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Dichiarazione di Conformità
declaration of conformity

PRODUTTORE:
PRODUCT MANUFACTURER: CD Automation S.R.L.

INDIRIZZO:
ADDRESS: Via Pablo Picasso 34//36
20025 Legnano (Mi)
Italia

Dichiara che il prodotto:
declare that the product:

Revo TC

SODDISFA I REQUISITI DELLA NORMA:
FULFILS THE REQUIREMENTS OF THE STANDARD:

Specifica di sicurezza EN60947-1:2008
EN60947-4-3:2001
Specifica sulle emissioni EN60947-4-3:2000
Specifica sulle Immunità EN60947-4-3:2000

Electrical safety Standard EN60947-1:2008
EN60947-4-3:2001
Generic Emission standard EN60947-4-3:2000
Generic Immunity standard EN60947-4-3:2000

CDAutomation dichiara che I prodotti sopra menzionati sono conformi alla direttiva
CDAutomation declares that The products above mentioned they are conforming to the directive

EMC 2004/108/CEE e alla direttiva Bassa Tensione (low Voltage) 2006/95/CEE

DESCIZIONE DEL PRODOTTO:
PRODUCT DESCRIPTION:
Unità di controllo potenza elettrica
Elettric power control

UTILIZZO:
SCOPE OF APPLICATION:
Controllo processi termici
Thermal control process

Data di emissione: 20/04/2010
Issued on: 20/04/2010

Amministratore Unico e
Legale Rappresentante
Claudio Brizzi
1 Important warnings for safety

This chapter contains important information for the safety. The not observance of these instructions may result in serious personal injury or death and can cause serious damages to the Thyristor unit and to the components system included. The installation should be performed by qualified persons.

The Thyristor unit are integral part of industrial equipments. When it is supply, the Thyristor unit is subject to dangerous tensions.

- Don't remove the protection Cover.
- Don't use these unit in aerospace applications and/or nuclear.

The nominal current corresponds to use at temperature not superior to 45°C.

- The Thyristor unit must be mounted in vertical position and without obstruction above and below to allow a good flow ventilation.
- The hot air of one thyristor unit must not invest the unit positioned above.
- For side by side placed leave a space of 15mm between the unit.

A suitable device must ensure that the unit can be electrically isolated from the supply, this allows the qualified people to work in safety.

Protection (Protection, Protezione)
The unit have IP20 protection rating as defined by the specific international. Is necessary consider the place of installation.

Earth (Terre, Messa a terra)
For safety, the Thyristor unit with isolated heat-sink must be connected to earth. Earth impedance should be correspondent to local earth regulation. Periodically the earth efficiency should be inspected.

Electronic supply (Alimentation électronique, Alimentazione elettronica)
The electronic circuit of the Thyristor unit must be supplied by dedicated voltage for all electronic circuits and not in parallel with coil contactors, solenoids and other. It's recommended to use a shielded transformer.

Electric Shock Hazard (Risque de choque électrique, Rischi di scosse elettriche)
When the Thyristor unit is energized, after the power supply is shut off, wait least a minute for allow the discharge of the internal capacitors where there is a dangerous tension. Before working, make sure that:

- Only authorized personnel must perform maintenance, inspection, and replacement operations.
- The authorized personnel must read this manual before to have access to the unit.
- Unqualified People don't perform jobs on the same unit or in the immediate vicinities.
Important warnings (Attention, Avvertenze importanti)
During the operations with units under tension, local regulations regarding electrical installation should be rigidly observed:

- Respect the internal safety rules.
- Don't bend components to maintain insulation distances.
- Protect the units from high temperature humidity and vibrations.
- Don't touch components to prevent electrostatic discharges on them.
- Verify that the size is in line with real needs.
- To measure voltage current etc. on unit, remove rings and other jewels from fingers and hands.
- Authorized personnel that work on thyristor unit under power supply voltage must be on insulated board.

This listing does not represent a complete enumeration of all necessary safety cautions.

Electromagnetic compatibility
(Compatibilità életromagnétique, Compatibilità elettromagnetica)
Our thyristor units have an excellent immunity to electromagnetic interferences if all suggestions contained in this manual are respected. In respect to a good Engineering practice, all inductive loads like solenoids contactor coils should have a filter in parallel.

Emissions (Emission, Emissioni)
All solid-state power controllers emit a certain amount of radio-frequency energy because of the fast switching of the power devices.
The CD Automation's Thyristor unit are in accord with the EMC norms, CE mark. In most installations, near by electronic systems will experience no difficulty with interference. If very sensitive electronic measuring equipment or low-frequency radio receivers are to be used near the unit, some special precautions may be required. These may include the installation of a line supply filter and the use of screened (shielded) output cable to the load.

2 Note

Warning: This icon is present in all the operational procedures where the Improper operation may result in serious personal injury or death

Caution: This icon is present in all the operational procedures where the Improper operation can cause damage for the unit.

CD Automation reserves the right to modify the own products and this manual without any advise.
3 Identification and Order Code

3.1 Identification of the unit

Caution: Before to install, make sure that the Thyristor unit have not damages. If the product has a fault, please contact the dealer from which you purchased the product.

The identification's label give all the information regarding the factory settings of the Thyristor unit, this label is on the unit, like represented in figure. Verify that the product is the same thing as ordered.
### REVO TC

#### 3. Phase Controlled

<table>
<thead>
<tr>
<th>Description</th>
<th>Numeric code</th>
<th>Description</th>
<th>Numeric code</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHASE UNIT 1PH</td>
<td>1</td>
<td>PHASE UNIT 2PH</td>
<td>2</td>
</tr>
<tr>
<td>PHASE UNIT 3PH</td>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 4. Phase Current 1PH/2PH/3PH

<table>
<thead>
<tr>
<th>Description code</th>
<th>Numeric code</th>
<th>Description code</th>
<th>Numeric code</th>
</tr>
</thead>
<tbody>
<tr>
<td>30A</td>
<td>0 3 0</td>
<td>35A</td>
<td>0 3 5</td>
</tr>
<tr>
<td>40A</td>
<td>0 4 0</td>
<td>60A</td>
<td>0 6 0</td>
</tr>
<tr>
<td>90A</td>
<td>0 9 0</td>
<td>120A</td>
<td>1 2 0</td>
</tr>
<tr>
<td>150A</td>
<td>1 5 0</td>
<td>180A</td>
<td>1 8 0</td>
</tr>
<tr>
<td>210A</td>
<td>2 1 0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 7. Max Voltage

<table>
<thead>
<tr>
<th>Description code</th>
<th>Numeric code</th>
<th>Description code</th>
<th>Numeric code</th>
</tr>
</thead>
<tbody>
<tr>
<td>480V</td>
<td>4</td>
<td>600V</td>
<td>6</td>
</tr>
</tbody>
</table>

#### 8. Aux. Voltage supply

<table>
<thead>
<tr>
<th>Description code</th>
<th>Numeric code</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:24V ac dc</td>
<td>4</td>
</tr>
</tbody>
</table>

#### 9. Input

<table>
<thead>
<tr>
<th>Description</th>
<th>Numeric code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermocouple</td>
<td>T</td>
</tr>
<tr>
<td>PT 100</td>
<td>N</td>
</tr>
<tr>
<td>0:10V dc</td>
<td>V</td>
</tr>
<tr>
<td>4:20mA</td>
<td>A</td>
</tr>
</tbody>
</table>

#### 10. Output 2

<table>
<thead>
<tr>
<th>Description code</th>
<th>Numeric code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relay Output 2</td>
<td>R</td>
</tr>
<tr>
<td>Heating Only</td>
<td>0</td>
</tr>
</tbody>
</table>

#### 11. Output 3

<table>
<thead>
<tr>
<th>Description code</th>
<th>Numeric code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 off D/I 24v d.c.</td>
<td>1</td>
</tr>
<tr>
<td>1 off D/O Relay contact</td>
<td>2</td>
</tr>
</tbody>
</table>

#### 12. Fuse & Option

- For All Units <= 40A
- Fuse + Fuseholder
- Fuse + Fuseholder + TA
- Fuse + Fuseholder + TA + HB with screw terminal
- Fuse + Fuseholder + TA + HB with Flat Cable
- For All Units > 40A
- Fixed Fuse Standard
- Fixed Fuse + TA
- Fixed Fuse + TA + HB

#### 13. 110 Fan Option

<table>
<thead>
<tr>
<th>Description code</th>
<th>Numeric code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without fan unit &lt; 90A</td>
<td>0</td>
</tr>
<tr>
<td>With Fan at 110V</td>
<td></td>
</tr>
<tr>
<td>Unit &gt; 90A</td>
<td></td>
</tr>
<tr>
<td>With 220V Fan Unit &gt; 90A</td>
<td>2</td>
</tr>
</tbody>
</table>

#### 14. Approvals

- CE EMC For European Market: 0
- cUL For American Market up to 210A: L

#### 15. Manual

- Italian Manual: 1
- English Manual: 2
- German Manual: 3
- French Manual: 4

#### 16. Version

- Standard unit with a single fuse: 1
- Unit with 2 Fuses + Fuse Holder <= 40A (Just on single phase units): 2
- Units with 2 Fuses + Fuses + Fuse Holder <= 40A (Available with single-phase units): 3

**Legend**

- CT = Current Transformer
- HB = Heater Break Alarm

**Note (1):** Fixed fuses over 40A
4 Technical Specifications

4.1 Environmental installation conditions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temperature</td>
<td>0-40°C at nominal current. Over 40°C use the derating curve.</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-25°C to 70°C</td>
</tr>
<tr>
<td>Installation place</td>
<td>Don’t install at direct sun light, where there are conductive dust, corrosive gas, vibration or water and also in salty environmental.</td>
</tr>
<tr>
<td>Altitude</td>
<td>Up to 1000 meter over sea level. For higher altitude reduce the nominal current of 2% for each 100m over 1000m</td>
</tr>
<tr>
<td>Humidity</td>
<td>From 5 to 95% without condense and ice</td>
</tr>
<tr>
<td>Pollution Level</td>
<td>Up to 2nd Level ref. IEC 60947-1 6.1.3.2</td>
</tr>
</tbody>
</table>

4.2 Derating Curve

5 Installation

Before to install, make sure that the Thyristor unit have not damages.
If the product has a fault, please contact the dealer from which you purchased the product. Verify that the product is the same thing as ordered.
The Thyristor unit must be always mounted in vertical position to improve air cooling on heat-sink.
Maintain the minimum distances in vertical and in horizontal as represented.
When more unit has mounted inside the cabinet maintain the air circulation like represented in figure.
Sometimes is necessary installing a fan to have better air circulation.
5.1 Dimensions and Weight

<table>
<thead>
<tr>
<th></th>
<th>W(mm)</th>
<th>H(mm)</th>
<th>D(mm)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>REVO TC 1PH</td>
<td>72</td>
<td>121</td>
<td>185</td>
<td>1.15</td>
</tr>
</tbody>
</table>

5.2 Fixing holes
6 Wiring instructions

Warning: Before connecting or disconnecting the unit check that power and control cables are isolated from voltage sources.

6.1 Out Terminal (Terminal block M1)

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Description</th>
<th>SSR Out</th>
<th>DI Input</th>
<th>Relay Out</th>
<th>Digital Input/Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>OUT4</td>
<td>SSR−</td>
<td>DI2</td>
<td>C</td>
<td>DI/O 2</td>
</tr>
<tr>
<td>2</td>
<td>OUT4</td>
<td>SSR+</td>
<td>DI2</td>
<td>NO</td>
<td>DI/O 2</td>
</tr>
<tr>
<td>3</td>
<td>OUT3</td>
<td>SSR−</td>
<td>DI1</td>
<td>C</td>
<td>DI/O 1</td>
</tr>
<tr>
<td>4</td>
<td>OUT3</td>
<td>SSR+</td>
<td>DI1</td>
<td>NO</td>
<td>DI/O 1</td>
</tr>
<tr>
<td>5</td>
<td>OUT2</td>
<td>SSR−</td>
<td></td>
<td>C</td>
<td>_</td>
</tr>
<tr>
<td>6</td>
<td>OUT2</td>
<td>SSR+</td>
<td></td>
<td>NO</td>
<td>_</td>
</tr>
<tr>
<td>7</td>
<td>TA</td>
<td>_</td>
<td></td>
<td>_</td>
<td>_</td>
</tr>
<tr>
<td>8</td>
<td>TA</td>
<td>_</td>
<td></td>
<td>_</td>
<td>_</td>
</tr>
<tr>
<td>9</td>
<td>OUT1</td>
<td>SSR−</td>
<td></td>
<td>C</td>
<td>_</td>
</tr>
<tr>
<td>10</td>
<td>OUT1</td>
<td>SSR+</td>
<td></td>
<td>NO</td>
<td>_</td>
</tr>
</tbody>
</table>

“-” = Not available

6.2 Supply Terminal (Terminal block M2)

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Supply 24Vdc/ac</td>
</tr>
<tr>
<td>12</td>
<td>Supply 24Vdc/ac</td>
</tr>
</tbody>
</table>

6.3 Communication Terminal RS485 (Terminal block M3)

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>RS485 A +</td>
</tr>
<tr>
<td>B−</td>
<td>RS485 B -</td>
</tr>
</tbody>
</table>

6.4 Input Terminal (Terminal block M4)

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>PT100</td>
</tr>
<tr>
<td>14</td>
<td>PT100</td>
</tr>
<tr>
<td>15</td>
<td>Compensazione</td>
</tr>
</tbody>
</table>

V+ mA+ V- mA-
6.5 Connection Diagram

Revo TC Basic:

Revo TC with flat wiring system Option:
Caution: this procedure must be performed only by qualified persons.

* See Out terminal chapter for more informations

*2 Only with flat wiring system Option: connect with proper cable (RJ45 Cat 5E Patch Cable UTP) as shown:
The cables supplied by CD Automation are

<table>
<thead>
<tr>
<th>Length</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>0,15 m</td>
<td>ICOC U5EB-001</td>
</tr>
<tr>
<td>0,3 m</td>
<td>ICOC U5EB-003-GREE</td>
</tr>
<tr>
<td>0,5 m</td>
<td>ICOC U5EB-005-GREE</td>
</tr>
<tr>
<td>1 m</td>
<td>ICOC U5EB-010-GREE</td>
</tr>
<tr>
<td>2 m</td>
<td>ICOC U5EB-020-GREE</td>
</tr>
<tr>
<td>3 m</td>
<td>ICOC U5EB-030-GREE</td>
</tr>
<tr>
<td>5 m</td>
<td>ICOC U5EB-050-GREE</td>
</tr>
<tr>
<td>7,5 m</td>
<td>ICOC U5EB-075-GREE</td>
</tr>
<tr>
<td>10 m</td>
<td>ICOC U5EB-100-GREE</td>
</tr>
<tr>
<td>15 m</td>
<td>ICOC U5EB-150-GREE</td>
</tr>
</tbody>
</table>

6.6 Access to Ln – Tn terminal Screw

1. Open fuse holder by pulling the frontal cover

2. Fix the wire on Ln

3. Fix the wire on Tn

4. Close the cover by pressing.
7 TU Module Basic

Revo TU is a termination unit that provides the power supply and RS485 comms (modbus RTU) for up to max 10 REVO TC units.

Terminal block M1

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RS485 B -</td>
</tr>
<tr>
<td>2</td>
<td>RS485 A +</td>
</tr>
<tr>
<td>3</td>
<td>Global Output</td>
</tr>
<tr>
<td>4</td>
<td>Global Output</td>
</tr>
</tbody>
</table>

Terminal block M2

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Not Used</td>
</tr>
<tr>
<td>6</td>
<td>Supply 24Vdc/ac</td>
</tr>
<tr>
<td>7</td>
<td>Supply 24Vdc/ac</td>
</tr>
</tbody>
</table>

Terminal Block M3 for flat wiring system
## 8 Control Panel

The keyboard is composed of **four push button** properly identified and protected: depending on the status of each device button assumes a specific function, as described below.

<table>
<thead>
<tr>
<th>Text or Combination</th>
<th>Description of function associated</th>
</tr>
</thead>
<tbody>
<tr>
<td>▲</td>
<td>Configuration and operational</td>
</tr>
<tr>
<td></td>
<td>Skip to next parameter or group</td>
</tr>
<tr>
<td></td>
<td>Configuration and ongoing operational and edit</td>
</tr>
<tr>
<td></td>
<td>Increases the value of the parameter currently displayed</td>
</tr>
<tr>
<td></td>
<td>Operating with manual output</td>
</tr>
<tr>
<td>▼</td>
<td>Configuration and operational</td>
</tr>
<tr>
<td></td>
<td>Skip to the previous group or parameter</td>
</tr>
<tr>
<td></td>
<td>Configuration and ongoing operational and edit</td>
</tr>
<tr>
<td></td>
<td>Decreases the value of the parameter currently displayed</td>
</tr>
<tr>
<td></td>
<td>Operating with manual output</td>
</tr>
<tr>
<td></td>
<td>Operating</td>
</tr>
<tr>
<td></td>
<td>Release</td>
</tr>
<tr>
<td></td>
<td>Avoid the Change of the value displayed through the upper LCD.</td>
</tr>
<tr>
<td></td>
<td>Accept the changed value</td>
</tr>
<tr>
<td>FUNC</td>
<td>Operating</td>
</tr>
<tr>
<td></td>
<td>T&gt; 3 sec</td>
</tr>
<tr>
<td></td>
<td>Special Views: load current, leakage current, heating power, the cooling power, firmware version.</td>
</tr>
<tr>
<td>MAN</td>
<td>Configuration</td>
</tr>
<tr>
<td></td>
<td>Exit the current group</td>
</tr>
<tr>
<td></td>
<td>While editing a parameter abort editing</td>
</tr>
<tr>
<td></td>
<td>Operating</td>
</tr>
<tr>
<td></td>
<td>T&gt; 3 sec</td>
</tr>
<tr>
<td></td>
<td>Set automatic or manual control mode</td>
</tr>
<tr>
<td></td>
<td>Configuration</td>
</tr>
<tr>
<td></td>
<td>Exit the current group</td>
</tr>
<tr>
<td></td>
<td>While editing a parameter abort editing</td>
</tr>
</tbody>
</table>
Operating during numeric editing
Reaches the max / min set for the actual parameter

(▲ / ▼) + MAN
Configuration during numeric editing
Reaches the max / min set for the current parameter

FUNC + MAN
Operating
\[ t > 3 \text{ sec.} \]
Input in configuration mode

▲ + FUNC
Operating
\[ t > 3 \text{ sec.} \]
Lamp test

▼ + FUNC
Operating
\[ t > 3 \text{ sec.} \]
Input in calibration mode

▼ + MAN
Operativo
Show on the display below the load current or SetPoint
9 Display

During operation, normal operating, the top display shows the process variable while the lower display the current setpoint.

Note: if the restriction is enabled to changes in setpoint (SPU, SPD), the setpoint value displayed may not match the actual value. In fact, if the group parameter SPUS misc configuration is set to appear FNSP the SP arrival, otherwise the current SP.

If properly enabled in the configuration you can increase or decrease the setpoint value directly from the operating mode.

To this should be button for 3 seconds. taken down ▼ or ▲

At this point the change is enabled. Each press of two buttons will cause the 'increase or decrease of the SP.

Failure pressure of either button for more than 5 seconds will stop the 'edit.

To resume editing the SP press again require either button for 3 seconds.

If properly enabled configuration by pressing the UP and MAN on the lower display shows the current in the load. To return to the set point, press the same buttons.
9.1 Indicators

LED1  Switched on when the output 1 is ON state.
LED2  Switched on when the output 2 is ON state.
LED3  Switched on when the output 3 is ON state.
LED4  Switched on when the output 4 is ON state.
LED5  Flashing when the function tune is working and in calculating mode.
LED6  Flashing when the function adaptive is working.

The Led 1, 2, 3 o 4 , if assigned to the status of the alarm 3, take the following feature:

- If the alarm 3 is in OFF state and also alarms Breakdown, leakage or loop-break are in OFF state
  the assigned LEDs are off

- If the alarm 3 is in ON state and also alarms breakdown, leakage or loop-break are in OFF state
  the assigned LEDs are On

- If the alarm 3 is in OFF state and one or more of the alarm of breakdown, leakage or loop-break
  are in ON state, the assigned LEDs flashes every 1 second.

- If the alarm 3 is in ON state and one or more of the alarm of breakdown, leakage or loop-break
  are in ON state, the assigned LEDs flashes every 0.5 seconds.

9.2 Possible outputs REVO TCM (Temperature Controller only)

<table>
<thead>
<tr>
<th>Uscita</th>
<th>RELAY TC07-02</th>
<th>SSR TC07-03</th>
<th>Analogic TC07-01</th>
<th>DI Input TC07-05</th>
<th>Input/Output TC07-04</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUT1</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>OUT2</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>OUT3</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>OUT4</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

*-* = Not available

9.3 Possible outputs REVO TC (SSR + Temperature Controller)

<table>
<thead>
<tr>
<th>Uscita</th>
<th>RELAY TC07-02</th>
<th>SSR TC07-03</th>
<th>Analogic TC07-01</th>
<th>DI Input TC07-05</th>
<th>Input/Output TC07-04</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUT1</td>
<td>-</td>
<td>Fixed</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>OUT2</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>OUT3</td>
<td>X</td>
<td>-</td>
<td>--</td>
<td>X</td>
<td>-</td>
</tr>
<tr>
<td>OUT4</td>
<td>Fixed</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*-* = Not available
10 Operative Mode

Description:

In operating mode, parameters can be viewed and modified in the present state of the device: to access the programming procedure, press the **FUNC** button and release it within 3 seconds.

The lower display shows the ID of the current group, while the upper display shows the string "Edt" permanently: the ▲ and ▼ buttons let you select the group to change, and allows the **FUNC** key to enter the selected group.

For each parameter in the group selected, the lower display shows the ID parameter as the upper display shows the current value: to switch to other parameters of the group acts on the ▲ and ▼.

Pressing the **FUNC** enter into modification of the displayed parameter (the upper display starts flashing).

With the ▲ and ▼ changing the current value displayed on the bottom.

Press the **FUNC** key to store the value currently displayed, pressing the MAN you exit without saving changes the new value.

For a list of parameters, see Chapter `<Programming procedure>`
11 Functions

11.1 Special Functions

By pressing for 3 sec the keys UP and MAN and the lower display, if enabled, the load current.
The next press the same button for 3 seconds will return to the SetPoint

By pressing the FUNC key for 3 seconds, you can see on the lower display in the following order:
• A character A followed by the value of the load current output.
• A character b followed by the leakage current value of output.
• A character H followed by the output value of heating (0-100%)
• A character C followed by cooling output value (0 - 100%)
• A t character followed by the value of the cold junction temperature detected
• A v character followed by the firmware version

Some information is only available if the instrument is properly configured.
The display returns to normal operating mode by pressing the MAN.
Pressing the ▲ + FUNC for 3 seconds activates the lamp test: all segments of all digits of the display
and front LEDs are switched on and off with 1 Hz frequency (duty-cycle 50%) until next keypress MAN.
11.2 Manual Mode

The manual mode can be activated by holding down the MAN button for 3 seconds, if enabled in the configuration (group misc parameter mnFn <> nonE) and only in normal operating mode.

Il display superiore visualizza la variabile di processo.
Esistono 3 modalità di funzionamento manuale (sempre definite in configurazione nel gruppo misc parametro mnFn):

The upper display shows the process variable.
There are 3 modes of operation manual (always defined in the configuration parameter group misc mnFn):

- **Classic Manual Mode:**
  - The operator sets the percentage of output power from 0 to 100% for heating only operation, from -100% to 100% for operating heating / cooling.
  - The lower display shows the current power preceded by the letter P.
  - The change from automatic mode to manual mode (and vice versa) will be in bumpless mode only if the integral action has not been previously excluded.
  - If the transfer AUTO ▶ MAN occurred during selftune, at the return in the AUTO mode the instrument will operate in auto-tuning adaptive abled.

- **OFF Mode:** the operator determines the release of relay heating (if output in mA or V brings the power to 0).

- **Displayed load current mode:** in this case does not change any control over the load, but show the load current.

When switch on, the device is always in AUTO mode or, if properly selected in configuration ,the state in which it was turned off.

11.3 Showing break-down alarm

The alarm condition detected in the measurement of current through the current transformer is indicated in OR on the relay or on the relays assigned to alarm 3.

The current sampling is done only if the state's output, which is inserted in the current transformer is maintained for at least 200ms ON: if during the current cycle time is not carried out any sampling, the value shown by the lower display will be "----".

This is shown only present if the group parameter HCEn Hbdu configuration is set to ON.
11.4 Showing leakage alarm

The alarm condition detected in the measurement of current through the current transformer is indicated in OR on the relay or on the relays assigned to alarm 3.

The current sampling is done only if the state’s output, which is inserted in the current transformer is unenergized for at least 200ms: if during the current cycle time is not carried out any sampling, the value shown by the lower display will be "----".

This view is only present if the group parameter HCEn Hbdu configuration is set to ON.

11.5 Showing loop-break alarm

- uscita di controllo al minimo e azione reverse
- uscita di controllo al massimo e azione direct

Analogamente, la variabile di processo deve crescere se:
- uscita di controllo al minimo e azione direct
- uscita di controllo al massimo e azione reverse

La condizione di allarme viene segnalata in OR sul relè o sui relè assegnati all’ allarme 3.

The loop-break alarm is generated by the dedicated algorithm when the control output is at the minimum / maximum value and the process variable changes in the time pre-chosen of amplitude below the threshold set in the configuration.

The process variable must decrease if:

- Control output to the minimum and Reverse Action
- Control output to the maximum and direct action

Similarly, the process variable must grow if:

- Control output to the minimum and direct action
- Control output to the maximum and reverse action

The alarm condition is reported in OR on the relay or the relays assigned to the alarm 3.

12 Function “Soft start”

When the instrument is switched on the function "soft start" protects temporarily the limit the output power. By limiting the heating power of switch on it’s possible to reduce the thermal stress to the heating elements. The user can configure the time and temperature threshold of the function "soft start".
13 Detection of malfunctions

The instrument can detect the following abnormal conditions of the process variable:

- over-range
- under-range
- sensor leads break

The condition of over-range is displayed by the characters “Undr” flashing in the upper display.

The condition of over-range is displayed with “oVrr” in the upper display.

Table 1 shows the state of OUT1 and OUT2 at the conditions of range of under-and over-range, according to the device settings (control mode heating / cooling and SEcF parameter value). The first four lines delineate the standard configuration.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Heating/Cooling</th>
<th>SEcF</th>
<th>reverse</th>
<th>direct</th>
<th>reverse</th>
<th>direct</th>
</tr>
</thead>
<tbody>
<tr>
<td>under-range</td>
<td>NO</td>
<td>0</td>
<td>ON</td>
<td>OFF</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>over-range</td>
<td>NO</td>
<td>0</td>
<td>OFF</td>
<td>ON</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>under-range</td>
<td>SI</td>
<td>0</td>
<td>ON</td>
<td></td>
<td></td>
<td>OFF</td>
</tr>
<tr>
<td>over-range</td>
<td>SI</td>
<td>0</td>
<td>OFF</td>
<td></td>
<td></td>
<td>ON</td>
</tr>
<tr>
<td>under-range</td>
<td>---</td>
<td>1</td>
<td></td>
<td>SEcO</td>
<td>SecO</td>
<td></td>
</tr>
<tr>
<td>over-range</td>
<td>---</td>
<td>1</td>
<td>SEcO</td>
<td></td>
<td>SecO</td>
<td></td>
</tr>
<tr>
<td>under-range</td>
<td>---</td>
<td>2</td>
<td>standard</td>
<td></td>
<td>standard</td>
<td></td>
</tr>
<tr>
<td>over-range</td>
<td>---</td>
<td>2</td>
<td>SEcO</td>
<td></td>
<td>SecO</td>
<td></td>
</tr>
<tr>
<td>under-range</td>
<td>---</td>
<td>3</td>
<td>SEcO</td>
<td></td>
<td>SecO</td>
<td></td>
</tr>
<tr>
<td>over-range</td>
<td>---</td>
<td>3</td>
<td>standard</td>
<td></td>
<td>standard</td>
<td></td>
</tr>
</tbody>
</table>

Table 1: security state Stati di sicurezza of the output in out-of-range condition.

Breakage of the temperature sensor can be reported as:

- over-range o under-range (configurable) for input TC/mV
- over-range for input RTD
- under-range for input mA / V (only with zero elevation)
14 Programming Procedure

14.1 Programming procedure Diagram

Figure 1 shows the state diagram of the programming process through which shows the strings displayed by the two front LCD display.

![Programming Procedure Diagram](image)
14.2 SET POINT Group (SP)

**SETPOINT**

- **Upper Display** → \( SP \)
- **Lower Display** → Valore di setpoint

**Range**

\[ r_L \leftrightarrow r_H \]

**SELFTUNE**

(available only if can be activated)

- **Upper Display** → \( Stun \)
- **Lower Display** → On or Off

**AUXILIARY SETPOINT**

- **Upper Display** → \( SP \) \( 1 \)
- **Lower Display** → Setpoint value

**Range**

\[ r_L \leftrightarrow r_H \]

**LOWER SETPOINT LIMIT**

- **Upper Display** → \( r_L \)
- **Lower Display** → Lower limit value

**Range**

\[ LoSc \leftrightarrow r_H \]

**UPPER SETPOINT LIMIT**

- **Upper Display** → \( r_H \)
- **Lower Display** → Upper limit value

**Range**

\[ r_L \leftrightarrow HiSc \]
**RATE OF CHANGE FOR POSITIVE CHANGES OF SETPOINT**

Upper Display \( \rightarrow \) \( SP_u \)

Lower Display \( \rightarrow \) Value of *rate of change* applied to any positive change in setpoint.

Range

1 ↔ 100 digit/min

*Inf*: rate of change forced to a Step.

---

**RATE OF CHANGE FOR NEGATIVE CHANGES OF SETPOINT**

Upper Display \( \rightarrow \) \( SP_d \)

Lower Display \( \rightarrow \) Valore del *rate of change* applicato a ogni variazione negativa del setpoint.

Range

1 ↔ 100 digit/min

*Inf*: rate of change forced to a Step.
14.3 ALARM Group (AL)

SILENCED ALARM
(appears only with at least one of programmable alarms with manual reset)

Upper Display → mrSt
Lower Display → on

Functioning:
To silence the active alarms stored, press key F U N C.

ALARM1 THRESHOLD

Upper Display → AL1
Lower Display → Actual value

Range
Process alarm
Span limit
Band alarm
0 ↔ 500
Deviation alarm
-500 ↔ 500

HYSTERESIS ALARM1

Upper Display → HSA1
Lower Display → Actual value

Range
0.1% ↔ 100.0% of the span or 1LSD
ALARM2 THRESHOLD

Upper Display → AL2
Lower Display → Actual value

Range

Process alarm
Limit of span

Band alarm
0 ↔ 500

Deviation alarm
-500 ↔ 500

ISTERESI ALARM2

Upper Display → HSA2
Lower Display → Actual value

Range
0.1% ↔ 100.0% of the span or 1LSD

ALARM3 THRESHOLD

Upper Display → AL3
Lower Display → Actual value

Range

Process alarm
Limit of span

Band alarm
0 ↔ 500

Deviation alarm
-500 ↔ 500

ISTERESI ALARM3

Upper Display → HSA3
Lower Display → Actual value

Range
0.1% ↔ 100.0% of the span or 1LSD
14.3.1 Alarm Function

General notes:
An automatic regulation, control and / or supervision takes into consideration different alarms.
In general, the alarms are "digital" elements or rather elements that can take only two values (true or false) because the condition that describes the alarm can only be "true" (ON) or "false" (OFF).
The condition that describes the alarm is usually summarized by the ALARM FUNCTION because it defines its behavior.
Over the years, depending on the specific needs of various systems have been developed many different types of alarm
(for example alarms, trends, alarms group, put alarms, etc. ...).
Here we will only considering alarms normally implemented on this controller.

The Functions of the alarms in the controller are 3 as follows:
1) Process alarm (or absolute)
2) Band Alarm
3) Deviation Alarm

---

1) Process alarm (or absolute)
The process alarm can be of two types:
A) Up alarm
B) Low alarm

Generally, the process alarm is an alarm which compares the instantaneous value of the measure \( M \) with the value assigned to the alarm \( SA \) (Threshold value)

A) If it is an Up alarm, the alarm will be ON when the measured value exceeds the threshold value

B) If it is a Low alarm, the alarm will be ON when the measured value is less than the threshold value \( M < AS \).
2) Band Alarm
We define "Controlling system" any automated system capable of performing the necessary actions to maintain the controlled variable (which usually coincides with the measured variable) as close as possible to a certain value (which is called set point).
The band alarm is a type of alarm that can only be done on a "Controlling system" because it links the value of the threshold on the Set point (SP).
In the Band alarm, the alarm threshold defines an area around the set point.
Again there are two possibilities:

A) **ON State** when the measure is **within** the bandwidth [(SP - SA) < M < (SP + SA)]
B) **ON State** when the measure is **outside** the bandwidth [M < (SP - SA) or M > (SP + SA)]

A) **ON State within** the bandwidth

B) **ON State outside** the bandwidth
3) Deviation Alarm

Also the deviation alarm can only be done on a "Controlling system" because it links the value of the threshold set point but in some ways is a cross between Process and Band alarm. For this reasons the deviation alarm acts as a process alarm where the alert threshold is added or removed from the set point.

Again there are two possibilities:

A) deviation alarm Up \([M > (SP + SA)]\)

B) Deviation alarm Down \([M < (SP - SA)]\)
Note:
The band and deviation alarms automatically moving the absolute value of the threshold when you change the set point value.
The process alarm, however, is indifferent to changes of set points.
14.3.2 Alarm Hysteresis

The purpose of the hysteresis is to prevent, when the measurement is near the threshold and there are disturbances on the measure, the alarm state changes continuously from ON to OFF and vice versa.

To do this it's possible to define a "safety margin" so that the alarm goes ON when the measure reaches a specified value (A) but does not go OFF before the measure reaches another value (B) more closely to the optimal condition.

Value (A) is used as the threshold and value (B) as the threshold more or less hysteresis;

The following example will clarify the foregoing.

Considering that we want to set a Low alarm process that goes ON at least 300 °C (value A) and returns to OFF only when the measure has risen to 360 °C (B value).

In this case the setting of the threshold is 300 (°C)

In questo caso il valor di soglia da impostare è 300 (°C) while the hysteresis have to be set equal to 60(°C).

Note. The hysteresis value is expressed on the instrument in % of full scale.

14.3.3 Alarm Out

Generally the state of an alarm is made visible to the user and can also produce physical actions on the system.

The status indication of an alarm can be:

1) Visual indication (a LED on the front of the instrument panel)
2) Software indication (state of a boolean variable on the serial communication)
3) State of a physical Out (normally a relay)

Note:

a) These three indications are present both individually than simultaneously.
b) At" State of a physical Out " are associated also physical action on the system.
14.3.4 Action of alarm output.

(also indicated as "Alarm Action")

When an alarm status is associated with the state of a physical output (ex. relay)
Quando allo stato di un allarme è associato lo stato di un uscita fisica (es. relè) it’s necessary to define the relationship between the alarm state and relay state.

Two action are possibile:

1) Direct action: out ON when the alarm is ON (ex.: excited relay when the alarm is ON)
2) Reverse action: Out OFF when the alarm is ON (ex.: un-excited relay when the alarm is ON)

Direct action is the most commonly used but you must remember that the reverse action allows to have an alarm signal when the instrument does not work or is off (because the ON state of alarm is indicated by the OFF state of output, when the instrument is switched off or not working the output will be definitely OFF).

In the case of relay output, the status of Output may not be sufficient to describe the state of the contact. In fact, when the output relay is provided with changeover contacts it is clear that the choice of the normally closed contact (NC) or normally open (NO) allows for equal status of the relay to reverse the state of the contact.

However remains the considerations valid regarding the possibility of having an alarm signal when the instrument is switched off or not working (reverse action).

14.3.5 Resetting of an Alarm

The alarms we have seen are based on the concept that when the measure falls in the OFF area the alarm also goes OFF automatically. In these cases it is said that the alarm is equipped with automatic reset.

In some cases it is preferable that the alarm still remains in the ON condition even after the measure is back in the OFF zone, the alarm will return to the OFF condition only after a physical action (pressing a key or other). In this case we say that the alarm has a manual reset.

The reason of this choice is due to the level of danger of the anomaly reported from the alarm, an overcurrent can damage the system and cause fire or dangerous situations for the users

Forcing the user to perform an action also ensures that we take note of the report and eliminate the cause of the problem before resetting the system.

Alarms with manual reset may have different behaviors depending on different situations but, generally, one can identify two families of behavior:

1) Alarm with unconditioned reset

Are those alarms that, when performed manually reset, set the alarm to OFF condition even if the alarm condition is still present.

A typical example are the alarms that drive the sirens, once the user reaches the machinery switch off the siren and then performs the necessary actions to remove the alarm condition. To get a further alarm signal is necessary that the measure goes to the area OFF and back in the ON area.
2) Alarm with conditioned reset

Are alarms that, when is running the manual reset, activate the alarm in OFF condition only if the alarm condition is no longer present.

For the conditioned alarms we have two types:

I. Alarms that require manual reset only after alarm condition has been eliminated (Otherwise remain in alarm). **This is the type of reset on this controller.**

II. Alarms that, if they are resetted when the alarm condition is still present, store the reset and run automatically when the alarm condition disappears.

It should however be noted that, even for resetting, has been developed a multitude of variations and types to meet the varied needs of the plant. As mentioned above describes only the most common condition and those normally present on the controllers.

### 14.3.6 Alarm mask

As we have said in many cases the alarm produces a physical action on the system.

Obviously, however, the alarm is usually set to report defects when the system is "fully operational". The conditions of the plant startup or after a set point change does not satisfy the condition "fully operational" and can cause unwanted alarmi.

To avoid unwanted alarms were studied different solutions according to the type of system where the alarm is applied.

In the controller has been implemented a solution due to the measure.

If at the start up is detected an alarm condition, this condition is ignored until the measure reaches the area where the alarm is OFF, then the alarm resumed normal function.

If the alarm is programmed as band alarm or deviation, the standby function masks the alarm condition in start un and set point variation, until the value of process variable reaches the alarm threshold with hysteresis.

If is a process alarm the alarm conditions mask only during start up.

Se l'allarme è di processo, maschera le condizioni di allarme solamente in accensione.
**Control Group (Cntr)**

### PROPORTIONAL BAND

- **Upper Display** → **Pb**
- **Lower Display** → **Actual value**

**Range**

- **No selftune with O2Fn ≠ Cool**
  - $1.0\% \leftrightarrow 100.0\%$ dello span
- **No selftune with O2Fn = Cool**
  - $1.5\% \leftrightarrow 100.0\%$ dello span
- **Selftune with O2Fn ≠ Cool**
  - LPb2 ↔ HPb
- **Selftune with O2Fn = Cool**
  - LPb1 ↔ HPb

### HYSTERESIS

(available only with ON/OFF – CntF = onoF (miSC group of configuration))

- **Upper Display** → **HYS**
- **Lower Display** → **Actual value for ON/OFF**

**Range**

- $0.1\% \leftrightarrow 10.0\%$ of span or 1LSD

### INTEGRAL TIME

(available only with PID or PI – CntF <> onoF (miSC group of configuration))

- **Upper Display** → **ti**
- **Lower Display** → **Actual value**

**Range**

- $00.01 \leftrightarrow 20.00$ mm.ss

Beyond the maximum value, on display the integral action is excluded.

**With selftune activated, the lower limit is given by Lti**
DERIVATIVE TIME

(available only with PI - CntF = Pi (miSC group of configuration))

Upper Display  ➔ td
Lower Display  ➔ Actual value

Range
00.01 ↔ 10.00 mm.ss

With selftune activated, the derivative time is equal to tI / 4

INTEGRAL PRELOAD

(available only with PID or PI - CntF <> onoF (miSC group of configuration))

Upper Display  ➔ iP
Lower Display  ➔ Actual value

Range
With O2Fn ≠ Cool
0 ↔ 100

With O2Fn = Cool
-100 ↔ 100
RELATIVE COOLING GAIN

(availabele only with PID or PI - CntF <> onoF (miSC group of configuration) with at least one output set as cooling)

Upper Display  →  rC
Lower Display  →  Actual value

Range

0.20 ↔ 1.00

When selftune is active and  rCEn = On the range become

PAL = Air

0.85 ↔ 1.00

PAL = OIL

0.80 ↔ 0.90

PAL = H2O

0.30 ↔ 0.60

DEAD BAND/OVERLAP through HEATING/COOLING OUTPUT

(available only with PID oe PI - CntF <> onoF (miSC group of configuration)) with at least one output set as cooling)

Upper Display  →  oLAP
Lower Display  →  Valore attuale.

Negative values indicate dead band, positive values indicate overlap.

Range

-20 ↔ 50
14.5 OUT Group (\text{Out})

TIME OF CIRCLE OUT1
(available only with at least one output set as heating not analogic)

Upper Display → CY1
Lower Display → Actual Value.

Range
1 ↔ 200 seconds

SUPERIOR LIMIT OUTPUT

Upper Display → oLH
Lower Display → Actual Value.

Range

With O2Fn ≠ Cool
0 ↔ 100

With O2Fn = Cool
-100 ↔ 100

TIME OF CIRCLE OUT2
(available only with at least one output set as heating not analogic)

Upper Display → CY2
Lower Display → Actual Value.

Range
1 ↔ 200 seconds

MAXIMUM RAMP-UP VARIATION ON OUTPUT

Upper Display → mP
Lower Display → Actual Value.

Range
1% ↔ 25% for second.

Over the max value the display show “\text{inf}” and the limitation is excluded.
THRESHOLD VALUE FOR BREAK-DOWN ALARM
(available only if HCEn = On)

Upper Display  →  Hbd
Lower Display  →  Actual Value (A)

Range
0 ↔ FULL SCALE (see HCHS)

Note
- When the output that is added to the current transformer is in excited state of relays, the instrument measures the current absorbed by the load and generates an alarm if the current is below the value of Hbd parameter (a low current indicates a break-down partial or full load).

- The resolution of the threshold value is equal to 0.1A for range up to 20A, 1A to 20A to 100A range.

HYSTERESIS VALUE FOR BREAK-DOWN ALARM
(available only if HCEn = On)

Upper Display  →  HbdH
Lower Display  →  Actual Value

Range
0 ↔ 1.0

THRESHOLD VALUE FOR SHORT CIRCUIT ALARM
(available only if HCEn = On)

Upper Display  →  SCA
Lower Display  →  Actual Value (A)

Range
0 ↔ FULL SCALE (see HCHS)

Note
- When OUT1 relay is in unexcited state, the instrument measures the leakage current in the load and generates an alarm if the current exceeds the value of the parameter SCA (a high current indicates a partial break or total of the relay or SSR).

- The resolution of the threshold value is equal to 0.1A for range up to 20A, 1A to 20A to 100A range.
14.6 Group EHT (Functions setted also from input1 and input2)

The functions
  - Auto/Manual
  - SP/SP1
  - Tune Insertion
  - Silencing the alarm
  - Control group selection

may be controlled from key panel, from serial or contact of input. To avoid conflicts, through this group, is possible to select from which of these functions will be controlled.

**FUNCTION COMMAND AUTO/MANUAL**
(available only if is present a contact module or digital IO on Input1 or Input2 and if one of the two input is configured by command Auto/Manual)

Upper display  →  mnoP
Lower display  →  Actual Value

Range
  - Sutc  → Command from Input
  - Serh  → Command from key panel or serial

**FUNCTION COMMAND SP/SP1**
(available only if is present a contact module or digital IO on Input1 or Input2 and if one of the two input is configured by command SP/SP1)

Upper display  →  SPoP
Lower display  →  Actual Value

Range
  - Sutc  → Command from Input
  - Serh  → Command from key panel or serial
COMMAND TUNE INSERTION
(available only if is present a contact module or digital IO on Input1 or Input2 and if one of the two input is configured for tune insertion)

Upper display → tnoP
Lower display → Actual Value

Range
Sutc → Command from Input
Serh → Command from key penel or serial

COMMAND ALARM SILENCING
(available only if is present a contact module or digital IO on Input1 or Input2 and if one of the two input is configured for alarm silencing)

Upper display → AroP
Lower display → Actual Value

Range
Sutc → Command from Input
Serh → Command from key penel or serial

COMMANDO CONTROL GROUP SELECTION
(available only if is present a contact module or digital IO on Input1 or Input2 and if one of the two input is configured for control group selection)

Upper display → Actual Value
Lower display → PSnP

Range
Sutc → Command from Input
Serh → Command from key penel or serial
14.7 Group dEF (default of run time Loading)

<table>
<thead>
<tr>
<th>Upper display</th>
<th>rt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower display</td>
<td>on</td>
</tr>
</tbody>
</table>

By pressing the key FUNC the default value are loaded

14.8 Group PAL1 (Pallet 1 control parameters)

**PROPORTIONALE BAND**

<table>
<thead>
<tr>
<th>Upper display</th>
<th>Pb1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower display</td>
<td>Actual Value</td>
</tr>
</tbody>
</table>

Range

*No selftune with O2Fn ≠ Cool*

1.0% ↔ 100.0% of span

*No selftune with O2Fn = Cool*

1.5% ↔ 100.0% of span

*Selftune with O2Fn ≠ Cool*

LPb2 ↔ HPb

*Selftune with O2Fn = Cool*

LPb1 ↔ HPb

**HYSTERESIS**

(available only with ON/OFF – CntF = onoF (group miSC of configuration))

<table>
<thead>
<tr>
<th>Upper display</th>
<th>HYS1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower display</td>
<td>Actual Value for ON/OFF</td>
</tr>
</tbody>
</table>

Range

0.1% ↔ 10.0% of span or 1LSD
INTEGRAL TIME
(available only with PID o PI - CntF <> onoF (group miSC of configuration))

- Upper display ➔ \( t_i1 \)
- Lower display ➔ Actual Value

Range

\( 0.01 \leftrightarrow 20.00 \) mm.ss

Beyond the maximum value, the display of the integral action is excluded.

With selftune activated, the lower limit is given by \( L_i \)

DERIVATIVE TIME
(available only with PI - CntF = Pi (group miSC of configuration))

- Upper display ➔ \( t_d \)
- Lower display ➔ Actual Value

Range

\( 0.01 \leftrightarrow 10.00 \) mm.ss

With selftune activated, the derivative time is equal to \( t_i / 4 \)

INTEGRAL PRELOAD
(available only with PID or PI - CntF <> onoF (group miSC of configuration))

- Upper display ➔ \( iP_1 \)
- Lower display ➔ Actual Value

Range

- With \( O2F_n \neq Cool \)
  \( 0 \leftrightarrow 100 \)
- With \( O2F_n = Cool \)
  \( -100 \leftrightarrow 100 \)
RELATIVE COOLING GAIN
(available only with PID or PI - CntF <> onoF (group miSC of configuration))
Upper display  →  rC1
Lower display  →  Actual Value

Range
0.20 ↔ 1.00
When selftune is active and rCEn = On the range become
PAL = AIr
  0.85 ↔ 1.00
PAL = OIL
  0.80 ↔ 0.90
PAL = H2O
  0.30 ↔ 0.60

DEAD BAND/OVERLAP TRA HEATING/COOLING OUTPUT
(available only with PID or PI - CntF <> onoF (group miSC of configuration)) e con
o2Fn = Cool)
Upper display  →  oLAP1
Lower display  →  Actual Value
Negative value indicates the dead band, positive value indicates the overlap.

Range
-20 ↔ 50

14.9 Group \(PAL_2\) (Pallet 2 control parameters)
See group 1

14.10 Group \(PAL_3\) (Pallet 3 control parameters)
See group 1