

Monitoring System

Resistance Thermometer Pt100

CPKN, CPKNO, CPKN-CHs
HPK, HPK-L
MegaCPK
RPH

Supplementary Operating Manual



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Supplementary Operating Manual Resistance Thermometer Pt100

Original operating manual

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1 Supplementary Operating Manual

1.1 General

This supplementary operating manual accompanies the installation/operating manual. All information contained in the installation/operating manual must be observed.

Table 1: Relevant operating manuals

Type series	Reference number of the operating/installation manual
CPKN CPKN-CHs CPKNO	2730.8, 2713.813, 2730.89 2730.84 2730.88
HPK HPK-L	1121.8, 1121.817 1136.8
MegaCPK	2731.8
RPH	1316.8014

1.2 Technical data

Table 2: Technical data (TR55)

Characteristic	Value
Sensor type	PT100 resistance thermometer
Permissible measuring range (input signal)	-50 ... +450 °C
Output signal	80 to 268 Ohm
Head transmitter	Without
Type	TR 55
Sensor tolerance	Class B to IEC 60751
Sealing, sensor tip/support tube	Not pressure-proof
Sensor tip	Spring-loaded (spring travel approx. 3 to 4 mm)
Wiring	1×4-wire
Process connection	G1/4 B (for RPH: G1/2 B) / Clamping ring
Permissible ambient temperature	T3/ T4: -40 ... +100 °C T5: -40 ... +95 °C T6: -40 ... +80 °C
Nominal length, depending on overall length	75, 85 and 125 mm

Table 3: Technical data of connection head (TR55)

Feature	Value
Design, head	JS
Enclosure, head	IP54
Material	Aluminium
Cable connection	M16×1.5

Table 4: Characteristic values for explosion protection (TR 55)

Characteristic	Value
Explosion protection, intrinsic safety	Ex ib IIC T6
CE conformity marking	TÜV 10ATEX 555793 X
Maximum supply current	$I_i = 550 \text{ mA}$
Maximum supply power	$P_{\text{maxSensor}} = 500 \text{ mW}$
Maximum supply voltage	$U_i = 30 \text{ V}$

1.3 Scope of supply

The following items are included in the scope of supply:

- PT100 resistance thermometer (various installation lengths)
- Compression fitting G1/4 B or G1/2 B

1.4 Function

Resistance thermometers are temperature sensors that measure the change in electrical resistance of metals with changing temperature. Resistance thermometers use a very thin layer of platinum film on a ceramic substrate. The nominal resistance of these measuring elements at 0 °C is 100 Ohm.

Interpretation of readings

The nominal resistance of the Pt100 resistance thermometer at 0 °C is 100 Ohm.

Equation for calculating the resistance value at any temperature (T):

Temperature range: T = 0 - 850 °C

$$R(T) = 100 + 0.39083 \times T - 5.775 \times 10^{-5} \times T^2$$

Sample calculation:

T = 80 °C Measured temperature: T = 80 °C

$$R(T) = 100 + 0.39083 \times 80 - 5.775 \times 10^{-5} \times 80^2$$

$$R(T) = 130.8968 \Omega$$

The Pt100 resistance thermometer has a resistance of approximately 130.9 Ohm at a temperature of 80 °C.

T = 20 °C Measured temperature: T = 20 °C

$$R(T) = 100 + 0.39083 \times 20 - 5.775 \times 10^{-5} \times 20^2$$

$$R(T) = 107.7935 \Omega$$

The Pt100 resistance thermometer has a resistance of approximately 107.8 Ohm at a temperature of 20 °C.

1.5 Installing the PT100 resistance thermometer in the pump

1. Remove the screw plug from the 4M.3 connection (⇒ Section 1.6, Page 6) .
2. Screw the compression fitting up to the stop.
3. Insert the PT100 resistance thermometer into the fitting up to the stop, i.e. until the tip of the PT100 thermometer touches the measurement surface.
4. Turn the connection head of the PT100 resistance thermometer to the required position.
5. Pull the PT100 resistance thermometer back by approximately 1 to 2 mm.
6. Tighten the compression fitting to prevent the PT100 resistance thermometer from loosening and rotating.

1.6 Connections

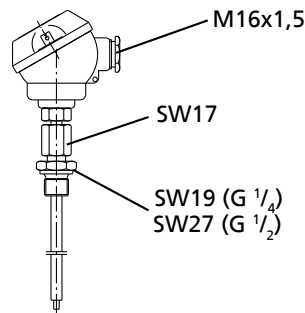


Fig. 1: PT100 resistance thermometer (TR 55) connections

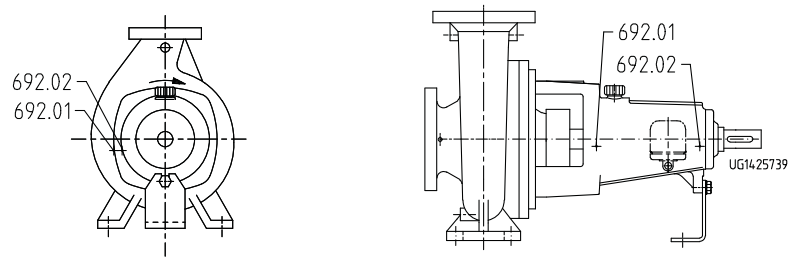


Fig. 2: Connections on MegaCPK

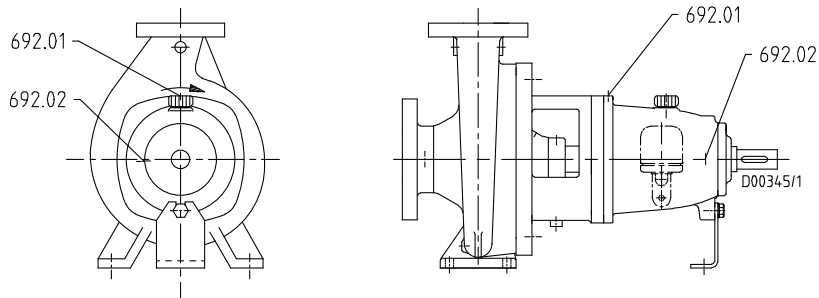


Fig. 3: Connections on CPKN, HPK: UP02/ P02as bearing bracket

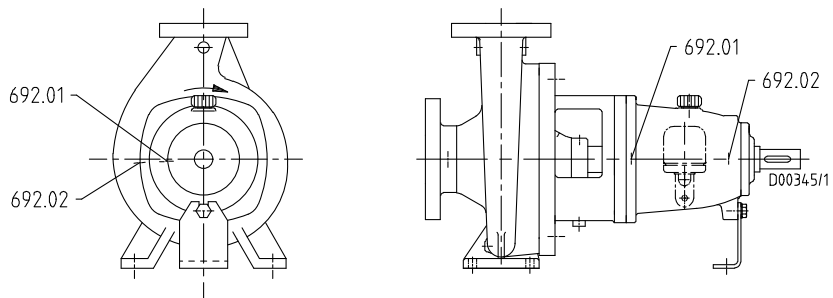


Fig. 4: Connections on CPKN, HPK: UP03-UP06/P03s-P06s bearing bracket

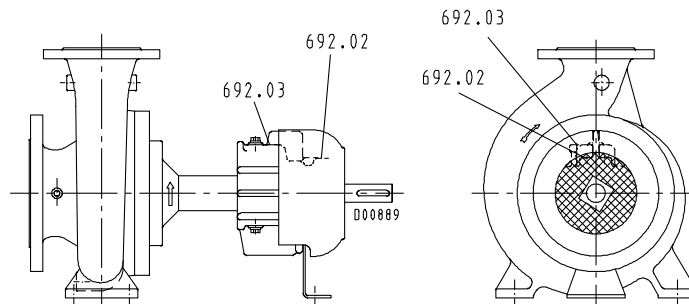


Fig. 5: Connections on HPK-L

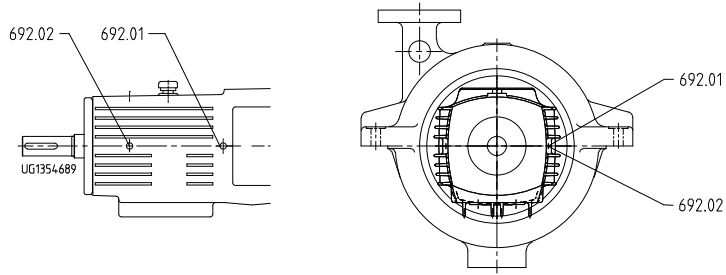


Fig. 6: Connections on RPH

Table 5: Technical data, connections

Part No.	Application	Measuring point	Connection		
			CPKN MegaCPK	HPK, HPK-L	RPH
692.01	Temperature measurement, PT100 resistance thermometer	Bearing, pump end	G 1/4	G 1/4	G1/2
692.02	Temperature measurement, PT100 resistance thermometer	Bearing, drive end	G 1/4	G 1/4	G1/2
692.03	Temperature measurement, PT100 resistance thermometer	Mechanical seal chamber (water temperature sensor)	G 1/4	G 1/4	G1/2

1.7 Electrical connection

When temperature is measured by a resistance thermometer, the measurement result is affected by the connection lead resistance.

Four-wire system A four-wire system provides the most accurate measurement because temperature and connection lead resistance effects are eliminated.

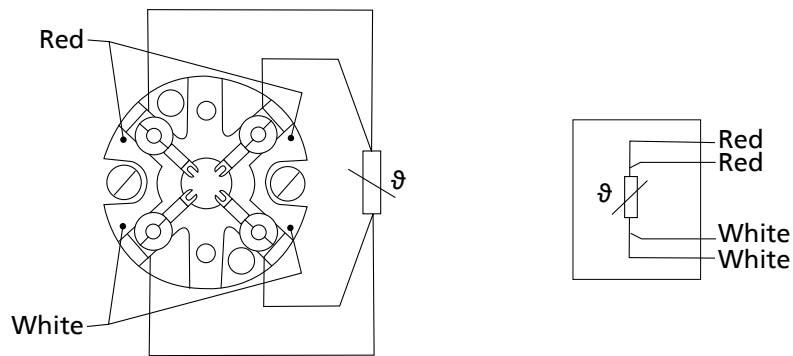


Fig. 7: Terminal assignment of four-wire system



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