



# HT950N

Panel meter for temperature control **CE**


**User's manual**



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## 1. SAFETY PRECAUTIONS AND PROCEDURES

This meter is designed in conformity to EN61010 standards relating to electronic measuring instruments. For your own safety and that of the apparatus, you must follow the procedures described in this instruction manual and specially read all the notes preceded by the symbol  carefully.

Strictly keep to the following instructions before and during measurements:

- Do not install the meter in environments with explosive gas, fuels or dust.
- Do not install in case of unusual conditions of the instrument such as deformation, breakage, leakage of substances, absence of display reading etc.

The following symbols are used in this manual:



### WARNING

No compliance with the Warnings and/or Instructions may damage the apparatus and/or its components or injure the operator.

#### 1.1. PRELIMINARY

- Use the meter only as specified in this manual; otherwise, the protection provided by the meter may be impaired.
- Only the accessories supplied with the instrument guarantee compliance with the safety standards. They must be in good conditions and must be replaced, if necessary, with identical models.
- Do not effect measurements beyond the limits specified in this manual.
- Take care that indications on display its according with selected function.

#### 1.2. DURING USE

Carefully read the following recommendations and instructions:



### WARNING

No compliance with the Warnings and/or Instructions may damage the apparatus and/or its components or injure the operator.  
Safety protection for the meter maybe damaged.

- Use the meter and the temperature probes only within the ranges specified in the chapter 7.1.1 of manual.
- Do not perform any measurement on materials under voltage. This could damage the instrument.

## 2. GENERAL DESCRIPTION

Dear Customer, we thank you for your patronage. The HT950N meter you have just purchased will grant you accurate and reliable measurements, on protection of MV transformer, provided that it is used according to the present manual's instructions.

The HT950N model it was been designed with high quality electrical components and, during test verify, it's subject to BURN-IN test to eliminate any internal bugs due to rapid death rate of components.

The HT950N meter presents the following features:

- 1 up to 4 input temperature signals, selectable by key, from same number of thermo sensitivity elements **Pt100 DIN** type with three wires.
- Measurement range from 0° to 200°C.
- Automatic compensation of 3-wire cable resistance.
- Setting of two alarm thresholds temperature T2 and T1, with  $T2 > T1$ , programmable on all measurement range, with activation of the same number of output relays.
- Setting of two alarm thresholds temperature UA and UF, with  $UF < UA$  with activation of an output relay. These thresholds can be used to activate a possible forced ventilation system or a parallel device.

## 3. PREPARATION TO USE

### 3.1. INITIAL

The instrument has been checked from every point of view before shipment. Every care has been taken to make sure that the instrument reaches you in perfect conditions. However, it's advisable to make a rapid check in order to detect eventual damages, which may have occurred in transit. Should this be the case, enter immediately the usual claims with the carrier. Make sure that all the accessories listed in paragraph 7.3.1 are contained in the package. In case of discrepancies contact the dealer.

In case of returning of the tester, please keep to the instructions given in chapter 8.

### 3.2. POWER SUPPLY

The instrument can be supplied with a voltage between 24 and 240 V AC (50/60 Hz) or DC voltage.

### 3.3. CALIBRATION

The instrument complies with the technical features listed in this manual.

### 3.4. STORAGE

In order to guarantee the accuracy of the measurements, after a period of storage in extreme environmental condition, wait for the necessary time so that the instrument returns to normal measuring conditions (see paragraph 7.2.1).

## 4. OPERATING INSTRUCTIONS

### 4.1. DESCRIPTION FRONT PANEL

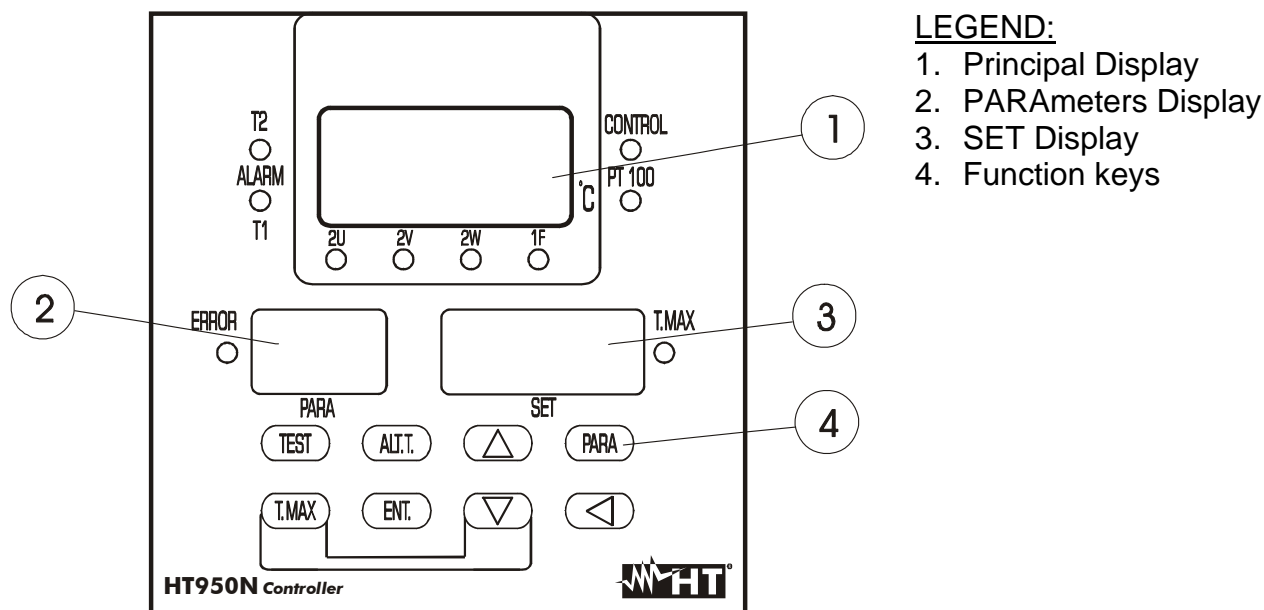


Fig. 1: Instrument description, frontal view

#### • CONTROL Led

The light on of this Led mean that temperature of one of four inputs is over the setting UA threshold value and the CONTR output relay is closed. This can active the start of forced ventilation system or a parallel device. The Led light off only when temperature decrease under UF threshold value and the CONTR relay is open. This can disconnect the forced ventilation system or a parallel device (see Fig. 9 ).

#### • PT100 Led

This Led shows that at least one of four controlled input probes (2U, 2V, 2W or 1F Led is blinking) is shorted or opened. In this case an alarm condition is activated by HT950N and relay T1 is opened.

#### • 2U-2V-2W-1F Led

These Leds shows, for each of four columns:

- With fixed light means the temperature column you can read on principal display.
- With blinking light, together Pt100 light on, means problems at the correspondent thermoresistance.

#### • T1 Led

This Led have the following functions:

- When is light on its shows that temperature of one of four probes is over T1 threshold set on HT950N and correspondent relay have activated pre-alarm condition (see Fig. 9).
- When is light off, with Pt100 Led fixed light on, its shows one of following conditions:
  1. Disconnection of one of four input Pt100 (with correspondent blinking led).
  2. One Pt100 is shorted (like point 1.).
  3. No one power supply at meter.

- **T2 Led**

This Led shows that measured temperature by one of four probes is over T2 alarm threshold set on HT950N and correspondent relay is activated. This means transformer turn off (see Fig. 9).

- **T.MAX Led**

This Led is light on when you press **T.MAX** key and show the maximum temperature recording by HT950N during all measured period. SET display shows the temperature value and PARA display shows the column (C1=2U, C2=2V, C3=2W, C4=1F) of correspondent maximum value.

- **ERROR Led**

This Led is light on if there is an error on setting threshold temperature values. In particular for  $T2 < T1$  or  $UA < UF$  wrong set conditions.

- **Principal Display**

This display always show the real time temperature of the hot column.

- **SET Display**

This display shows the following temperatures:

- T2 temperature of transformer turn off during threshold setting.
- T1 temperature of pre-alarm during threshold setting.
- UA temperature of forced ventilation activation during threshold setting.
- UF temperature of forced ventilation disable during threshold setting.
- Maximum temperature recording by HT950N during measurements.
- Temperature of four columns C1, C2, C3, C4.

- **PARA Display**

This display show the control parameter (T2, T1, UF, UA) and the columns symbol (C1, C2, C3, C4).

## 4.2. DESCRIPTION OF FUNCTION KEYS

- **PARA key**

This key can activate the setting of thresholds temperature. Refer to chapter 5.4 for any details.

- **ALT.T. key**

Press this key the HT950N meter shows real temperatures on the four columns. PARA display shows the columns names C1=2U, C2=2V, C3=2W, C4=1F and SET display shows the correspondent temperature values. These displays light off in the following three ways: press **ENT.** Key, press **ALT.T.** key when C4 column appear or automatically after about 20 sec. From last operation.

- **TEST key**

Press this key HT950N execute a functionally test on verify the light on of all Led and displays on the front panel.

### • T.MAX key

Press this key the meter show at PARA display the column symbol (C1, C2, C3, C4) which have the maximum temperature value during all measure period. SET display show instead the value of recording temperature. T.MAX Led is light on during operation.

After about 20 sec. from pressing of **T.MAX** key PARA and SET displays automatically light off.

**T.MAX** key is also used for reset temperature maximum value (see chapter 5.4. for details).



### WARNING

- T.MAX is automatically update only with higher values and remain saved inside HT950N also in switch off condition.
- **T.MAX** key don't execute any operation if meter is inside setup parameters menu (see chapter 5.4).

## 4.3. DESCRIPTION OF BACK PANEL

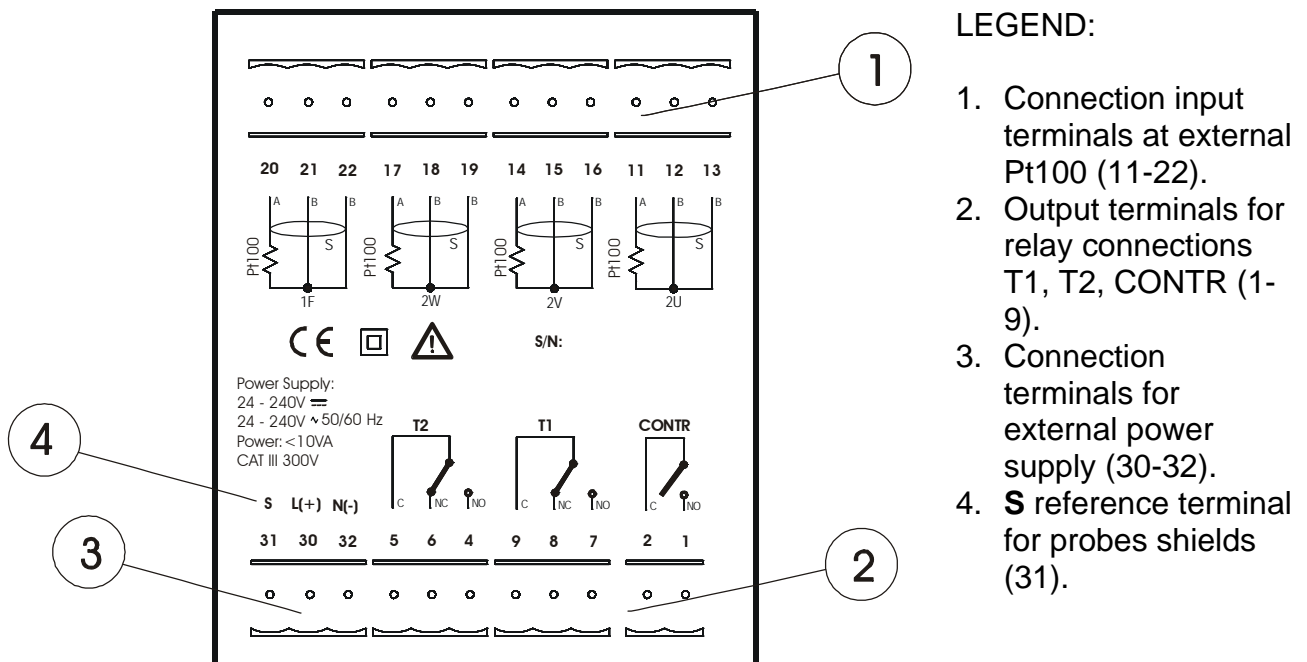


Fig. 2: Instrument description: back panel

## 5. OPERATIVE INSTRUCTIONS

### 5.1. INSTALLATION

For HT950N practice installation please consider the following specifications:

- Installation zone must to be dust and corrosive gas free.
- HT950N meter must to be installed:
  - Far from direct solar light and impact warm sources;
  - Far from MV devices (big meter counter, energy cables, SCR or TRIAC apparatus, radiotransmitter).
- You must prepare a square hole on 36.8 x 36.8 inch (height x width).
- Insert HT950N and fix with standard screws and connectors.

### 5.2. ELECTRICAL CONNECTIONS

Please see the following Fig. 3 to execute all electrical connections on HT950N meter.

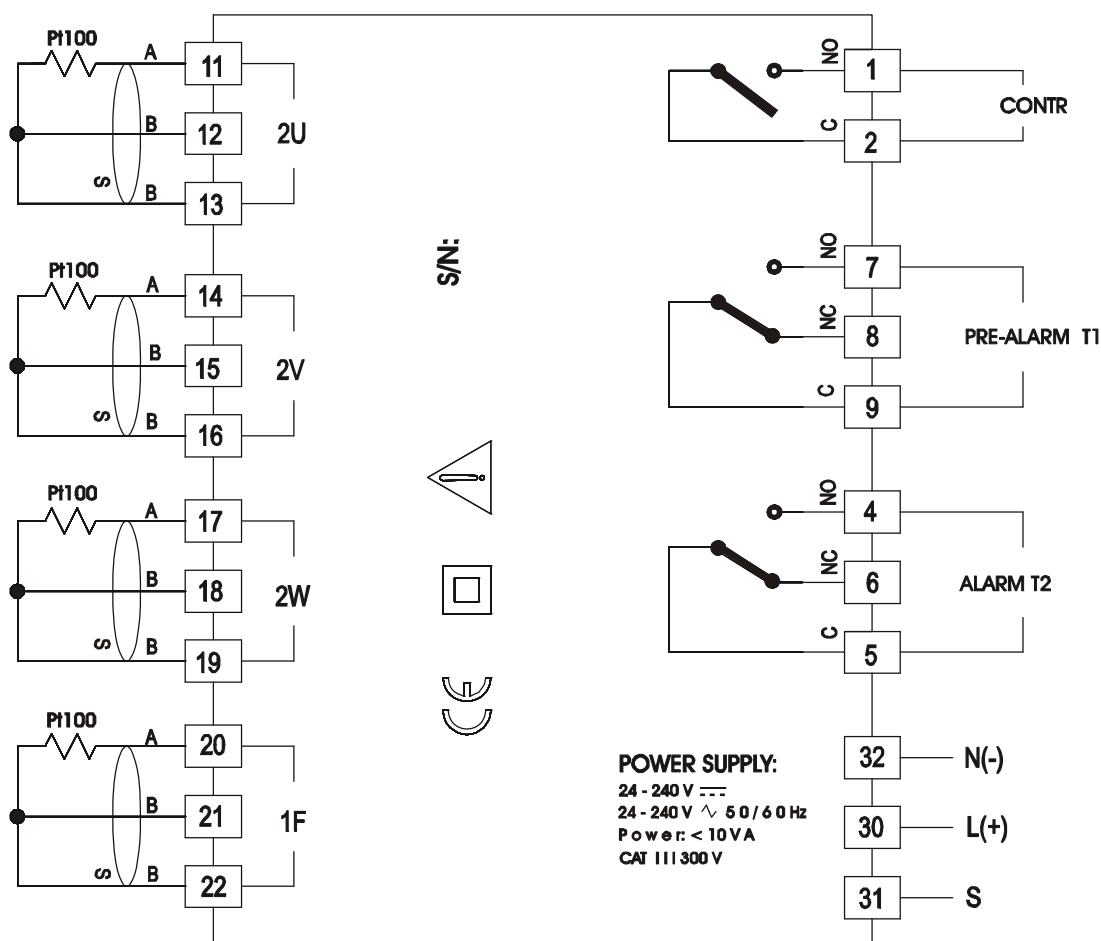


Fig. 3: electrical connections on HT950N meter



### 5.2.1. Power supply circuit

HT950N meter can be supplied with AC (50/60Hz frequency) or DC sources. If you use DC supply please connect positive (+) and negative (-) contact at terminals 30 and 32 respectively, like shown on Fig. 4

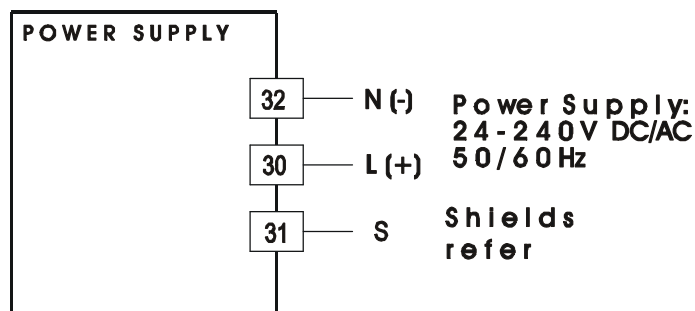


Fig. 4: Power supply terminals of HT950N

### WARNING

- Use a cable with section  $\geq 1\text{mm}^2$  for power supply the meter.
- Its necessary to insert a easy to reach voltage protection switch on/off before HT950N to interrupt voltage.
- **The EMC levels/immunity declared in chapter 7.2.2 are referred only inserted standard filter on supply cord, like shown in Fig 5.**



Fig. 5: connection of EMC filter on supply cord.

### WARNING

As all safety protections of HT950N meter depend on refer **S** terminal (31), its necessary to connect all Pt100 shields at this terminal.

### 5.2.2. Temperature probes



#### WARNING

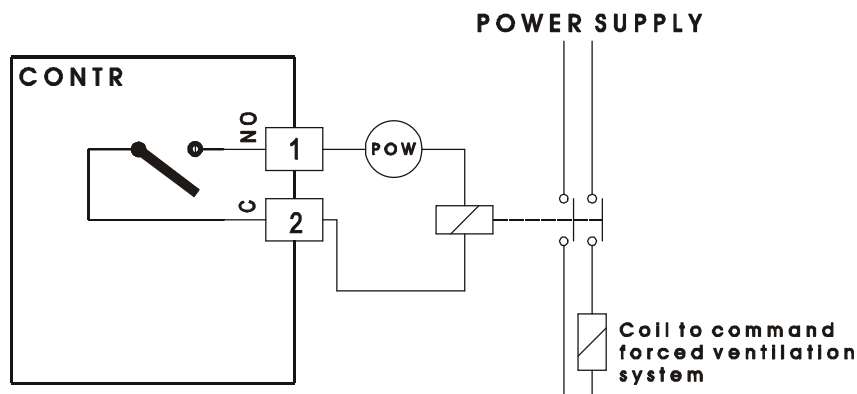
- Input circuits (2U, 2V, 2W, 1F) operates with small signals therefore its necessary to execute a separated wiring from relay command output circuits, supply circuit and from other power circuit.
- **We always recommended to connect of each Pt100 to use a shielded cable with shield connected from meter front only. Connect at S terminal (31) the shield of each thermoresistance, like shown on Fig. 3.**
- Resistance of each Pt100 connection cable must be 5Ω max and each of three conductors must have the same resistance. I value is over 5Ω is possible to have a reading error at display. You can refer at the following Table 1 to obtain correct measurements.

Lenght Pt100 conductor from transformer connector to HT950N meter	
Twisted conductor	Single conductor
0.5 mm <sup>2</sup> ..... about 100 m	Diameter 1.0 mm.....about 150 m
0.75 mm <sup>2</sup> .... about 150 m	Diameter 1.2 mm.....about 250 m
	Diameter 1.6 mm.....about 400 m

**Table 1: conductors section on HT950N connection**

### 5.2.3. CONTR output circuit

The output circuit CONTR can be used to connect a forced ventilation system or a parallel device installation. The electrical scheme of connection is presented on following Fig. 6.



**Fig. 6: CONTR relay on no alarm condition (normally disabled)**

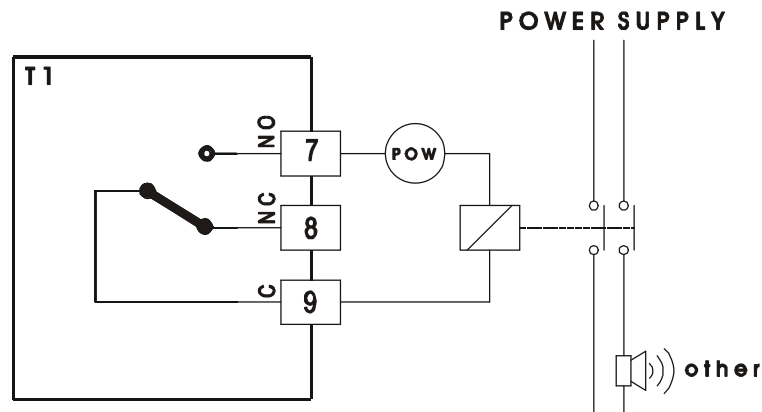
CONTR relay operate a commutation in the following cases:

- When HT950N measures a temperature over UA threshold CONTR is activated.
- When HT950N measures a temperature under UF threshold CONTR is disabled.

CONTR relay can be more important for operators on solution of various installations problems.

#### 5.2.4. T1 output alarm circuit

The output relay connection of T1 pre-alarm circuit is presented on following Fig. 7:



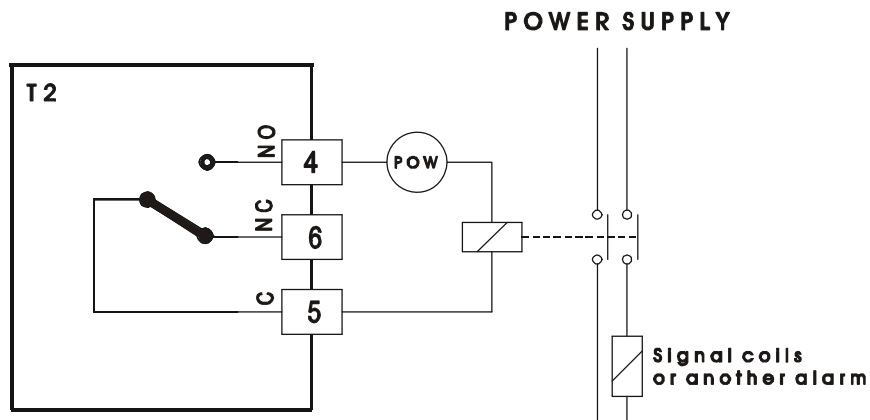
**Fig. 7: T1 relay on no alarm conditions (normally activated)**

T1 relay operate a commutation in the following cases:

- When HT950N measures a temperature over T1 threshold.
- When Pt100 probes open or shorted.
- Power supply switch off on HT950N.

#### 5.2.5. T2 output alarm circuit

The output relay connection of T2 alarm circuit is presented on following Fig. 8:



**Fig. 8: T2 relay on no alarm conditions (normally disabled)**

T1 relay operates a commutation when HT950N measures a temperature over T2 threshold, after a delay time of **50 seconds**.

#### 5.3. MESSAGES ON POWER-ON

<b>r_ N</b>	This message appear for about 2 seconds on principal display to indicate the realise of internal firmware of meter. N show the version number.
<b>Ht 950</b>	This message is fixed on PARA and SET display and show the model of meter. Press <b>ALT.T.</b> or <b>T.MAX</b> key followed by <b>ENT.</b> key to disappear message.

#### 5.4. SETUP OF ALARM THRESHOLDS

On HT950N meter it's possible to set up to four alarm thresholds with values within all measure range. The sequence of programmable parameters presented cyclically by meter is the following:

**T2 → T1 → UF → UA**

Parameters setup is possible using **PARA** and arrows keys [**◀**], [**▲**], [**▼**] with the following procedure:

1. Power on HT950N meter.
2. Press **PARA** key. On PARA display appear "t2" message and on SET display is shown the last programmed T2 value.
3. Press [**◀**] key to move cursor on units, tenths or hundreds values on SET display.
4. Press [**▲**] key to increase the parameter value variable from 0 to 9 as for units as for tenths and from 0 to 1 for hundreds.
5. Press [**▼**] key to decrease the parameter value up to 0, minimum value for units, tenths and hundreds.
6. Press **ENT.** key to confirm T2 value. HT950N automatically present the following "t1" parameter.
7. Repeat the previous steps from 1 to 6 for fix the threshold values of T1, UF and UA parameters.
8. Press **ENT.** key to exit from last item **C\_End** and return on normal measurement.

#### WARNING



- Range of possible values for T2, T1, UF, UA parameters is from 0°C to 199°C.
- The set values of parameters are maintained on memory meter also when instrument power off.
- HT950N don't execute any measure and don't show any value at principal display during temperature threshold setup.
- For >200°C temperature measure the meter always show the "200" value on principal display. For temperature value > 230°C on principal display is shown the "- - -" message of disabled probes and T1 relay open the circuit.

### 5.4.1. Example of HT950N meter setup

In the following Fig. 9 is possible to see a simple example diagram with programmable parameters T1, T1, UA, UF, with relative meaning.

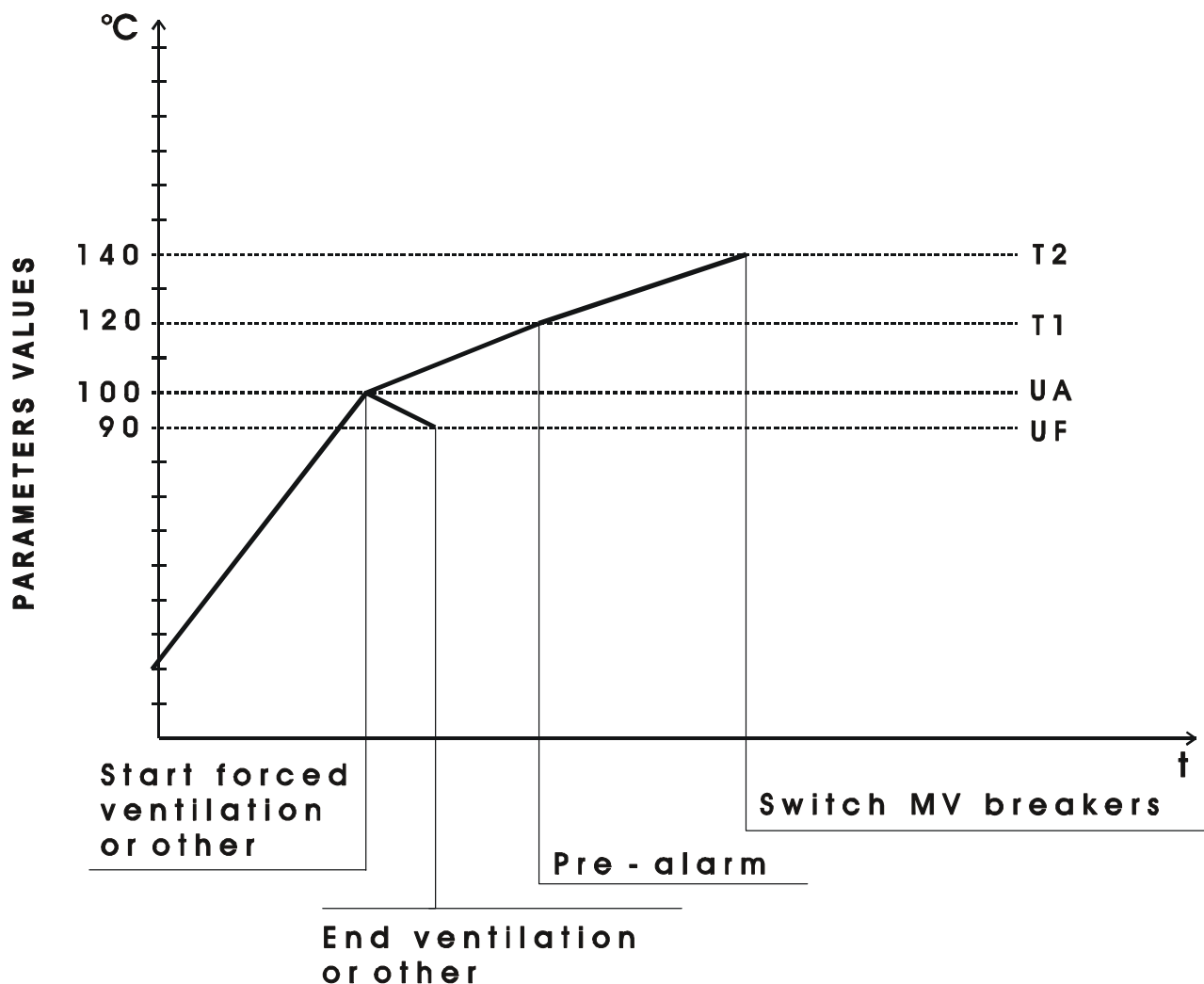


Fig. 9: Example of HT950N meter setup

### 5.5. CLEAR OF RECORDED MAX TEMPERATURE VALUE

To execute clear of maximum value of temperature recorded by HT950N meter, do the following procedure:

1. Press **T.MAX** key to show the maximum temperature value on PARA and SET display.
2. Press [**▼**] key before both display lights off. On SET display compare 00 value.
3. From this instance the meter start to recording new maximum values.

## 5.6. SETUP OF INPUT PROBES NUMBER

Default internal setup of HT950N meter consists on activation of 3 Pt100 probes only (2U, 2V, 2W). To modify this number operate in following way:

- Press **PARA** key until message **C\_End** compare on SET display.
- Press [**◀**] key. On SET display the digit “d” starts to blinking.
- Press [**▲**] or [**▼**] key and setting the “111” number onset display. Press **ENT.** key to confirm.
- On PARA and SET display compare respectively the item “**CE nn**” where “nn” is a two digits number with value from 01 to 15. Modify this number with arrows key [**▲**] or [**▼**] on base of following Table 2 to obtain the desired inputs:

CE	C1 (2U)	C2 (2V)	C3 (2W)	C4 (1F)
01	ON			
02		ON		
03	ON	ON		
04			ON	
05	ON		ON	
06		ON	ON	
07	ON	ON	ON	
08				ON
09	ON			ON
10		ON		ON
11	ON	ON		ON
12			ON	ON
13	ON		ON	ON
14		ON	ON	ON
15	ON	ON	ON	ON

**Table 2: Setup number of input probes of HT950N**

- Confirm the operation with **ENT.** key which guarantee the save of desired inputs and the exit to normal measurement, at the same time.

## 6. PREVENTIVE MAINTENANCE

### 6.1. GENERAL INFORMATION

1. This digital meter is a precision instrument. Whether in use or in storage, please do not exceed the specification requirements to avoid any possible damage or danger during use.
2. Do not place this meter in high temperature or expose to direct sunlight.

### 6.2. CLEANING

For cleaning the instrument use a soft dry cloth. Never use a wet cloth, solvents or water, etc.

## 7. TECHNICAL SPECIFICATIONS

### 7.1. TECHNICAL CHARACTERISTICS

#### 7.1.1. Inputs characteristics

Inputs:	from 1 to 4 PT100 DIN 3-wires
Accuracy:	$\pm(0.5\% \text{ rdg} + 1 \text{ dgt})$
Range:	$0 \div 200^{\circ}\text{C}$
Compensation line resistance:	automatically

#### 7.1.2. Output characteristics

Outputs:	3 independent relays free of voltage
Current::	5 A
Nominal voltage:	250 V
Max. commutable voltage:	250 V
Nominal AC1 power :	1250 VA

#### 7.1.3. Safety characteristics

Safety:	EN 61010
Overvoltage category:	CAT III 300V
Insulation:	Class 2, double insulation
Pollution degree:	2
Internal use, max altitude:	2000m

#### 7.1.4. General characteristics

##### Mechanical characteristics

Case:	plastic auto-extinguish (Noryl)
Dimensions:	96(L) x 96(W) x 110(H) mm
Weight:	about 800g

##### Power supply

AC/DC:	24 – 240 V DC/AC
Frequency:	DC or 50/60Hz
Consumption:	< 10VA

##### Display

Characteristics:	3 red LED (12x17mm); 2+3 red LED (10x12mm)
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### 7.2. ENVIRONMENTAL CONDITIONS

#### 7.2.1. Climatic conditions

Operating temperature:	$-10 \div 50^{\circ}\text{C}$
Operating humidity:	< 70% RH
Storage temperature:	$-20 \div 70^{\circ}\text{C}$
Storage humidity:	< 80% RH

#### 7.2.2. EMC

This tester was designed in accordance with EMC standards in force and its compatibility has been tested in accordance with EN61326-1 (1997) + A1 (1998) + A2 (2001).

### 7.3. ACCESSORIES

#### 7.3.1. Standard accessories

- HT950N meter with the following:
  - No.8 extractable connectors for Pt100, output relays, power supply.
  - No 1 EMC filter for power supply cable.
  - No 2 connectors for fixing on panel with screws.
- User's manual

## 8. SERVICE

### 8.1. WARRANTY CONDITIONS

This equipment is guaranteed against material faults or production defects, in accordance with the general sales conditions. During the warranty period (one year), faulty parts may be replaced. The manufacturer reserves the right to decide either to repair or replace the product.

In case of returning of the instrument, all transport charges must be paid by the customer. The instrument must be accompanied by a delivery note indicating the faults or reasons of returning. The returned tester must be packed in its original box. Any damage occurred in transit because of lack of original packaging will be debited to the customer.

The manufacturer is not responsible for any damage against persons or things.

The warranty won't be applied to the following cases:

- faults due to improper use of the equipment
- faults due to combination of the tester with incompatible equipment.
- faults due to improper packaging.
- faults due to servicing carried out by a person not approved by the company.
- faults due to modifications made without explicit authorization of our technical department.
- faults due to adaptation to a particular application not provided for by the definition of the equipment or by the instruction manual.

The contents of this manual cannot be reproduced in any form without our authorization.

<b>Our products are patented. Our logotypes are registered. We reserve the right to modify characteristics and prices further to technological developments.</b>
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### 8.2. SERVICE

If the equipment doesn't work properly, before contacting the SERVICE, test cables and Pt100 state and change them if necessary.

If the equipment still doesn't work, make sure that your operating procedure complies with the one described in this manual.

In case of returning of the instrument, all transport charges must be paid by the customer.

The instrument must be accompanied by a delivery note indicating the faults or reasons of returning. The returned tester must be packed in its original box. Any damage occurred in transit because of lack of original packaging will be debited to the customer.





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