

INSTRUCTION MANUAL

TEMPERATURE SWITCHES TSZ3H-24

These temperature switches with display are designed for using as two-state controller (on/off type control) for compare the temperature set-point with the actual temperature value in range -50 to 250°C, with the possibility of switching the electrically isolated contacts of a connected relay



SENSIT s.r.o.

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 Company is incorporated in the Companies Register at the Regional Court in Ostrava, Section C, File 13728, sensit@sensit.cz, www.sensit.cz



5407.1	01.17
Supersede	



Legal regulations and standards:

- Electrical connection of the detector may only be carried out by a competent person with electrician qualification who is familiarized with the "Instruction Manual" in detail.
- The Instruction Manual is part of the product and it is necessary to keep it for the entire service life of the product.
- The Instruction Manual must be transferred to any other owner or user of the product.
- The disposal must be performed in compliance with the Directive 2008/98/EC of the European Parliament and of the Council - on waste and the Directive 2012/19/EU of the European Parliament and of the Council – on waste electrical and electronic equipment (WEEE), as amended
- The switches are delivered in packages, which guarantee resistance to mechanical influences and that meet the conditions with the European Parliament and Council Directive 94/62/ES on packaging and packaging waste.
- The final metrological inspection – comparison with standards or working instruments – is carried out for all the products. Continuity of the standards and working measuring instruments is ensured within the meaning of the Section 5 of Act no.505/1990 on metrology. The manufacturer offers a possibility to supply the sensors calibrated in SENSIT s.r.o. laboratory (according to EN ISO/IEC 17025 standard) or in an Accredited laboratory.

Application:

These temperature switches with display are designed for using as two-state controllers (on/off type control). They compare the temperature set-point with the actual temperature value and enable switching the galvanically isolated (electrically isolated) contacts of a connected relay. Supply voltage of the switches is 7 to 36 V DC or AC. Two temperature sensing elements on the base of Pt (Pt 100/3850) or on the base of Ni (Ni 1000/6180) can be connected to the switches. The display indicates the present value of the measuring temperature during measure process. Setting of individual parameters is executed by two control buttons.

The switch can be used in 5 different modes:

- the switch operates as a single controller which switches the first relay by the set temperature interval and the second relay is switched at the exceeding set emergency temperature (only one sensing element is used)
- the switch operates as a single controller which switches each relay by the set temperature interval (only one sensing element is used)
- the switch operates as a double controller, it means that each relay is controlled by the temperature of one sensing element
- the switch operates as a differential controller which switches on the base of temperature difference of two sensing elements (analogous to mode no. 1)
- the switch operates as a differential controller which switches on the base of temperature difference of two sensing elements (analogous to mode no. 2)

The time delay of switching-off for the relay 1 within the limits 0–300 s can be set in each mode. The switches are intended for assembly to the DIN rail. Maximum operating temperature range of the switch is -50 to 250 °C. The switches are intended for operating in a chemically non-aggressive environment.

Recommended use and location of switches:

- Operating position is arbitrary, the switches are designed for installation in the switchboard boxes on DIN rail.

Warnings and restrictions:

The switches must not be used for measuring in locations:

- Where the specified technical parameters and operating conditions are not adhered
- Where the converter is exposed to mechanical action or I locations with explosion hazard
- With chemically aggressive environment that does not correspond the used metal materials
- Where the converter is exposed to dust and humidity

It is not suitable to use the convertors for measuring in locations:

- Where the supply cable might run parallel to mains cables (risk of interference signal induction and the measurement results may be influenced), the safe distance from mains power cables when cables run parallel can be as much as 0,5 m according to the nature of interfering fields.

Failure to follow the said recommendations will negatively affect measurement accuracy, reliability and service life of the convertor.

Product safety:

Product safety and technical parameters were evaluated according to the following standards and norms, as amended:

- EN 61003-1, EN 60 529
- EN 50121-3-2 – part 7, EN 50121-3-2 – part 8, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6

Declaration of conformity:

SENSIT s.r.o. provides the product with the **EU Declaration of Conformity** issued according to Act No. 90/2016 Coll. and Act No. 22/1997 Coll., as subsequently amended. The product is in accordance with the following directives:

- European Parliament and Council Directive 2011/65/EU of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment
- European Parliament and Council Directive 2014/30/EU of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility

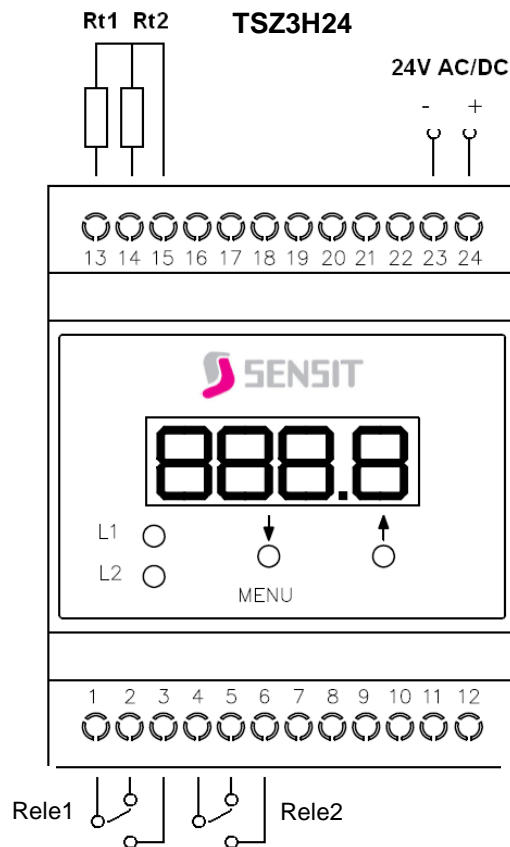
Switches description:

The product consists of a plastic box with the terminals for connecting power supply, signal from temperature sensor end for connecting output contacts of a relay. Inside of the box is placed the electronic module with a display unit for displaying the measured temperature and other setting data. The part of the plastic box is a grip for DIN rail. The material of the plastic box is LEXAN™ RESIN – EXL 5689.

Switches installation:

1. Place the converter to the DIN standard rail using a grip, which is a part of the plastic box
2. Connect the cable from resistance sensor Pt 100/3850 or Ni 1000/6180 and from power supply into appropriate terminals according to wiring diagram. Connect the cable to the output relay contacts according to the wiring diagram.
3. After installation and connection to the consequential electrical measuring device, the sensor is ready for operation. The sensor does not require any special manipulation or maintenance.

Wiring diagram:



Description of display:

Range of the displayed temperature -50,0°C to +250,0°C

- if the value is out of range the following indication is displayed
 - „uuu“ if the temperature is lower than -50,0°C
 - „nnn“ if the temperature is higher than +250,0°C
 - „OPn“ if any sensing element is not connected or if an input is short-circuited on power
 - „ShC“ if an input is short-circuited on GND
- if the relay is short-circuited in emergency mode, the red LED blinks slowly
- if the relay is short-circuited in operating mode, green LED or red LED is alight

Control buttons and indicating LED:

LED L1, green:	relay1 in operating mode:	short-circuited - is alright / break - is not alright
LED L2, red:	relay2 in operating mode:	short-circuited - is alright / break - is not alright
	relay2 in emergency mode:	short-circuited - blinks slowly break - is not alright
	mode for displaying or value setting:	blinks quickly

Multifunction button No.1 Menu ↓: setting of switch values downwards and indicating of set value – long press

Multifunction button No.2 ↑: setting of switch values upwards

Synchronous pressing of multifunction button No.1 ↓ and 2↑: calling RESET

Setting of the switch:

- The setting is performed by means of the left (SW1) and the right (SW2) button. After pressing the button SW1 the red LED blinks and thereby indicates that the display does not measure the actual temperature but some of parameters. During the parameters editing the measurement is not performed and state of the relay is not changed.

Parameter display:

- Indicating of adjusted parameters is made by means of long pressing of the button SW1. The parameters are displayed stepwise including their identifiers.

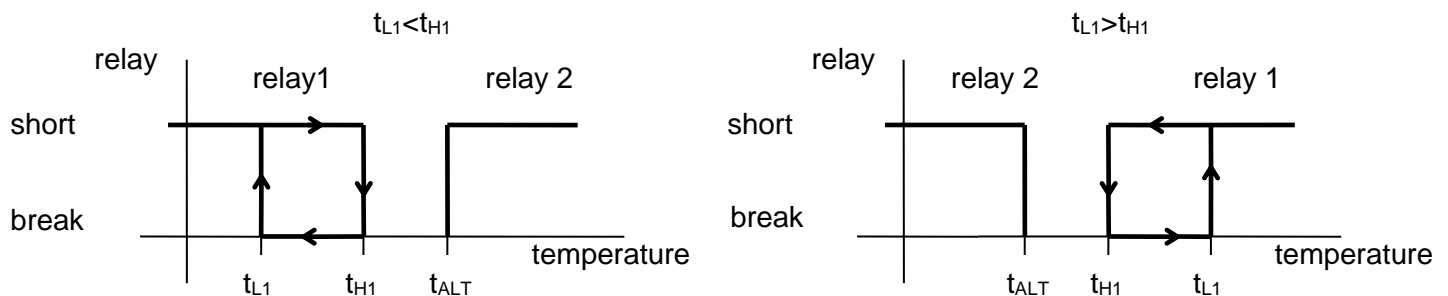
Setting of parameters:

- Adjustable parameters are cyclically switched over by means of holding the button SW1. The number of the parameters is dependent on the selected function of the switch. First a parameter indicator is displayed (for example „Fnc“, „rt1“, ...) and afterwards its set value is indicated. As the first the type of function (parameter „Fnc“) is always set. A characteristic of relay switching can be set by means of hardware circuits or by means of software. If the adjusted temperature t_{Lx} is higher or lower than t_{Hx} - see the following characteristics.

function 01

- temperature is read out by means of one sensing element (R_{t1}); relay1 switches in operating mode, relay2 switches in emergency mode.

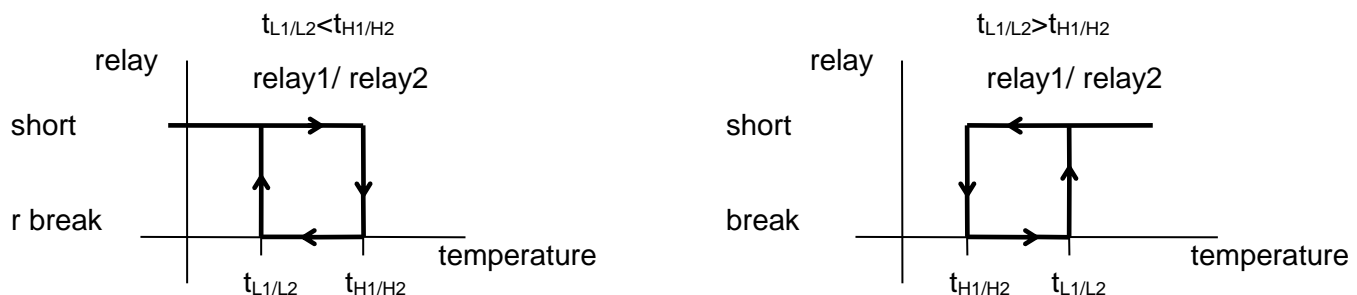
function („Fnc“) → sensing element („rt1“) → temperature t_{L1} („tL1“) → temperature t_{H1} („tH1“) → alarm t_{ALT} („Alt“) → brightness („bri“)



function 02

- temperature is read out by means of one sensing element (R_{t1}); relay1 and relay2 switch in operating mode

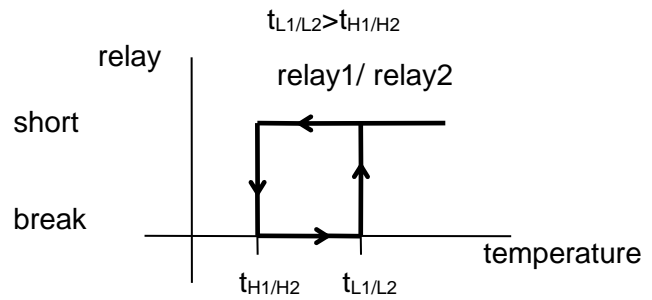
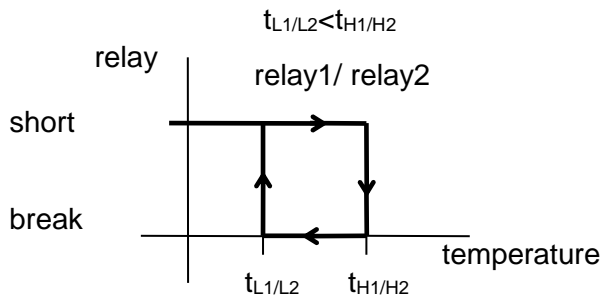
function („Fnc“) → sensing element („rt1“) → temperature t_{L1} („tL1“) → temperature t_{H1} („tH1“) → temperature t_{L2} („tL2“) → temperature t_{H2} („tH2“) → brightness („bri“)



function 03

- temperature is read out by means of two sensing elements; relay1 and relay2 are controlled by individual temperatures independently from each other

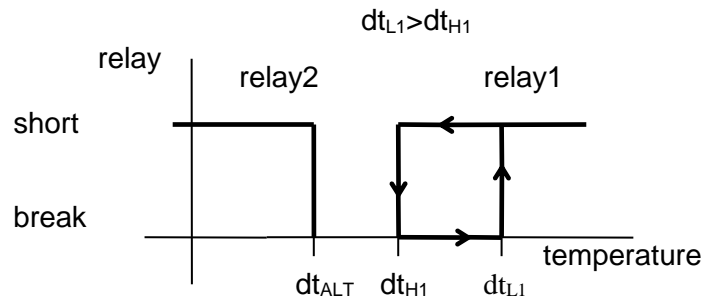
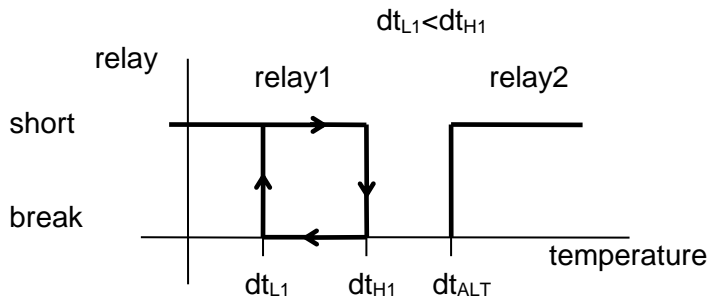
function („Fnc“) → sensing element1 („rt1“) → temperature t_{L1} („tL1“) → temperature t_{H1} („tH1“) → sensing element2 („rt2“) → temperature t_{L2} („tL2“) → temperature t_{H2} („tH2“) → brightness („bri“)



function 04

- temperature is read out by means of two sensing elements; relays are controlled by their temperature differences $dt = |t_{R11} - t_{R12}|$; relay1 switches in operating mode, relay2 switches in emergency mode.

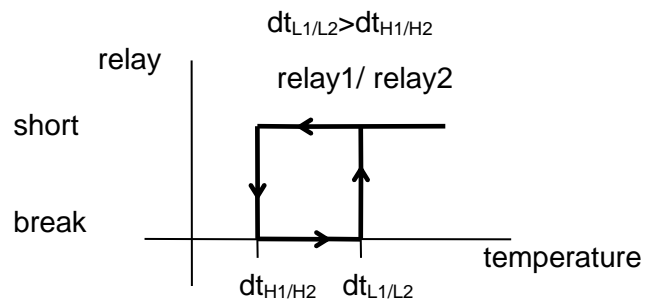
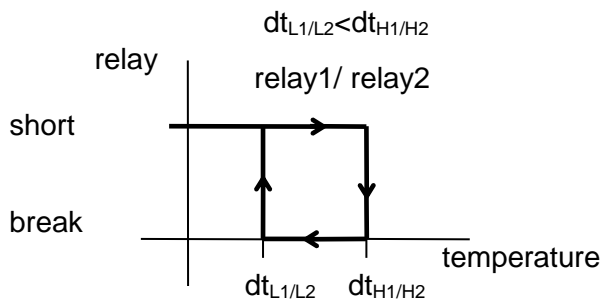
function („Fnc“) → sensing element1 („rt1“) → sensing element2 („rt2“) → temperature difference dt_{L1} („tL1“) → temperature difference dt_{H1} („tH1“) → → alarm dt_{ALT} („Alt“) → brightness („bri“)



function 05

- temperature is read out by means of two sensing elements; relays are controlled by their temperature differences $dt = |t_{R11} - t_{R12}|$; relay1 and relay2 switch in operating mode.

function („Fnc“) → sensing element1 („rt1“) → temperature difference dt_{L1} („tL1“) → temperature difference dt_{H1} („tH1“) → sensing element2 („rt2“) → → temperature difference dt_{L2} („tL2“) → temperature difference dt_{H2} („tH2“) → brightness („bri“)



Note: sensor R_{12} is not used in functions 01 and 02
 relay1 contacted - interconnection of the terminals 1,3; relay2 contacted - interconnection of the terminals 4,6
 the relay can be set as short or break for all function

The delay function

- the delay function (dL1) is used for setting time delay for break relay1 in range 0 – 299s.

Setting of the sensor:

- the type of sensor is set according the next table:

Type of sensor	Setting
Pt 100/3850	Pt
Ni 1000/6180	Ni

Note:

After releasing the button SW1 while indicating required parameter the set point value can be adjusted by means of the buttons SW1 (Down) and SW2 (Up). The buttons are provided by a two-step autorepeat, it means while pressing the button the selected parameter is changed at the beginning slowly and after approximately 10 s quickly. After releasing the button the parameter is saved in memory in a few moments and the switch is reverted in standard displaying.

Deactivation of the emergency relay (only for the functions 01 and 04):

SW1+SW2: on the display the value „rSt“ is indicated and the emergency relay is deactivated. Deactivation goes through only in this case if temperature falls under set alarm temperature.

Attention!!!

If the power supply of the switch is broken the relay terminals 9, 10 (relay1) and 12, 14 (relay2) are interconnected. If the power supply of the switch is broken the last state of the emergency relay is load in the processor memory (functions 01 and 04). Change of the state of the emergency relay has no influence on the function of the operating relay.

Technical parameters:

Type of element	Pt 100/3850 or Ni 1000/6180
Temperature element wiring	Two - wire
Measuring range	-50 to 250 °C
Temperature operating range	-50 to 250 °C, step 0,1°C
Maximum error of the electronic module	± (0,2% from value + 2 dig)
Recommended power supply	230 VAC
Maximum switched voltage / current	7 to 36 VDC nebo VAC
The type of Display	4-digit LED
Character height	10 mm
Display resolution	0,1°C
Display updating	< 0,2 s
Default parameters	Fnc = 01; R _{t1} = Pt; t _{L1} = 10,0; t _{H1} = 15,0; dL ₁ = 00; R _{t2} = Pt; t _{L2} = 20,0; t _{H2} = 25,0; Alt = 30,0; bri = 0
Recommended wire	cross section: 0.35 to 1,5 mm ²
Box / terminals IP code	IP 20
Dimension / material of the box	86 x 69 x 49 mm / ABS
Weight	0,22 kg

Operating conditions:

- temperature round the converter: -30 °C to 70 °C
- relative humidity of the surroundings: 10 to 80 %
- atmospheric pressure: 70 to 106 kPa

Storage:

- Ambient temperature 5 to 40 °C
- Humidity 5 to 85%

Delivery:

Each delivery contains the following unless otherwise agreed by the customer:

- Converter according to purchase order
- Instruction Manual, including Guarantee Certificate
- Delivery Note

Likvidace:

SENSIT s.r.o. has signed an agreement with the Company RETELA s.r.o., on the collective performance by §37h - paragraph1, letter c) of the Act No.185 / 2001 Sb. on waste, as amended.

Complaints and repairs:

Guarantee and after-guarantee repairs of sensors are ensured by the manufacturer. The product must be delivered including a copy of the Guarantee Certificate, duly packed and fit to shipment so as not to get damaged during transportation.

GUARANTEE CERTIFICATE

The product is covered by guarantee for 24 months from the date of purchase.

In this period, the manufacturer will remove all material or manufacturing defects arisen demonstrably during the applicable warranty period. The manufacturer is liable for the technical and operational parameters of the product given in the user manual. Any identified defects will be claimed by the buyer without undue delay after their identification or, as appropriate, after the buyer was able to identify them during his routine care. A completed Warranty Certificate with a brief description of the defect plus the product must be submitted with the claim.

Warranty does not cover a product:

- That was damaged during transport and inappropriate storage, improper commissioning and/or that has been used for a purpose other than specified
- That has been used in an improper manner, inconsistent with the user manual and/or generally applicable technical standards or safety regulations
- That is worn or damaged as a result of normal use of the product, without loss of its operational characteristics and guaranteed technical parameters
- Into which unskilled intervention, unauthorised structural or other changes (reprogramming, resetting of set parameters, etc.) have been made
- That is mechanically damaged, e.g. by fall, being hit by a hard object, cleaning with unsuitable agents, power cord tearing/breaking, breaking or other damage of individual product parts
- That has been exposed to adverse external influence, e.g. object intrusion, wrong supply voltage, influence of chemical processes, electrical surge (obviously burnt components or printed circuits), dusty, dirty, aggressive or otherwise unsuitable environment, except normal variation
- That has been damaged by an incidental or natural disaster or as a result of natural or external phenomena, such as storm, fire, water, excessive heat
- That is claimed without the Warranty Certificate or nameplate.

Rights and obligations regarding the rights arising from defective performance will be governed by the applicable legislations and the applicable Business Terms and Conditions of SENSIT s.r.o. and this Warranty Certificate.

Date of sale confirmation:

Serial number: