Weidmüller

WAVESERIES
PT 100/4 Signal Conditioners for Voltage Output

Type	Cat. No.
Screw-type connection WTS4 PT100/4 Select V	8432240000
Tension clamp connection WTZ4 PT100/4 Select V	8432250000

Read these instructions before using the product and retain for future information.

1 General instructions

The WAVESERIES signal conditioner PT 100 should only be installed by qualified staff. The signal conditioner PT 100 should only be powered up following professional installation.

2 Application

The WAVESERIES signal conditioner PT 100 can be used to connect PT 100 sensors as well as converting temperature data into standard linear voltage signals. The temperature range can be set by DIP switches on the printed circuit board.
The signal conditioner PT 100/4 can be connected to 2-, 3- and 4-wire temperature sensors.

3 Mounting and dismounting

Warning!! Mounting and dismounting may only be carried out when the power supply has be disconnected. Failure to observe will lead to considerable damage!

3.1 Mounting onto TS 35 DIN rails

(s. Fig. 1)

3.2 Pluggable electronic components for range alteration (depending on model)

(s. Fig. 2)

1. Remove connector, (depending on model either screw-type or tension clamp).
2. Press locking clips on both sides of the enclosure.
3. Pull out the circuit board.

Warning!! The circuit board can only be inserted in one position. The connectors have been coded by the manufacturer, ensuring that they cannot be reversed.

3.3 Setting the potentiometer (depending on model)

(s. Fig. 3)

The module has been exactly calibrated by the manufacturer. Should nevertheless a follow-up adjustment be necessary, open the hinged cover upwards.
The potentiometers are on the front panel.

3.4 Pluggable cross-connections for voltage supply
(s. Fig. 4)

A maximum feed through of 2 A is possible.
If a signal conditioner is accidently rotated through 180°, the cross-connection cannot be inserted.

3.5 Labelling possibilities
(s. Fig. 5)

WS 10 connector markers can be used to label module.

4 Calibration

Warning!! The power supply must be disconnected, before changing the signal conditioner settings using the DIP switches.
Failure to observe will lead to considerable damage!

4.1 Equipment
– Power supply 24 Vdc, 50 mA
– Simulator for PT 100 or precision resistance decade
– Current meter/voltmeter that can be so calibrated, as to allow an accuracy of > 0.1 % from the upper range value

4.2 Basic calibration with a signal output from 0 ... 10 V

1. Select the temperature range on the printed circuit board using the DIP switch, see table on the module or pages 23 and 24.
   The DIP switches 1, 2 and 3 set the minimum input temperature ϑ_{min}.
   The span (difference between minimum and maximum input temperature) is set using the DIP switches 4, 5 and 6.
2. Professionally install module.
3. Add 1 % of the temperature span to the selected "*minimum*" temperature and set this value on a PT 100 simulator (when using a precision resistance decade, where necessary observe DIN IEC 751 conversion table from °C to Ω!) and calibrate the signal conditioner output signal to 0.100 V using the *null* potentiometer. (The potentiometers are located behind the hinged cover).
4. Set the "*maximum*" selected temperature on a PT 100 simulator (or precision resistance decade) and calibrate the signal output to 10.000 V using the S*pan* potentiometer.
5. Repeat steps 3 and 4 (approx. 2-3 times), until the required accuracy is achieved.

Example

Input range: -50 ... +150 °C

Minimum input temperature: = -50 °C

Choose next lower or equal value according to table for ϑ_{min}.

Table value -60 °C

Set DIP switch 1 to OFF; DIP switches 2 and 3 to ON.

The span is 200 K (150 °C - (-50 °C)).

The table value lies between 165 ... 245 °C

Set DIP switch 4 to OFF; DIP switches 5 and 6 to ON.

The input range must be raised by 10 K (-60 °C + 50 °C).

The 10 K corresponds to 5 % of the span (see calculation).

The input range can be raised by up to 25 % using the "null" potentiometer.

Calculation: $\frac{\text{Offset}}{\text{Span}} \times 100\ \% = \frac{10\ \text{K}}{200\ \text{K}} \times 100\ \% = 5\ \%$

Should the 25 % be exceeded using the above calculation, then an adjustment to the temperature input range is **not** possible.

4.3 Linearity calibration

1. Proceed with basic calibration, see above.
2. Add 1 % of the temperature span to the selected "*minimum*" temperature and set this value on a PT 100 simulator (when using a precision resistance decade, where necessary observe DIN IEC 751 conversion table from °C to Ω!) and calibrate the signal conditioner output signal to 0.100 V using the *null* potentiometer.
3. Set the mean temperature "$(\vartheta_{max} + \vartheta_{min})/2$" on the PT 100 simulator.
   Determine the difference to the desired value:
   "ΔU = shown value on measuring instrument - 5.000 V" and calibrate the output signal to (5.000 V - ΔU) using the *span* potentiometer.
4. Set the "*maximum*" selected temperature ϑ_{max} on a PT 100 simulator and calibrate the signal output to 10.000 V using the *lin* potentiometer.
5. Repeat steps 2 to 4 until the required accuracy is achieved.

Example

Chosen measurement range: -50 ... +150 °C → 200 K span
1 % from 200 K span = 2 K

Set *minimum* temperature on the PT 100 simulator and calibrate the signal conditioner output signal to 0.100 V using the *null* potentiometer.
-50 °C + 2 K = -48 °C

Mean temperature $= (\vartheta_{max} + \vartheta_{min})/2$
$= (150\ °C + (-50\ °C))/2$
$= 50\ °C$

Set the 50 °C value on the PT 100 simulator

Then determine ΔU: ΔU = measured value from measuring instrument - 5.000 V
→ $\Delta U = 4.970\ V - 5.000\ V$
$= -0.030\ V$

Then calibrate the output signal to (5.000 V - ΔU) using the *span* potentiometer i.e. here an example.
"5.000 V - (-0.030 V) = 5.030 V"

Then set the *maximum* temperature on a PT 100 simulator and calibrate the output signal to 10.000 V using the *lin* potentiometer.

4.4 Setting the DIP switches

Warning!! The signal conditioner PT 100 must be protected against a direct electrostatic discharge when setting the DIP switches.

	DIP switches		
	8	9	10
2-wire	ON	ON	ON
3-wire	ON	OFF	ON
4-wire	OFF	ON	OFF

	DIP switches		
ϑ_{min}	1	2	3
0 °C	ON	ON	ON
-10 °C	ON	ON	OFF
-20 °C	ON	OFF	ON
-40 °C	ON	OFF	OFF
-60 °C	OFF	ON	ON
-80 °C	OFF	ON	OFF
-100 °C	OFF	OFF	ON
-200 °C	OFF	OFF	OFF

	DIP switches		
Span	4	5	6
40 ... 50 °C	ON	ON	ON
50 ... 75 °C	ON	ON	OFF
75 ... 110 °C	ON	OFF	ON
110 ... 165 °C	ON	OFF	OFF
165 ... 245 °C	OFF	ON	ON
245 ... 360 °C	OFF	ON	OFF
360 ... 540 °C	OFF	OFF	ON
540 ... 800 °C	OFF	OFF	OFF

5 Electrical connection

(s. Fig. 6)

4-wire technology

6 Dimensions

(s. Fig. 7)

7 Notes on CE labelling of WAVESERIES modules

WAVESERIES modules, that carry CE-labelling, fulfil the requirements of the EU-Guidelines 89/336/EU “electromagnetic compatibility” and the therein listed harmonised European Norms (EN).
The declarations of conformity are, in accordance with the above-mentioned EU-Guideline, Article 10, held at the following address for the relevant authorities:

Weidmüller Interface GmbH & Co.
Postfach 3030
D-32720 Detmold

8 Technical data

Input

Sensor types	PT 100/4 Select V according to DIN IEC 751
Input current	1.35 mA ... **1.45 mA** ... 1.60 mA
Connection type	selection using DIP switches
Conductor resistance	< 50 Ω (3- and 4-wire connection)
Influence of conductor resistance	max. ± 0.005 °C/Ω for 3- and 4-wire connection

Input range	-200 ... +800 °C adjustable using DIP switches
Offset	input range up to +25 % possible

Output

Voltage output	0 ... 10 V
Load resistance	≥ 1 kΩ
Accuracy	
Measurement range	accuracy
≥ 100 K; < 600 K;	
ϑ_{min} ≥ -100 °C	± 0.1 from measurement range
≤ 100 K	± 0.1 K
≥ 600 K	± 0.2 % from measurement range
Temperature coefficient	
Measurement range	
≥ 200 K	≤ 200 ppm/K (typ. 80 ppm/K)
≥ 100 K; < 200 K	≤ 225 ppm/K (typ. 90 ppm/K)
≥ 40 K; < 100 K	≤ 450 ppm/K (typ. 180 ppm/K)

Connection data

Connection	BLZ/SL
Insulating stripping length	8 ± 0.5 mm
Solid core	0.5 ... 2.5 mm^2
Flexible core	0.5 ... 2.5 mm^2
With ferrules	0.5 ... 1.5 mm^2

EMC specification	according to EN 55011, class B, group 1 according to EN 50081-1 according to EN 50082-2

General

Current consumption	23mA ... **28 mA** ... 38 mA I_{out} = 10 mA
Voltage supply	19.2 Vdc ... **24 Vdc** ... 28.8 Vdc
Cross-connection, upper	24 V, max. 2 A
Cross-connection, lower	0 V, max. 2 A
Operating temperature	0 ... +55 °C
Storage temperature	-20 ... +85 °C

Approvals	CE, CSA, UL

9 Accessories

Cross-connection ZQV 2,5N/2 black	1718080000
Cross-connection ZQV 2,5N/2 red	1717900000
Cross-connection ZQV 2,5N/2 blue	1717990000
Cross-connection ZQV 2,5N/2 yellow	1693800000

Terminal connector, 2-pole for screw-type connection
BLZ 5,08/2

- orange	1526460000
- black	1526410000

Terminal connector, 2-pole for tension clamp connection
BLZ 5,08/2

- orange	1707460000
- black	1707700000

Connector markers

WS 10/5 Multicard for plotter labelling	1635010000
WS 10/5 blank	1060860000

In the interest of protecting the environment, return any spare operating instructions to your local stockist for re-use.
Printed on chlorine-free bleached paper.