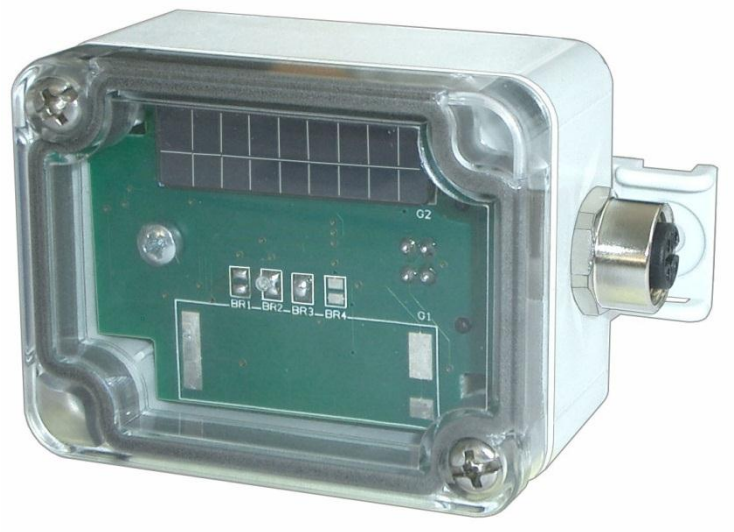
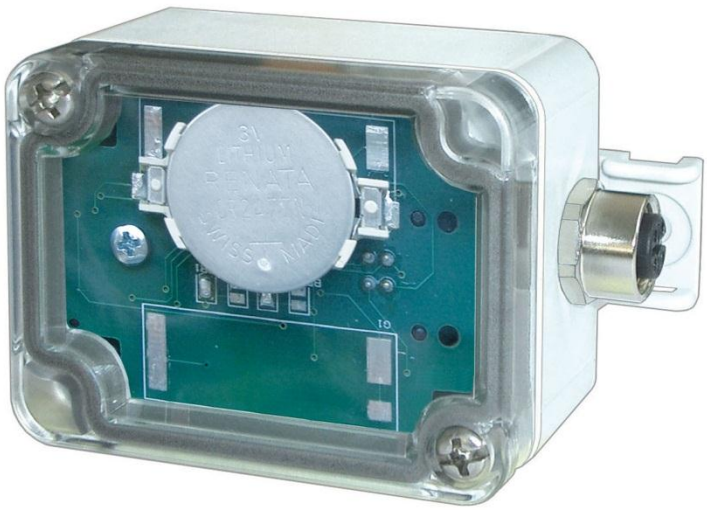
Operating manual - Archive document -

Wireless temperature sensor WSPt100

potential-free temperature monitoring of high-voltage transformers





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1. Application and brief description

The WSPt100 wireless sensor measures the temperature of an attached Pt 100 sensor. The measured values are radio-transmitted to a WR250 wireless relay where they are evaluated. The WSPt100 draws its energy from a built-in battery or from an integrated photovoltaic module. If run on solar power, energy is buffered in the storage capacitor, enabling the WSPt100 to measure and transmit temperature values even in transient darkness.
Uptime in the dark depends on the selected measuring and transmission intervals and on the charge state of the storage capacitor.
Energy supply and data transmission are completely potential-free and thus capable of bridging even high potential differences.
To this end, the electronics must be mounted potential-free or at the same potential as the attached sensor. The maximal ambient temperature is 65°C.

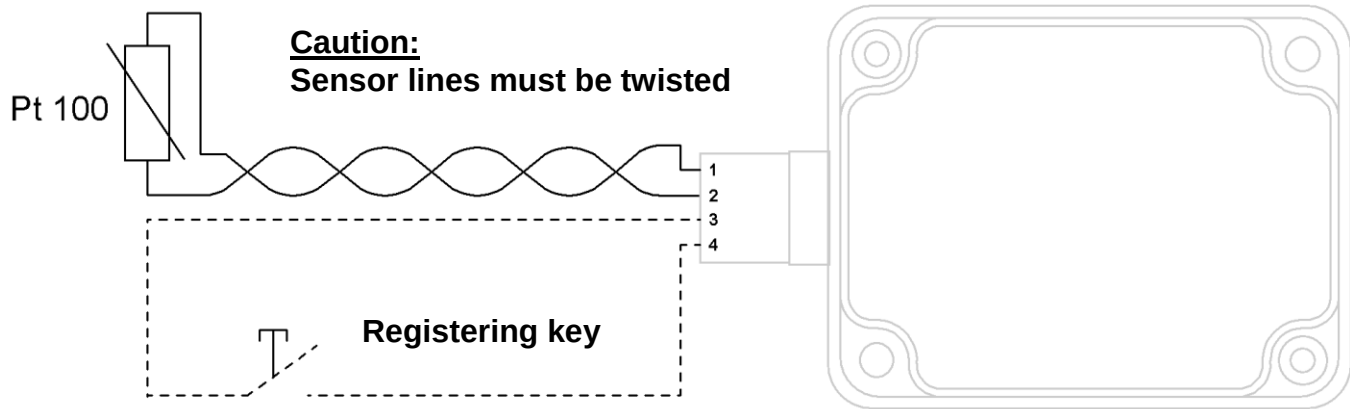
Application:
The WSPt100 is used in combination with a WR250 wireless relay:

- for overheating protection in high-voltage transformers (also in primary coils)
- for measuring temperatures at high potential
- where contact-free data transmission by radio is preferred

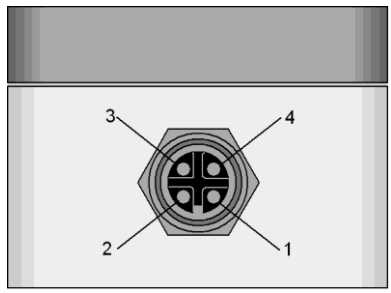
2. Function overview

- Measurement range 0 ... 180 °C (other ranges upon request)
- Measuring cycle adjustable (1 s / 10 s / 100 s)
- Transmission cycle adjustable (every 1 / 10 / 100 measurements)

3. Connection diagram



3.1 Pin assignment of sensor plug-in socket



Pin 1 / Pin 2:
Connector for Pt100 temperature sensor

Pin 3 / Pin 4:
Registering pins; for registering to a WR250 briefly link the contacts

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4. Important information

CAUTION

Dangerous electric voltage!
May cause electric shock and burns.
Before beginning work, disconnect system and device.

Correct and safe operations of any device requires that it has been transported and stored appropriately, installed and commissioned correctly and is being operated according to the instructions.
Only persons familiar with installation, startup and operations and possessing qualifications appropriate for their work may perform work on the device. They must observe the contents of the operating instructions, the information printed on the device and the relevant safety regulations for construction and operation of electric installations.
The devices are manufactured in accordance with DIN / EN and leave the production site in a condition of safety-related flawlessness.
If in any case the information provided in the operating instructions should be insufficient, please contact us directly, or address your local representative.
When using the device outside the area of applicability of the industrial norms referred to in the present operating instructions and valid in Europe, in their stead comply with the applicable regulations valid in the country of application.

5. Installation

The electronics must be mounted potential-free or on the same potential as the attached sensor. The maximum ambient temperature of the electronics is 65°C.
The device can be fastened:

- With M4 screws.
- On mounting plate (mounting plate with M4 screws)

Connect in accordance with connection diagram.

6. Detailed description

- The WSPt100 wireless sensor measures the temperature of an attached Pt 100 sensor (measurement range 0 ... 180°C)
- The values measured are transmitted to a WR250 wireless relay by radio signals
- The WR250 wireless relay performs evaluation of the radio signals, i. e. of the measurement values (see operating instructions WR250)
- Battery-powered operations (service life: see table under item 7.5)
- Solar-powered operations (uptime in the dark: see table item 7.5)

6.1 Principle of operation

- In intervals of a few seconds (selectable), the WSPt100 cyclically measures the temperature of the attached Pt 100 sensor for a few milliseconds.
- After n measurements (selectable), a measurement value is sent to the WR250
- Temperature changes > 4 °C will be sent to the WR250 immediately after measurement.

6.2 Operating distance of the radio transmission

The following are values for orientation which may be influenced by a number of circumstances.
Ranges may be significantly reduced if radio transmission is hampered by interferences (e. g. ferro-concrete walls, sources of disturbances, shieldings, installation in switching cabinets…).
In case of doubt, conduct range tests.

- Open field: approx. 100 m
- Building: approx. 20 m

6.3 Service life of the storage capacitor (solar version)

To enable continued operations of the WSPt100 during transient darkness, energy is buffered in a storage capacitor.
The service life of this storage capacitor in the WSPt100 strongly depends on ambient temperature. At higher temperatures, it loses its capacity more quickly.

- service life at $T_{ambient}$ = 25°C: approx. 100,000 h
- service life at $T_{ambient}$ = 65°C: approx. 5,000 h

This leads to shortened uptime of the wireless sensor during transient darkness. If continuous illumination of the wireless sensor is guaranteed, this will have no negative effects.

6.4 Service life of the battery (battery version)

see table under item 7.5.

7. Starting the wireless system

7.1 Startup overview

required	optional	Overview	
X		7.2	Charging the storage capacitor (solar version only)
X		7.3	Illumination (solar version only)
X		7.4	Inserting the battery (battery version only)
X		7.5	Adjusting the basic settings
X		7.6	Registering with the WR250 wireless relay
X		7.7	Connecting the Pt 100 sensor

7.2 Charging the storage capacitor (solar version)

Transport/storage or darkness for days on end may lead to exhaustive discharge of the storage capacitor in the WSPt100.
Before startup it should be recharged.

Illumination (lux)	Environment	Charging time (minimum / recommended)
500	Workplace	2 / 3 h
1000	Window (daylight)	1 / 1.5 h
> 2000	Bright lamp, sunshine	0.5 / 0.75 h

In case of exhaustive discharge, it may take up to one day until the full capacity of the storage capacitors is available again.

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7.3 Illumination (solar version)

To guarantee trouble-free operations of the WSPt100, it is required to provide sufficient light for the solar cell.

Light intensity should amount to about 500 lux at least.

7.4 Inserting the battery (battery version)

Open the lid of the casing and snap the battery into the fitting
(coin cell type CR2477N by Renata).

7.5 Adjusting the basic settings

Using the solder bridges BR1 – BR4, measuring and transmission intervals of the WSPt100 can by adjusted.
To this purpose, open the lid of the casing and open or close, respectively, the solder bridges (see table).
Caution: Do not damage the solar cell or the battery, respectively, nor expose to heat unnecessarily.

0 = solder bridge open, X = solder bridge closed

BR 1	BR 2	BR 3	BR 4	Measure-ment every (s)	Radio signal every (s)	Prog. #	Data for solar version: Uptime with Err5 displayed on the WR250	Data for solar version: Uptime in the dark *²
0	0	0	0	1	1	1	approx. 9 minutes	approx. 0.5 h
0	0	X	0	1	10	2	approx. 13 minutes	approx. 0.75 h
0	0	0	X	1	100	3	approx. 13 minutes	approx. 0.75 h
X	0	0	0	10	10	4	approx. 56 minutes	approx. 3.25 h
X	0	X	0	10	100	5 *)	approx. 90 minutes	approx. 5.25 h
X	0	0	X	10	1000	6	approx. 90 minutes	approx. 5.25 h
0	X	0	0	100	100	7	approx. 125 minutes	approx. 7.5 h
0	X	X	0	100	1000	8	approx. 175 minutes	approx. 10 h
0	X	0	X	100	10000	9	approx. 200 minutes	approx. 12 h

***) factory default setting**
***²) with the storage capacitor fully charged**

Temperature changes > 4 °C will be sent to the WR250 immediately after measurement.

battery service life (battery version):

	Program #	1	2	3	4	5 *)	6	7	8	9	
permanent ambient*² temperature	20 °C	≈ 0.5	≈ 2	≈ 2	≈ 5	≈ 10	≈ 10	≈ 10	≈ 10	≈ 10	[years]
	30 °C	≈ 0.5	≈ 2	≈ 2	≈ 5	≈ 10	≈ 10	≈ 10	≈ 10	≈ 10	[years]
	40 °C	≈ 0.5	≈ 1	≈ 2	≈ 5	≈ 8	≈ 10	≈ 10	≈ 10	≈ 10	[years]
	50 °C	≈ 0.5	≈ 1	≈ 1	≈ 4	≈ 6	≈ 7	≈ 9	≈ 10	≈ 10	[years]
	60 °C	≈ 0.5	≈ 1	≈ 1	≈ 3	≈ 4	≈ 4	≈ 5	≈ 5	≈ 5	[years]
	70 °C *²)	≈ 0.5	≈ 1	≈ 1	≈ 2	≈ 2	≈ 2	≈ 2	≈ 2	≈ 2	[years]

***) factory default setting**
***²) in practice, permanently high temperatures are rare**

Note:
The program number matching the configuration must be selected at the WR250 wireless relay (see WR250 operating instructions).
All WSPt100 sending to a WR250 wireless relay must have the same configuration.

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7.6 Registering with the WR250 wireless relay

- Invoke the registration routine of the WR250 wireless relay (see operating instructions for WR250)
- After prompting by the WR250, within 30 s briefly link pins 3 and 4 at the sensor plug-in socket (small wire jumper, or if the sensor plug is plugged in, briefly link the two contacts 3 and 4)
- The WR250 will confirm successful registration with a flashing Lrnd

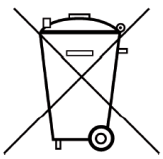
7.7 Connecting the Pt 100 sensor

CAUTION: To avoid perturbation, the sensor lines must be twisted.
Connect the Pt100 sensor (not included in delivery) to the sensor plug (pin 1 and 2) and screw the plug upon the sensor plug-in socket.

8. Servicing and maintenance

Solar version
For long-lasting functioning it is essential that the cover lid above the photovoltaic cell is not soiled. For cleaning, use water with a mild cleansing agent.
Slight soiling, as is to be expected, can be compensated by higher light power.

Battery version
To prevent sensor failure, replace the battery no later than expiry of the stated battery service life (table under item 7.5; coin cell Typ CR2477N by Renata).



The disposal of waste batteries in the normal household waste is forbidden by law. The end user is obliged to return old batteries and accumulators to the local retailer or accessible collection points.
Alternatively supplied batteries can be returned free of charge to our address.

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9. Troubleshooting

For troubleshooting please use the operating instructions of the WR250 wireless relay (item „Troubleshooting“).

10. Technical data

control voltage U_C (solar version)	none (energy provided by photovoltaic cell)
control voltage U_C (battery version)	3 V lithium coin cell type CR2477N by Renata
wave band	868,3 MHz
approved for	Europe (Version for USA and Canada upon request)
transmission power	max. 10 mW

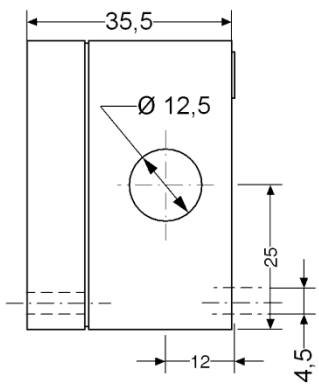
measuring cycle transmission cycle	approx. 1s / 10s / 100s (BR1 and BR2) every 1 / 10 / 100 measurements (BR3 and BR4)
measurement range tolerance	0 °C ... 180 °C ± 4 K
environment	weather-protected places +5°C … +65°C 5% … 85% relative humidity bedewing or icing not permissible
Protection type	IP 66
EMC stability	EN 61000-6-2

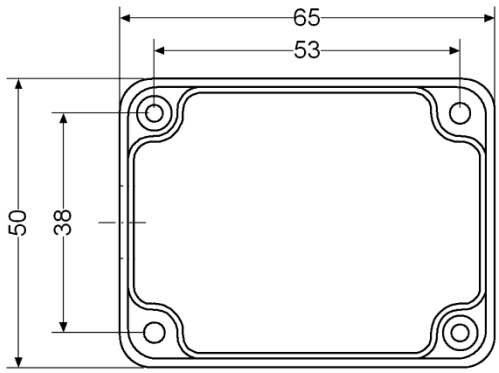
Subject to technical modifications

11. Design

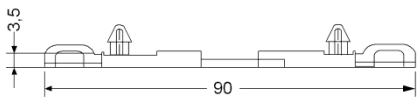
Dimensions in mm

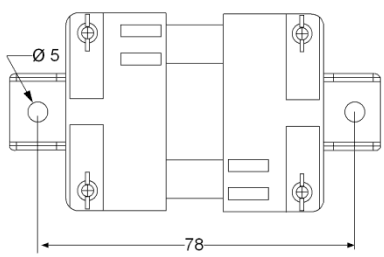
Size (W × H × D)	50 × 35 × 65 mm
Protection type of casing	IP 66
Protection type of M12 socket	IP 67
Fastening	Screw fastening M 4
Weight	approx. 80 g





Mounting plate





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