must not be negated and reasserted between the three bytes to be transmitted.

Data operation

The MOSI is internally connected to high level. So there is no data transmission from master to slave. Because of internal configuration the slave will answer the first byte with an FFxh. The second and third byte contain the 15 bit pressure information (see Fig. 2).

For further information please refer to Sensortechnics SPI bus application note

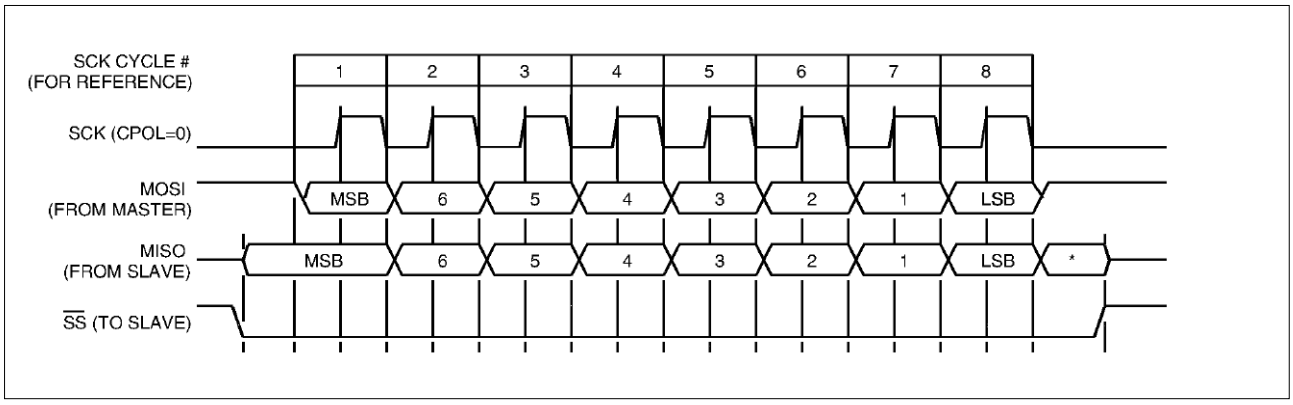
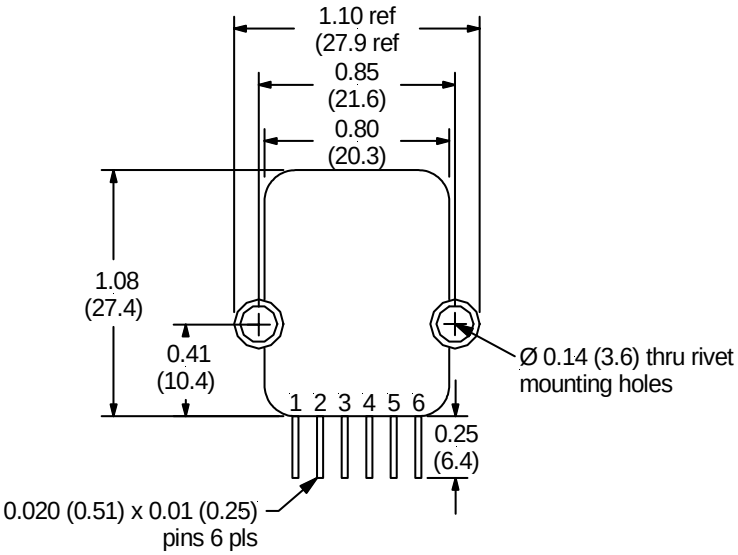


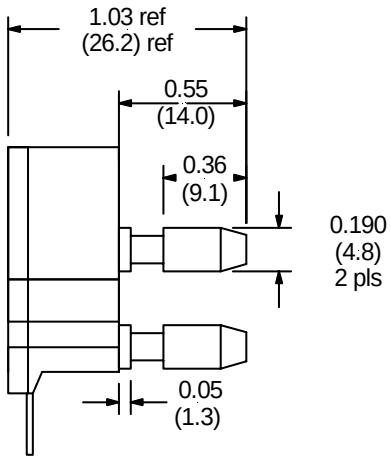
Fig. 1 Example of a standard 1 byte SPI data transfer for CPHA=0 and CPOL=0

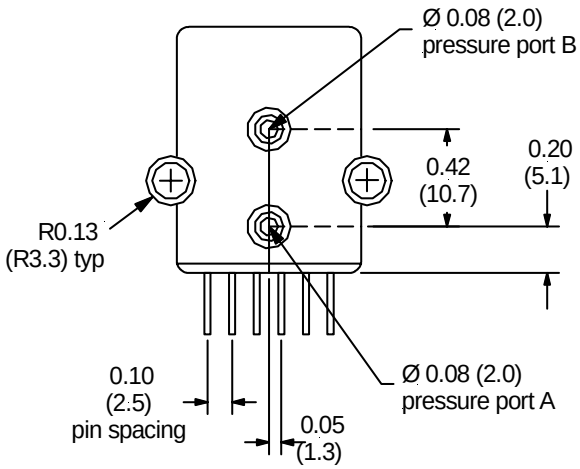
	1. Byte									2. Byte									3. Byte							
MOSI	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1
MISO	x	x	x	x	x	x	x	x		x	E14	E13	E12	E11	E10	E9	E8		E7	E6	E5	E4	E3	E2	E1	E0

Fig. 2 3 byte data stream between RCE sensor and master containing the pressure value as a 15 bit information

PHYSICAL DIMENSIONS

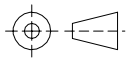






Port B:
High pressure Port for gage and differential devices

Port A:
High pressure Port for absolute devices



third angle projection

dimensions in inches (mm)

ORDERING INFORMATION

	Series	Pressure range		Pressure mode		Calibration	
Options	**RCE**	**0611***	600...1100 mbar	**A***	Absolute	**B**	Bidirectional
		M010**	10 mbar	**D**	Differential/Gage	**U**	Unidirectional
		M025	25 mbar			**R**	Barometric
		M050	50 mbar				
		M100	100 mbar				
		M250	250 mbar				
		M500	500 mbar				
		B001	1 bar				
		B002***	2 bar				
		B005***	5 bar				
		1216*	12...16 psi				
		H004**	4 inch H_2O				
		H010	10 inch H_2O				
		P001	1 psi				
		P005	5 psi				
		P015	15 psi				
		P030***	30 psi				
		P100***	100 psi				
		* only available as barometric devices ** only available as bidirectional devices *** only available as unidirectional devices		* only available from 1 bar/15 psi and for barometric ranges			
Example:	**RCE**	**M025**		**D**		**B**	

Sensortechnics PRO services:

- Extended guarantee period of 2 years
- Improved performance characteristics
- Custom product modifications and adaptations even for small quantities
- Advanced logistics models for supply inventory and short delivery times
- Technical support through application engineers on the phone or at your site
- Fastest possible technical response for design and QA engineers

... plus other services on request