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## INTRODUCTION

New **DH96-TMP** has been designed to measure temperature any of following sensors: Pt100, Pt200, Pt500, Pt1000 or thermocouple type: B, E, J, K, N, R, S, T. Temperature can be displayed as °C, °F, or K.

This **DH96-TMP** is equipped with 5 red digits display. Parameters of the instrument are user programmable by means of four frontal key-board.

Instrument permits to save peak and valley values into an internal **EEPROM** memory. This storage process is even performed in case of power supply failure.

The choice of input transducer type is done through jumpers on main board and through key-board.

The easy and intuitive set up process of digital instrument enables the user to quickly familiarize with their operation mode, for the modification of diverse configuration options with no need to consult this manual again.

Digital indicators of the **DH96** Series have been designed to offer a wide range of specifications and features in a compact and heavy duty device, thus allowing their operation within any industrial environment meeting all the requirements and standards currently established.

### Expansion modules

Indicator's standard features can be expanded with the use of optional pluggable cards. Available expansion cards are:

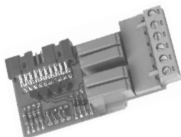
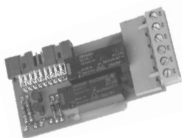
- Cards equipped with 2 alarm relay outputs.
- Cards equipped with 4 alarm relay outputs.
- Cards equipped with **RS-485** serial communication output (**MODBUS** Protocol, **RTU** mode).
- Cards equipped with **RS-232** serial communication output (**MODBUS** Protocol, **RTU** mode)
- Cards equipped with 2 alarm relay outputs + RS 485 / 232 communication output
- Cards equipped with 4 alarm relay outputs + RS - 485 / 232 communication output
- Cards equipped with analog output.
- Cards equipped with 2 alarm relay outputs + Analog Output

The instrument is equipped with a connector for the card input.

## CARDS SPECIFICATIONS

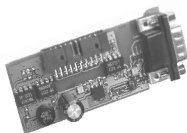
### Cards equipped with 2 or 4 alarm relay.

- Trip for maximum and minimum condition.
- Trip pick-up and drop-off relay user-configurable.
- Hysteresis user configurable between 1 and 99999 seconds
- Optional trip latch
- Optional operation mode with failure safety function.



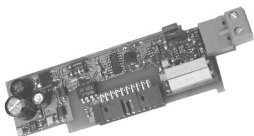
### Cards equipped with RS-485 or RS-232 serial communication output

- Communications protocol **MODBUS**.
- Slave address user-configurable.
- Baud rate set up: 1200, 4800, 9600 y 19200 bit/s.
- Parity set up: (even, odd or without parity bit)
- Stop bits, 1 or 2 bit stop selectable.



### Cards equipped with Analog Output

- User selectable no shifted output: (0-20mA, 0-10V)
- User selectable no shifted output: (4-20mV, 2-10V)
- User configurable output range regarding to the reading.



## TECHNICAL SPECIFICATIONS

### Auxiliar supply

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Rated value:	115 V ó 230 V (-15%, +20%)
Frequency range:	45 a 65 Hz
Burden:	4 VA (without optional card) 7 VA (maximum burden)

### Display

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7 segments  
5 digits (high 14 mm)  
Hi-efficacy red colour  
Over-range thermocouple or broken  
RTD's transducers indication:  
"OUT.rG"  
3 alarm Led indication.  
Programmable decimal point.

### Input circuit

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A/D converter resolution:	16bits
Conversion method:	[-] ADC
Samplingrate:	32.768kHz
Low Band filters type:	(sin(x)/x) <sup>3</sup>
50Hz Rejection:	- 93dB
60Hz Rejection:	- 74dB

#### Thermocouple

Cold-junction compensation	-40°C a +125°C
Accuracy:	0.1%±1digits

#### Measurementrange:

Type B	250°C to 1800°C
Type E	- 200°C to 1000°C
Type J	- 210°C to 1200°C
Type K	- 200°C to 1372°C
Type N	- 200°C to 1300°C
Type R	- 50°C to 1768°C
Type S	- 50°C to 1768°C
Type T	- 200°C to 400°C
Algorithm:	Polynomial coefficients as NIST(National Institute of standards and technology) ITS 90

#### Pt100, Pt200, Pt500, Pt1000

Current excitation:	200µ A
Accuracy:	0.1%±1digit
Measurement Range :	- 129° C to 850°C
Connection type:	3 wires
Algorithm:	Callendar-Van Dusen
Standard:	IEC 751-1983, DIN43760(1980)

### Isolation

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Between input circuit, measurement circuit and output circuit (relays, analog, RS232 or RS485)

Test voltage:	3 kV RMS 50Hz during 1 minute
Pulse test:	4 kV ( 1.2 / 50ms )

### Environmental conditions

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Storage temperature:	-40 °C ... + 70 °C
Operation temperature:	-10 °C ... + 65 °C

### Relay characteristics

### 1 commuted contact

---

Rated a.c. current:	8 A
Maximum a.c. current:	10 A
Rated Voltage:	250 V c.a. 50 Hz
Maximum voltage (VDE 0435):	440 V c.a.
Maximum a.c resistive load :	2000 VA
Isolation resistance at 500 V:	> 10 <sup>4</sup> MΩ
Contact-coil isolation:	6000 V c.a.
Contact-contact isolation:	1000 V c.a.
Mechanical endurance	> 20 x 10 <sup>6</sup> operations
Electrical endurance:	> 2 x 10 <sup>6</sup> operations at 5 A and 35 V

### Relay characteristics

### 1 single contact

---

Rated a.c. current:	5 A
Maximum a.c. current:	5 A
Rated Voltage:	250 V c.a. 50 Hz
Isolation resistance at 500 V:	> 1000 MΩ
Contact-coil isolation:	2000 V c.a. - 1 min
Contact-contact isolation::	1000 V c.a. - 1 min
Mechanical endurance	> 20 x 10 <sup>6</sup> operations
Electrical endurance:	> 100 x 10 <sup>3</sup> operations

### General characteristics

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Dimensions:	96 x 48 x 138 mm
Weight:	550 g
Case material:	Self-exting. ABS, anthracite grey
Protection index:	Frontal: IP54 IP65 with optional FIP Case: IP20 Terminals: IP20

### Design standards

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IEC 1010 / IEC 348 / IEC 664  
IEC 801 / VDE 0110 / VDE 0435  
EN 50081-2 / EN 50082-2 / IEC 751  
ITS-90 / DIN 43760

## SAFETY WARNINGS

### 1. Information and warning texts

The **DH96** meets protection **class I**.

- It has ground terminal.
- Case is not dangerous to tactile touching (isolation material)
- Screws terminals are not accessible for human appendix

This instrument has been designed and tested to meet **IEC 348** standard and is factory-shipped in proper conditions. The manual you hold in your hands contains information and warnings that the user should respect in order to guarantee a proper operation of all of the instrument functions and keep its safety conditions.

#### 1.2 Installation

The instrument is for indoor use. It could be occasionally subjected to temperatures between +75 °C and 10 °C keeping its safety conditions.

The instrument must not be powered and used until its final assembly on the board. Before powering the instrument, its grounding terminal must be connected to a suitable protection conductor.

#### 1.3 Warning!

Any interruption of the protection conductor, either inside or outside the instrument, or the disconnection of the protection grounding terminal might imply a dangerous situation; therefore, any intentional interruption is totally forbidden.

### 1.4 Adjustment, element replacement and repairing actions

With the instrument powered on, the terminals could be dangerous to touching and cover opening actions may allow accessing dangerous parts. Therefore, before any adjustment, replacement, maintenance or repairing operation is carried out, the instrument must be disconnected from any power supply source.

No adjustment, maintenance or repairing operation should be done over the instrument open and powered and, should those are essential, high-qualified operators must perform them.

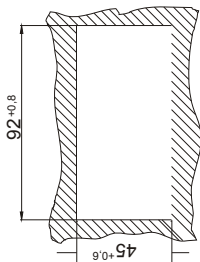
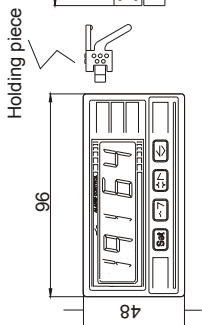
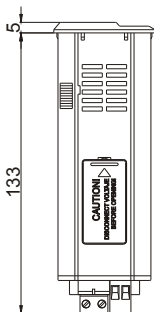
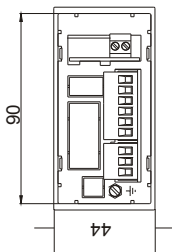
Check that fuses used for replacing damaged ones match required types and rated currents. The use of improvised fuses or to short-circuit fuse bases is totally avoided.

#### 1.5 Defects and malfunction

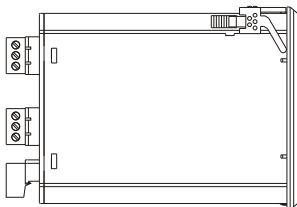
When any protection failure is suspected to exist, the instrument must be immediately put out of service. The protection could be damaged whether:

- You can see damages on the case.
- It cannot perform proper measurements.
- Storage conditions were not the suitable ones.
- Any damage in transit occurred.

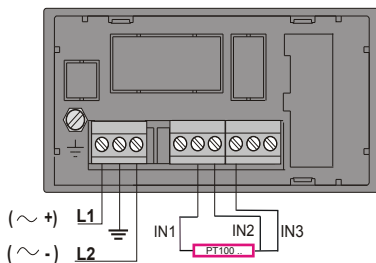
# DIMENSIONS



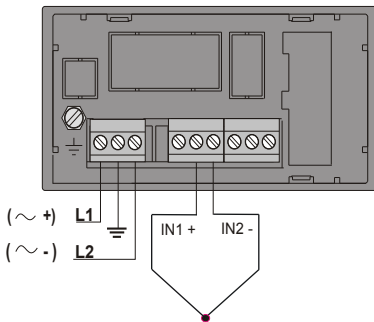
Panel cut-out



**WIRING DIAGRAM : PT100, PT200, PT500, PT1000**



**WIRING DIAGRAM THERMOCOUPLES: B, E, J, K, N, R, S, T**



## INPUT TYPE SETUP

### Input configuration

**DH96-TMP** instrument measures temperature through transducers RTD (Pt100, Pt200, Pt500, o Pt1000) or thermocouples (B, E, J, K, N, R, S, T)

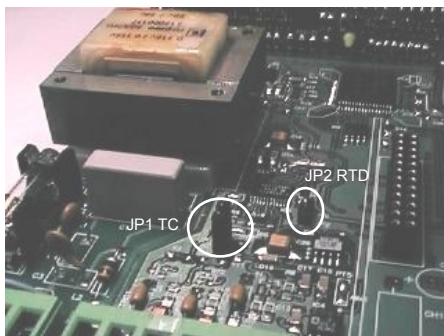
When thermocouples are used, a cold-junction compensation is made by a thermocouple sensor located next to input terminals.

Sensor type would be selected through inside jumpers. To select desired sensor proceed as below pictures say.

Jumper JP2 RTD, for Pt100, Pt200, Pt500 o Pt1000, sensors.

Jumper JP1 TC, for thermocouplesensors

**Note:** Default configuration is K thermocouple.



## PLUGGIN CARDS

**WARNING:** Insure that no coming wire is connected to the instrument before doing any work on the equipment, since failure to observe this practice can result in equipment damage and even serious injury.

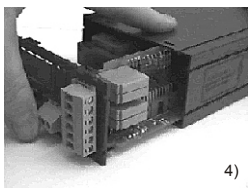
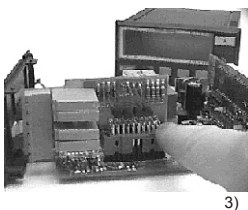
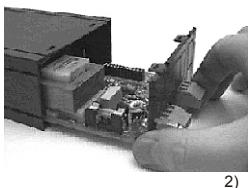
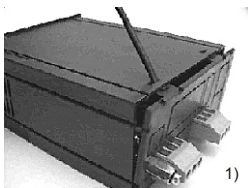
**Proceed as below pictures show.**

1) Press the case holding piece with a screwdriver or a similar tool in order to release the base from the rest of the case.

2) Remove the set composed by the base and circuits by pulling the base and carefully sliding it out.

3) Insert the card into the appropriate connector. Take care that only the connector is press but not all the card.

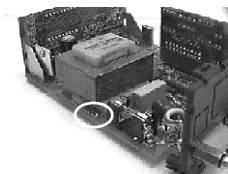
4) Put the set composed by the base and circuits in again by pushing the base and carefully sliding it into. When the set is totally inserted, press until the case holding pieces are fitted into the pertinent holes.



## AUXILIARY SUPPLY MODIFICATION

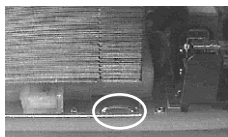
Instrument is manufacture to be energized at 230Va.c. , but it is possible to change to 115 Va.c following instructions below mentioned.

To perform this modification , open the instrument case ( see page 10 "Pluggin cards"), thoughtfully following all safety warnings (see section 1.4 at page 6) and identify referred zone in figure 1.



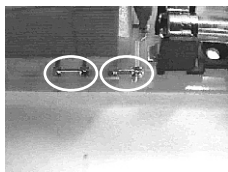
il. 1

For auxiliary supply of 230 Va.c. only the jump labelled as 1 must be done (figure 2)



il. 2

On the contrary, if an auxiliary supply of 115V is required, only jumps labelled as 2 and 3 must be done (figure 3)



il. 3

## KEYBOARD FUNCTIONS

### Programming



Pressing this key during at least 3 seconds, set-up menus are accessed for user-configuration actions. Once within the set-up menus, use this key to validate choices and modifications.

### Peak and Valley



Pressing this key the maximum and minimum values monitored are displayed.

### Reset Peak and Valley values



To delete the peak or valley value just press this key during 3 sec. while the value is on screen.

### Default set-up values



Pressing this key during at least 5 sec., default set-up values replace user-configured ones

### Password



Pressing simultaneously both keys when the instrument is powered on, a 5 digit password can be set in order to control the access configuration options. To disable this password, reset the instrument and simultaneously press again both keys when powering it. Enter the set password and menus will be accessible again.

**Note:** The password must be always entered twice, the first one for definition and the second one for confirmation. In case that the confirmation does not match with the firstly defined password, the instrument will continue its initialization process.

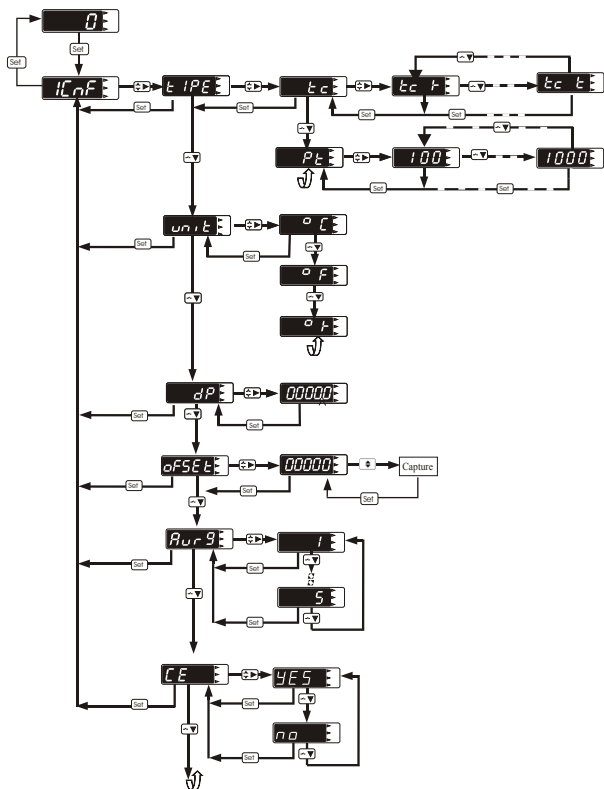
Besides **DH96 TMP** offers another security level against parameter modification. That way, option **CE**, with options **YES** or **NO**, is shown at the end of any menu group.

In case that, for instance, along the configuration of all the instrument's parameters, the option **CE** has been always set at **NO**, no parameter will be allowed to be modified when entering again into set up unless this option is reached and set at **YES**.

## SETUP INTRODUCTION

The **DH-96** has an easy and intuitive configuration procedure. The instrument configuration can be carried out in a logical mode through a tree-type menu.

# CONFIGURATION



TYPE

---

**Sensor type**

---

Input can be selected among following sensor types: PT100, PT200, PT500, PT1000 or thermocouple (B, E, J, K, N, R, S, T)

unit

---

**Units used**

---

Temperature can be displayed in °C or °F or K units

dp

---

**Decimal point**

---

Set here the required position of decimal point when the measurement is displayed on screen.

offset

---

**Offset**

---

Set here offset value using keyboard or using temperature capture function, in which it will set measured temperature.

Average

---

**Average**

---

Set here number of samples to do the average, from 1 to 5.

CE

---

**Configuration enable**

---

Set at *no* it avoids any modification of the above parameters. Set at *yes* it enables their modification.

