Operating Instructions for

Clamp-On Temperature Switch GP2610

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1 General

This instruction describes only the special features of the GP2610 temperature switch. For the clamp-on technology, please consult the operating instructions for the GA2610 devices (BTA-049).

1.1 Intended Use

The temperature switch GP2610 is intended for measuring the surface temperature of a pipe with a simple high/low output signal.

1.2 General Safety Notes

The installation, set up, service or removal of this device must only be done by trained, qualified personnel using suitable equipment and authorized to do so by the plant operator.

Improper installation or use of these devices or the use of damaged or defective devices may result in malfunction or property damage!

1.3 CE Marking

The CE marking on these devices certifies their compliance with the applicable EU Directives for placing products on the market within the European Union.

The following guideline applies to model series GP2610:

EMC Guideline EMC 2004/108/EC

2 Transportation and Storage

Store and transport these devices only under clean, dry conditions. Avoid exposure to shocks and excessive vibrations.

Permissible storage temperature: -40 ℃ to +100 ℃

3 Installation

Before installing the device, be sure that the device is suitable for the intended process application with respect to the temperature range and pipe diameter. Make sure that the pipe surface is clean and free of imperfections.

Install only on straight pipe sections with constant diameter.

Complete the mechanical installation before making the electrical connections.

After the mechanical installation and the electrical connection are both complete, the device is ready for use as soon as the voltage supply is switched on.

3.1 Electrical Connection of the Device

Make all electrical connections with the voltage supply switched off.

Permissible supply voltage

U_V = 24 VDC - 32 VDC

Route the cable so that it does not apply a constant force to the device

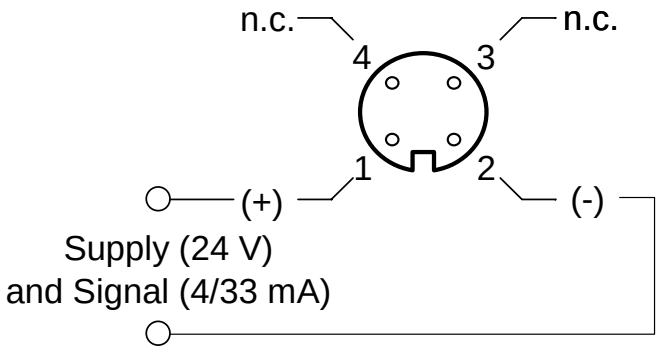


Figure 1: Pin assignment for M12 circular connector

3.2 Electrical Connection on the PLC side

The device converts a temperature signal into a high/low information. Above the switch-point the device generates a current of 33 mA, below the switch-point of 4 mA. You can use a digital PLC input to convert the current into an on/off signal with an appropriate load resistor $\mathbf{R_{Load}}$ as shown below. For an accurate dimensioning of the load resistor, you need to take the internal resistance of the PLC input into account.

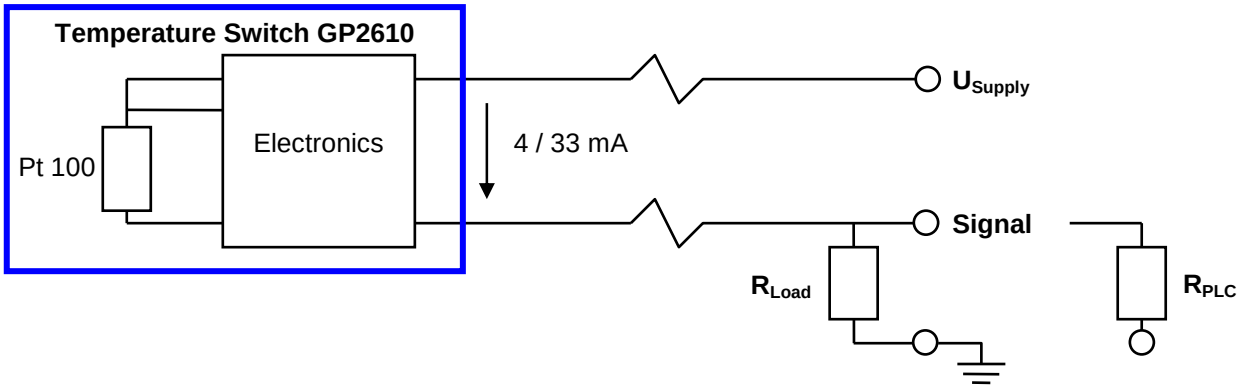


Figure 2: Connection to digital PLC input with load resistor

3.2.1 Calculating the size of the load resistor

The required size of the load resistor $\mathbf{R_{Load}}$ depends on the used PLC digital input module and must fulfill three conditions.

1. Maximum resistance to generate a "Low" signal at 4 mA (0,004 A):

$$R \leq \frac{U_{Low}}{0{,}004\,A}$$ with $\mathbf{U_{Low}}$ = max. voltage that is considered "Low" by the PLC

The overall resistance **R** results from the parallel connection of $\mathbf{R_{Load}}$ and $\mathbf{R_{PLC}}$, therefore $\mathbf{R_{Load}}$ calculates as follows:

$$R_{Load} = \frac{R \cdot R_{PLC}}{R_{PLC} - R}$$ with $\mathbf{R_{PLC}}$ = PLC internal resistance of the digital input channel

This can be combined into one formula:

(1) $$R_{Load} \leq \frac{U_{Low} \cdot R_{PLC}}{0{,}004\,A \cdot R_{PLC} - U_{Low}}$$

2. Minimum resistance to generate a "High" signal at 33 mA (0,033 A):

Calculated like the first requirement (see above):

(2) $$R_{Load} \geq \frac{U_{High} \cdot R_{PLC}}{0{,}033\,A \cdot R_{PLC} - U_{High}}$$ with $\mathbf{U_{High}}$ = min. voltage that is considered "High" by the PLC

3. Maximum resistance not to exceed the allowed overall load for the device

The GP2610 device requires at least 9,5 V voltage difference on its supply pins to operate. Assuming a supply voltage of 24 V this results in a maximal overall load for the device as follows:

$$R = \frac{R_{Load} \cdot R_{PLC}}{R_{Load} + R_{PLC}} \leq \frac{24V - 9{,}5V}{0{,}033\,A} \approx 440\Omega$$ what results in

(3) $$R_{Load} \leq \frac{R_{PLC} \cdot 440\Omega}{R_{PLC} - 440\Omega}$$

Sample calculation for SIEMENS S7 SM321 digital input module

The SIEMENS SM321 digital input module is specified as follows

- $\mathbf{U_{Supply}}$ = 24 V
- $\mathbf{U_{Low}}$ = 5 V, $\mathbf{U_{High}}$ = 13 V
- Input current at "High" Level = 4,2 mA => $\mathbf{R_{PLC}}$ = 13 V / 4,2 mA = 3000 Ohm

Maximum $\mathbf{R_{Load}}$ for "Low" signal

$$R_{Load} \leq \frac{5\,V \cdot 3000\,\Omega}{0{,}004\,A \cdot 3000\,\Omega - 5V} \approx 2140\,\Omega$$

Minimum $\mathbf{R_{Load}}$ for "High" signal

$$R_{Load} \geq \frac{13\,V \cdot 3000\,\Omega}{0{,}033\,A \cdot 3000\,\Omega - 13\,V} \approx 450\,\Omega$$

Maximum $\mathbf{R_{Load}}$ to stay within the stable working conditions for the device

$$R_{Load} \leq \frac{3000\,\Omega \cdot 440\Omega}{3000\,\Omega - 440\Omega} \approx 515\,\Omega$$

For this example the external load resistor $\mathbf{R_{Load}}$ must be between 450 and 515 Ohm, e.g. 470 Ohm.

4 Operation

During device operation, care must be taken to ensure that the device remains within its intended temperature range (ambient and process temperature).

Permissible ambient temperature: -40 ℃ to +85 ℃

When properly installed in accordance with applicable specifications, this device is maintenance-free. However, we recommend an annual recalibration of the device.

4.1 Hysteresis and optional switching delay

The basic functionality is enhanced by a hysteresis of 0,1 K (higher on request) to avoid signal jitter. The hysteresis is implemented as a positive hysteresis according to the typical use as a monitoring device for hot vapor sterilization. This implementation ensures that the signal changes from High to Low as soon as the temperature falls below the switch point. The figure below shows the temperature and output signal.

In addition devices can be ordered with an optional switching delay (see below).

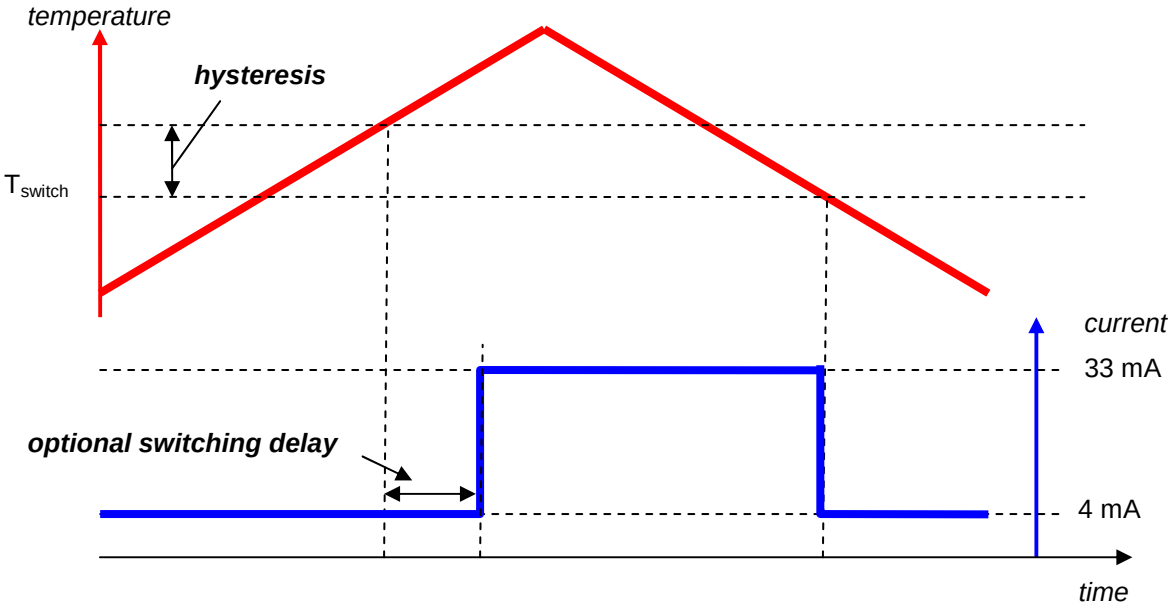
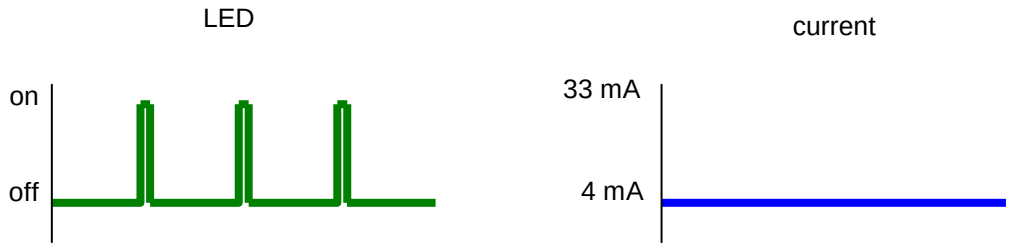


Figure 3: Temperature to current relation

4.2 Options for LED indicators

The switch state is indicated with two LEDs on top of the device. The LEDs are on, if the measured temperature is higher than the switch point. Optionally the LEDs can also indicate its readiness when the switch is off with short flashing of the LED.



LED Option 1: Indication of system readiness when switch is off

With another option a sensor break or short circuit will result in a continuous blinking (also visible in current
signal)

LED Option 2: Indication of sensor break or short circuit

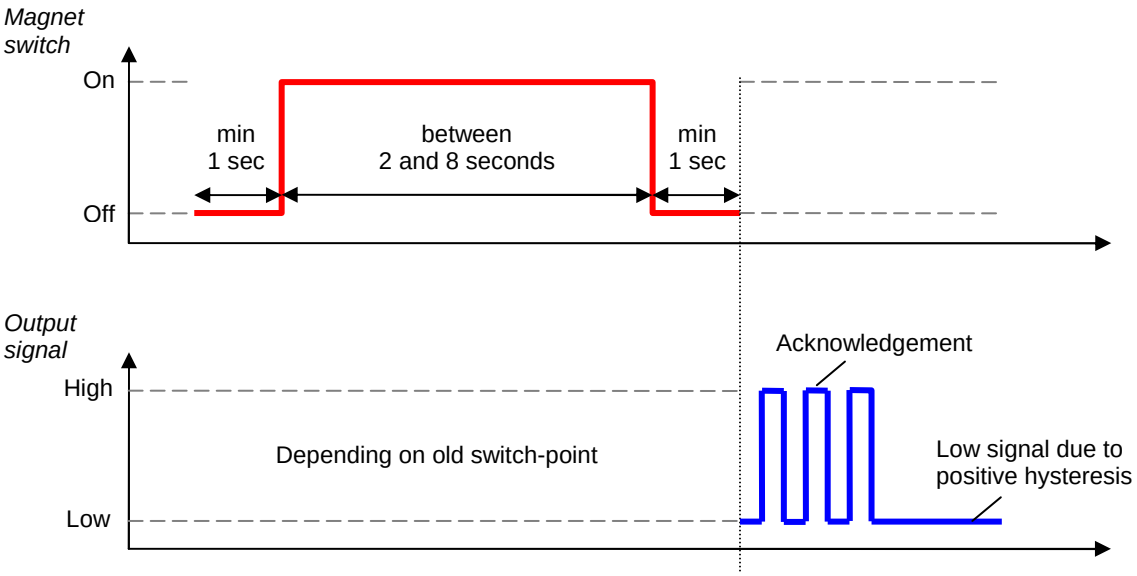
4.3 Adjusting the switch point

The switch-point is typically configured as per the customer request. It can be re-adjusted by holding a magnet to the setting point (as indicated on the type label) when the Pt-100 is heated to the intended switching temperature (e.g. in a block calibrator).

To avoid an unintentional re-configuration, the following procedure must be followed

1. Keep the magnet away from the device for at least one second
2. Hold the magnet to the setting point between two and eight seconds
3. Remove the magnet from the device for at least another second

If the setting procedure was successful, the device acknowledges the new setting by blinking LEDs for one second.



4.4 Calibration

You can calibrate GP2610 devices like all other products in the LABOM Clamp-On family. LABOM offers a custom calibration insert for dry block calibrators that ensures accurate calibration results.

For details consult the document "Calibration Guideline for LABOM Clamp-on Resistance Thermometers" (TA_008).