HIGH PRESSURE OEM SENSOR RHU50

Unlike many other pressure transducers, the series RH **high pressure/high temperature sensors** can directly measure pressure in media **up to 300°C / 570°F**. Due to the unique design of the silicon measuring cell it does **not require any toxic or unstable liquid fills**. The pressure transducer's rugged diaphragm makes the series RH suitable for the toughest conditions in hydraulics and process control. The outstanding stability and high accuracy as well as its high natural frequency gives added advantages and allows the measurement of static and dynamic pressure changes.

- **Pressure ranges up to 3000 bar/ 45000 psi**
- **Temperature range up to 300°C / 570°F**
- **High lifetime and overload capabilities**
- **RTD temperature output (optional)**
- **Excellent long term stability**
- **High accuracy**





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The transducers are available as **absolute pressure types** with closed **Wheatstone bridge** output with pressure ranges from **0...100 to 3000 bar / 0...1500 to 45000 psi**. For improved accuracy and thermal compensation they can also be supplied with a set of coefficients for digital sensor compensation.
The sensors are designed as small as possible to fit a large variety of fittings and can be mounted easily into many applications.
Optionally it is possible to provide a temperature output signal with a built-in additional RTD temperature sensor or by use of the change in bridge resistance (constant current supply) and by using a digital sensor compensation.
Combined with an amplifier type 4620 (digital compensation) or 4618 (analog compensation) the output signal of the transducer can be converted into an industrial **0...10 V and/or 4...20 mA output signal**.

Applications

The RH-series transducers can be used for a wide range of important applications in process control applications.

Examples

- Equipment and apparatus manufacturing
  High pressure hydraulic and process control
- Instruments for Off-Shore industry,
  and oil and gas exploration
- Food and dairy applications
- Chemical, petrochemical and pharmaceutical applications
- High pressure pumps
- Hydraulic machine tools
- High pressure reactors
- Down hole tools
- Food extrusion
- Paint, resins and glue processing

All information is the best representation of actual knowledge. All data is subject to change. Kristal does not assume any liability arising out of the application or use of any product or circuit described herein.

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Technical Data

General technical sensor data

Ranges	bar_{abs}	100[2]	200[2]	500	1000	2000	3000[3]
Approx. equivalent range	psi_{abs}	1500	3000	7500	15000	30000	45000
Overload	bar_{abs}	250	500	1100	2500	3000	3500
Sensitivity of transducer, typical (±20%)	mV @ 2mA	150	225	300	350	450	850

Compensated temperature range

Standard	**°C**	**25...225**	
Option **L** (**L**ow)	°C	25...120	
Option **H** (**H**igh)	°C	25...300	
Reference temperature	°C	25	
Operating temp. at diaphragm	°C	-10...300	lower temperatures on special request
Storage temp. range	°C	-40...100	
Max. temperature at GFT	°C	300	
Max. temperature GFT pins	°C	depends on selected wiring technique ⇨ customers choice	
Zero offset signal of sensor, typical	mV @ 2mA	100...250	@ 25°C
Output impedance at 25 / 300°C, typ.	Ω	3200 / 7000	±10%
Repeatability[1]	%FS	≤±0.2	
Pressure hysteresis[1]	%FS	≤±0.3	
Thermal hysteresis, typical[1]	%FS	≤±1	
Natural frequency	kHz	≥100	
Shock resistance	*g*	≥1000	
Acceleration error (100 Hz...10 kHz)	mbar/*g*	<10	
Electrical connection		7-pin Glass Feed Through	
Process connection		½-20 UNF-2A other process connection available on request	
Degree of protection		IP65, NEMA 4	
Material of wetted parts		17-4PH / 1.4542	
Terminology as per		ANSI / ISA-Standard, ST 37.1-1975 (R1982)	

Installation and operating instructions for RH-Sensors are described in **data sheet B4.30e**.

Ordering Code

RH **U50** xxx x **V9G**..... **High Pressure OEM Sensor** (analog, with compensation sheet)

Port: **U50** **½-20 UNF-2A**

Range: *use codes written in italic for psi values*

B01 / *P01*	**100 bar /** *1500 psi*
B02 / *P03*	**200 bar /** *3000 psi*
B03 **/** *P05*	350 bar / *5000 psi*
B05 / *P07*	**500 bar /** *7500 psi*
B07 **/** *P10*	**700 bar** / *10000 psi*
B10 / *P15*	**1000 bar /** *15000 psi*
B14 **/** *P20*	1400 bar / *20000 psi*
B20 / *P30*	**2000 bar /** *30000 psi*
B30 / *P45*	**3000 bar /** *45000 psi*

Temperature:

S	**Standard compensated temperature range**	**25...225°C**
L	Low compensated temperature range	25...120°C
H	High compensated temperature range	25...300°C

V9G ..... **OEM-Sensor with glass feed through**

Options: Vxxxx on request only..... customized version i.e. including any options below:
with built-in RTD, Pt 100 or Pt1000 *(not with 4618/4620)* ***or***
special digital compensation with polynomial of higher degrees
other temperature compensation)

Bold text: Standard types

Accessoires

7.642.016 ..... for digital compensation, with coefficients on 1,4 Mb diskette

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Temperature compensation

To perform over a wide temperature range of 25...300°C within the specified limits, the sensors require temperature compensation. All our sensors are individually tested and measured.

Because of the well-known and excellent sensor characteristics of silicon pressure measuring elements, it is possible to compensate these individually over the operating temperature range. The constant current supply to the sensors is a preferred method of temperature compensation, because of the auto-compensation effect thereby obtained. Much of the temperature effect will be counteracted this way.
Normally, the remaining temperature dependence of the sensor is compensated by a resistance network connected to the Wheatstone bridge. This takes account of the influence of temperature on the zero and sensitivity but not on the linearity. If the accuracy of this compensation is insufficient, then digital compensation must be used.

Analog Compensation with Amplifier 4618

Range	bar_{abs}	100[2]	200[2]	500	1000	2000	3000[3]
Standard compensated temperature range		**25...225°C**					
Thermal zero shift	%FS typ./max	±5/8	±5/5	±2/4	±2/4	±2/4	±2/4
Thermal sensitivity shift	%FS typ./max	±1/3	±2/2	±1/2	±1/2	±1/2	±1/1
Compensated temperature **Option L**:		**25...120°C**					
Thermal zero shift	%FS typ./max	±4/6	±4/4	±2/3	±2/3	±2/3	±2/3
Thermal sensitivity shift	%FS typ./max	±1/2	±2/2	±1/1	±1/1	±1/1	±1/1
Compensated temperature **Option H:**		**25...300°C**					
Thermal zero shift	%FS typ./max	±6/10	±8/8	±3/5	±3/5	±3/5	
Thermal sensitivity shift	%FS typ./max	±2/4	±3/3	±1/2	±1/2	±1/2	
Linearity (end point)	%FS typ./max.	≤±0.5/1.0					

Digital Compensation with Amplifier 4620

Detailed research work has revealed that the graph of temperature influences on the sensor can be mathematically expressed as a polynomial p = f (S, Ub) with S = signal [V] and Ub = bridge voltage [V].
An evaluation program has been specifically developed to ascertain the polynomial coefficient necessary for compensation. This includes not only the effect of temperature but also the linearity of the sensor. Model accuracies of <0.1% are thereby possible depending on the order of the polynomial, temperature and pressure range.
At the same time as compensation of the pressure, the temperature can also be compensated using the familiar function of the bridge resistance and reproduced as a linear output signal. The output signal can therefore be reproduced as function T = f (Ub).

Examples of RH Pressure Transducer digitally compensated with polynomial of 3rd order

Specifications for all pressure ranges

Range	bar_{abs}	100[2]	200[2]	500	1000	2000	3000[3]
Data points pressure	% of FS	0	25	50	75	100	
Thermal zero shift[4]	%FS	≤±0.1					
Thermal sensitivity shift[4]	%FS	≤±0.1					
Linearity[4] (end point)	%FS	≤±0.1					

Standard compensated temperature range		**25...225°C**			
Data points temperature [°C]	°C	25	100	175	225
Compensated temperature **Option L**:		**25...120°C**			
Data points temperature [°C]	°C	25	50	85	120
Compensated temperature **Option H:**		**25...300°C**			
Data points temperature [°C]	°C	25	150	225	300

[1] Values for standard compensated temperature range.

[2] 100 bar and 200 bar types only supplied with amplifier 4620A2.

[3] For a safe operation of the sensor, precautions must be taken to select the type of sensor and corresponding gasket/seal according to the measured medium, pressure and temperature ranges.
For transducers with pressure ranges >2000 bar /30'000 psi the operating temperature is limited to 225°C/440°F.

[4] Model behavior (calculation of digital compensation) at data points selected by KRISTAL.
For other technical data related to digital compensation of silicon pressure sensors consult **data sheet A9.01e**.

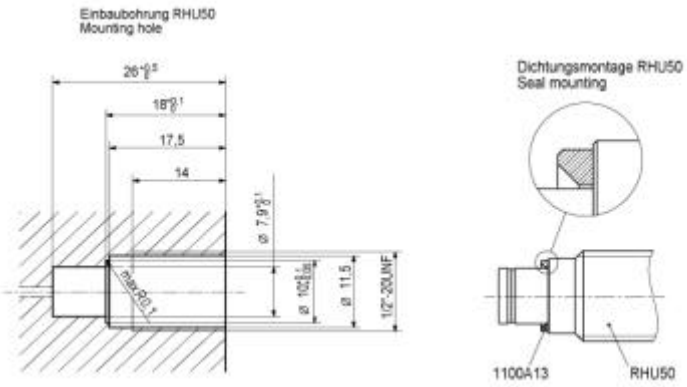
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Note: KRISTAL supplies complete **matched measuring systems** comprising of the RH sensor, cable 4790Ax and amplifier 4620A2 or 4618Ax**.**
Please consult **data sheet A4.32 e** for detailed ordering information**.**

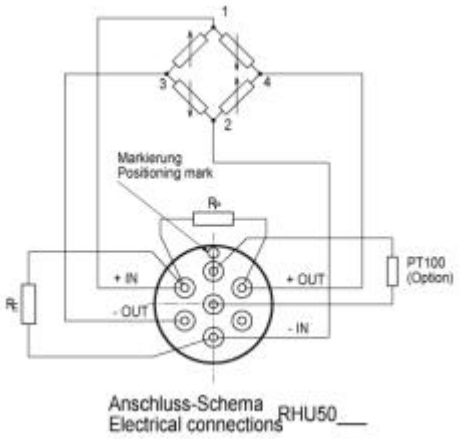
Accessories

1100A13 ..... Gasket ø 10/8 x 1 mm for RHU50

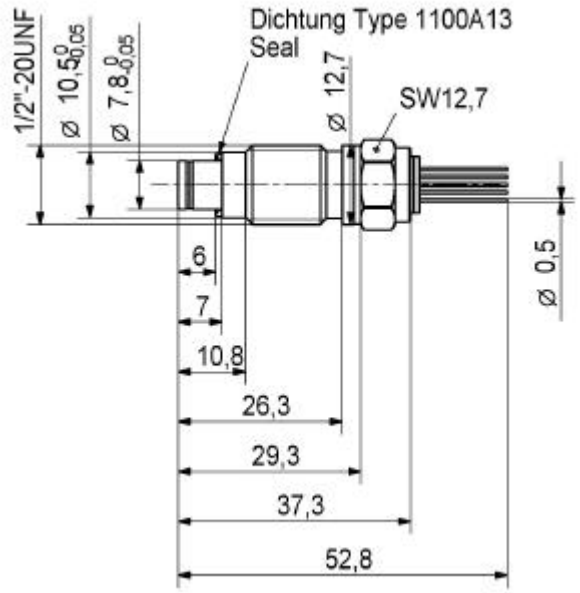
Installation RHU50



Connections



Dimensions



RHU50 AxxxB V9G

Mounting torque

RHU50:	30 Nm
RHU56/RHM16:	35 Nm

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