USER’S MANUAL
Rev. 12/2010

Revo TC
Temperature Controller

Part 2

CD Automation S.r.l.
Via Picasso 34/36 - 20025 – Legnano (MI) – ITALY
Tel +39 0331 577479 – Fax +39 0331 579479
E-Mail: info@cdautomation.com - WEB: www.cdautomation.com
15 SELF-TUNING Algorithms

The instrument implements two different algorithms of self-tuning

- PreTune
- SelfTune

15.1 PreTune

Allows to calculates a first approximation of the parameters of PID controller by induction of instability in the controlled process: the control output is increased to the maximum value until it reaches a certain error (SP-PV, typically between 5% and 10% of span) before being brought to its minimum value (or vice versa).

Pre-tune is activated by parameter Pret = On of menu SP accessible by pressing **FUNC** key.

The Pre-Tune function is automatically enabled at the end of calculation or change of setpoint value, it's not inserted if the difference between set and measured temperature is below 20% of span value.

To deactivate manually the Pre-tune set the parameter Pret = On on menu SP accessible by pressing **FUNC** key. When PRETUNE is active **LED6** is flashing.
15.2 SelfTune

If enabled, the algorithm is continuously applied during regulation to optimize the coefficients of the PID controller when using it. The function of self-tune is always enabled to optimize the coefficients of the PID controller when using it. The self-tune function is enabled by setting the parameter SLFt = On on SP menu accessible by pressing FUNC key.

The Self-tune function is always enabled but works only when is between a range of +/- 4% of the span value. To disable self-tuning function set the parameter SLFt = SP menu accessible by pressing FUNC key.

When SELFTUNE is enabled but not working LEDs is On. When SELFTUNE is enabled and is working LEDs is On and flashing.

NOTE: If self-tuning is working the PID parameter can be viewed only without possibility of settings; It also removed the upper limit output OLH.
16 Serial RS485 and USB communication interface

The instrument can be connected to a PC via the RS485 serial interface designed for remote configuration and supervision, or through the Connector USB with RS232 interface for operations of configuration. In the first case, the serial communications parameters can be setted through the setup configuration of the instrument. In the second case the parameters are fixed:

- Address 1
- Baud rate 9600
- Parity none
- Stop bit 1

In both cases, the protocol used is Modbus RTU. During the operations of remote configuration, the instrument disables the control outputs.
17 Configuration Mode

17.1 Description

From operative mode it's possible to access the configuration mode by pressing $\text{FUNC} + \text{MAN}$ for 3 seconds and entering the appropriate password (the upper display shows "PSU"), that value must be set to "3" through $\uparrow$ and $\downarrow$, confirmed by pressing the $\text{FUNC}$.

The upper display shows the ID of the current group, while the lower display shows the string "CnF" permanently: the $\uparrow$ and $\downarrow$ keys allows to select the group to change, the $\text{FUNC}$ key allows to enter the active group.

For each parameter in the group selected, the upper display will show the ID parameter while the lower display will show the current value: to switch to other parameters group acts on the $\uparrow$ and $\downarrow$.

By pressing the $\text{FUNC}$ key it's possible to enter into modification of the displayed parameter (the upper display starts flashing).

Use the $\uparrow$ and $\downarrow$keys for changing the current value displayed on the lower display.

Press the $\text{FUNC}$ key to store the value currently displayed, press the $\text{MAN}$ to exit without saving the changes of value.

To end the configuration mode, press $\text{MAN}$ until appears on the upper display END and select YES: by selecting NO the instrument returns to the first group available..
17.2 Configuration procedure diagram

Figure 2 and Figure 3 shows the complete sequence of the configuration.

Figure 1: Sequence Diagram Programming - part A
Figure 2: Sequence Diagram Programming - part B
### 17.3 Group INPUT (\( \text{inP} \))

#### Typology of input and range

<table>
<thead>
<tr>
<th>Display</th>
<th>Typology</th>
<th>Low</th>
<th>High</th>
<th>M.Unit</th>
<th>Regulations</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Ld C</td>
<td>0</td>
<td>400</td>
<td>°C</td>
<td>DIN 43710 - 1977</td>
</tr>
<tr>
<td>1</td>
<td>L C</td>
<td>0</td>
<td>900</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>L F</td>
<td>0</td>
<td>1650</td>
<td>°F</td>
<td>DIN 43710 - 1977</td>
</tr>
<tr>
<td>3</td>
<td>Jd C</td>
<td>-100.0</td>
<td>400.0</td>
<td>°C</td>
<td>IEC 584-1</td>
</tr>
<tr>
<td>4</td>
<td>J C</td>
<td>-100</td>
<td>1000</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>J F</td>
<td>-150</td>
<td>1830</td>
<td>°F</td>
<td>IEC 584-1</td>
</tr>
<tr>
<td>6</td>
<td>Kd C</td>
<td>-100.0</td>
<td>400.0</td>
<td>°C</td>
<td>IEC 584-1</td>
</tr>
<tr>
<td>7</td>
<td>K C</td>
<td>-100</td>
<td>1370</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>K F</td>
<td>-150</td>
<td>2500</td>
<td>°F</td>
<td>IEC 584-1</td>
</tr>
<tr>
<td>9</td>
<td>N C</td>
<td>-100</td>
<td>1400</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>N F</td>
<td>-150</td>
<td>2550</td>
<td>°F</td>
<td>IEC 584-1</td>
</tr>
<tr>
<td>11</td>
<td>S C</td>
<td>0</td>
<td>1760</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>S F</td>
<td>0</td>
<td>3200</td>
<td>°F</td>
<td>IEC 584-1</td>
</tr>
<tr>
<td>13</td>
<td>r C</td>
<td>0</td>
<td>1760</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>r F</td>
<td>0</td>
<td>3200</td>
<td>°F</td>
<td>IEC 584-1</td>
</tr>
<tr>
<td>15</td>
<td>td C</td>
<td>-199.9</td>
<td>400.0</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>t F</td>
<td>-330</td>
<td>750</td>
<td>°F</td>
<td>IEC 584-1</td>
</tr>
<tr>
<td>17</td>
<td>Ptd C</td>
<td>-199.9</td>
<td>400.0</td>
<td>°C</td>
<td>DIN 43760</td>
</tr>
<tr>
<td>18</td>
<td>Ptd F</td>
<td>-199.9</td>
<td>400.0</td>
<td>°F</td>
<td>DIN 43760</td>
</tr>
<tr>
<td>19</td>
<td>Pt C</td>
<td>-200</td>
<td>800</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Pt F</td>
<td>-330</td>
<td>1470</td>
<td>°F</td>
<td>DIN 43760</td>
</tr>
<tr>
<td>21</td>
<td>20 nA</td>
<td>0</td>
<td>20</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>2 nA</td>
<td>4</td>
<td>20</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>60 nA</td>
<td>0</td>
<td>60</td>
<td>mV</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>6 nA</td>
<td>12</td>
<td>60</td>
<td>mV</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>10 V</td>
<td>0</td>
<td>10</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>10 _V</td>
<td>2</td>
<td>10</td>
<td>V</td>
<td></td>
</tr>
</tbody>
</table>
DECIMAL POINT POSITION (only linear Input)

- No Decimal Point: “----.”
- One Decimal Point: “--.-”
- Two Decimal Points: “-.--”
- Three Decimal Points: “.-.-”

TOP RANGE VALUE FOR LINEAR INPUT

-1999 ↔ 4000 for linear input
For input TC / RTD compare parameter table IntY.
When this parameter is changed, the parameter rL is realigned.

BOTTOM RANGE VALUE FOR LINEAR INPUT

-1999 ↔ 4000 for linear input
For input TC / RTD compare parameter table IntY.
When this parameter is changed, the parameter rH is realigned.

OFFSET (disabled for linear input)

-199 ↔ 199 for input with range without decimals
-19.9 ↔ 19.9 for input with range with decimals
The value is algebraically added to the measured value.
17.4 Group I/O (σ)

17.4.1 Out 1

**Ω IFn**
Visible with Relay, SSR circuit
Function OUT1

- Disabled
- Heating Function
- COOL
- Cooling Function
- AL1
  Out alarm 1 Function
- AL2
  Out alarm 2 Function
- AL3
  Out alarm 3 Function

**Ω IFA**
Visible with ANALOGIC circuit
Function OUT1

- Disabled
- Heating Function
- COOL
- Cooling Function
- Sprt
  SetPoint retransmission Function
- PVrt
  Measure retransmission Function
**O1TY**

Visible with ANALOGIC circuit

**TYPE OUTPUT OUT1**

- 0 20
  - out 0-20 mA
- 4 20
  - out 4-20 mA
- 0 10
  - out 0-10 V
- 2 10
  - out 2-10 V

**O1LS**

Visible with ANALOGIC circuit + O1Fn = retransmission

**BOTTOM LIMIT OF RETRANSMISSION**

Limits of span

**O1HS**

Visible with ANALOGIC circuit + O1Fn = retransmission

**TOP LIMIT OF RETRANSMISSION**

Limits of span

17.4.2 OUT 2

**O2Fn**

Function OUT2

- **non** Enabled
- **HEAT**
  - Heating Function
- **COOL**
  - Cooling Function
- **AL1**
  - Out alarm 1 Function
- **AL2**
  - Out alarm 2 Function
- **AL3**
  - Out alarm 3 Function
17.4.3 OUT 3 or Di 1

<table>
<thead>
<tr>
<th>03Fn</th>
<th>Visible with Relay , SSR circuit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Function OUT3</td>
</tr>
<tr>
<td></td>
<td>nonE</td>
</tr>
<tr>
<td></td>
<td>Disabled</td>
</tr>
<tr>
<td></td>
<td>HEAT</td>
</tr>
<tr>
<td></td>
<td>Heating Function</td>
</tr>
<tr>
<td></td>
<td>COOL</td>
</tr>
<tr>
<td></td>
<td>Cooling Function</td>
</tr>
<tr>
<td></td>
<td>AL1</td>
</tr>
<tr>
<td></td>
<td>Out alarm 1 Function</td>
</tr>
<tr>
<td></td>
<td>AL2</td>
</tr>
<tr>
<td></td>
<td>Out alarm 2 Function</td>
</tr>
<tr>
<td></td>
<td>AL3</td>
</tr>
<tr>
<td></td>
<td>Out alarm 3 Function</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1EY</th>
<th>Visible with DI circuit, DI/O + O4Fn = none</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Function Digital Input 2</td>
</tr>
<tr>
<td></td>
<td>nonE</td>
</tr>
<tr>
<td></td>
<td>Disabled</td>
</tr>
<tr>
<td></td>
<td>Auto</td>
</tr>
<tr>
<td></td>
<td>Select mode AUTO / MANUAL</td>
</tr>
<tr>
<td></td>
<td>tunE</td>
</tr>
<tr>
<td></td>
<td>Start selftune</td>
</tr>
<tr>
<td></td>
<td>SP</td>
</tr>
<tr>
<td></td>
<td>Select setpoint</td>
</tr>
<tr>
<td></td>
<td>ALrS</td>
</tr>
<tr>
<td></td>
<td>Alarm Reset</td>
</tr>
<tr>
<td></td>
<td>PSEL</td>
</tr>
<tr>
<td></td>
<td>Palette Selection</td>
</tr>
</tbody>
</table>

**CAUTION:**

For the proper functioning of the digital set parameters correctly in the menu (£H£)
O3Fn
Visible with ANALOGIC circuit.
Function OUT3

non E
Disabled

HEAT
Heating Function

COOL
Cooling Function

Sprt
SetPoint retransmission Function

PVrt
Measure retransmission Function

O3Ly
Visible with ANALOGIC circuit
TYPE OUTPUT OUT3

0 20
Out 0-20 mA

4 20
Out 4-20 mA

0 10
Out 0-10 V

2 10
Out 2-10 V

O3LS
Visible with ANALOGIC circuit + O3Fn = retransmission
BOTTOM LIMIT OF RETRANSMISSION
Limits of span

O3HS
Visible with ANALOGIC circuit + O3Fn =
TOP LIMIT OF RETRANSMISSION
Limits of span
17.4.4 Out 4

\[ O4Fn \]
Visible with RELE', DI, DI/O circuit

\[ \text{nonE} \]
Disabled

\[ \text{HEA}t \]
Heating Function

\[ \text{COOL} \]
Cooling Function

\[ \text{AL1} \]
Out alarm 1 Function

\[ \text{AL2} \]
Out alarm 2 Function

\[ \text{AL3} \]
Out alarm 3 Function

\[ \text{I2LY} \]
Visible Con Scheda DI, DI/O + O4Fn = none

\[ \text{nonE} \]
Disabled

\[ \text{Auto} \]
Select AUTO / MANUAL mode

\[ \text{tunE} \]
Start selftune

\[ \text{SP} \]
Setpoint select

\[ \text{ALrS} \]
Alarm Reset

\[ \text{PSEL} \]
Palette Select

\text{CAUTION:}

For the proper functioning of the digital Input set parameters correctly in the menu.
### 17.4.5 General

<table>
<thead>
<tr>
<th>CLnd</th>
<th>Visible with at least one output setted as Cooling (Double action)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE OF COOLING AGENT</td>
<td></td>
</tr>
<tr>
<td>Air cooling</td>
<td></td>
</tr>
<tr>
<td>Oil cooling</td>
<td></td>
</tr>
<tr>
<td>Water cooling</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HAct</th>
<th>COOLING ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>(with no out, cooling out and at least one relè or ssr out)</td>
<td></td>
</tr>
<tr>
<td>Reverse action</td>
<td></td>
</tr>
<tr>
<td>Direct action</td>
<td></td>
</tr>
</tbody>
</table>
17.5 ALARM Group (AL)

17.5.1 Alarm 1

**AL1F**

ALARM1 FUNCTION (available only if O2Fn = AL1o)

- **none**
  - Disabled
- **Proc**
  - Process Alarm
- **Band**
  - Band Alarm
- **Dev**
  - Deviation Alarm

**AL1n**

ALARM1 CONFIGURATION (available only if O2Fn = AL1o and AL1F <> none)

- **HA**
  - High alarm with automatic reset
- **LA**
  - Low alarm with automatic reset
- **HN**
  - High alarm with manual reset
- **LN**
  - Low alarm with manual reset

**AL1o**

ALARM1 ACTION (available only if O2Fn = AL1o and AL1F <> none)

- **dir**
  - Direct action (Out high in alarm condition)
- **rev**
  - Reverse action (Out high in normal condition)

**AL1s**

ALARM1 STANDBY FUNCTION

(available only if O2Fn = AL1o and AL1F <> none)

- **off**
  - Disabled
- **on**
  - Abled
17.5.2 Alarm 2

**AL2F**

**ALARM2 FUNCTION** (available only if O3Fn = AL2o)
- **none**
  - Disabled
- **Proc**
  - Process Alarm
- **Band**
  - Band Alarm
- **Dev**
  - Deviation Alarm

**AL2n**

**ALARM2 CONFIGURATION** (available only if O3Fn = AL2o and AL2F <> none)
- **hA**
  - High alarm with automatic reset
- **lA**
  - Low alarm with automatic reset
- **hL**
  - High alarm with manual reset
- **Ll**
  - Low alarm with manual reset

**AL2o**

**ALARM2 ACTION** (available only if O3Fn = AL2o and AL2F <> none)
- **dir**
  - Direct action (Out high in alarm condition)
- **rev**
  - Reverse action (Out high in normal condition)

**A2nS**

**ALARM2 STANDBY FUNCTION**
(available only if O3Fn = AL2o and AL2F <> none)
- **off**
  - Disabled
- **on**
  - Abled
17.5.3 Alarm 3

**AL3F** ALARM3 FUNCTION (available only if O4Fn = AL3o)
- **none** Disabled
- **Proc** Process Alarm
- **Band** Band Alarm
- **Dev** Deviation Alarm

**AL3n** ALARM3 CONFIGURATION (available only if O4Fn = AL3o and AL3F <> none)
- **HA** High alarm with automatic reset
- **LA** Low alarm with automatic reset
- **HA** High alarm with manual reset
- **LA** Low alarm with manual reset

**AL3o** ALARM3 ACTION (available only if O4Fn = AL3o and AL2F <> none)
- **dir** Direct action (Out high in alarm condition)
- **rev** Reverse action (Out high in normal condition)

**AL3ns** ALARM3 STANDBY FUNCTION (available only if O4Fn = AL3o e AL2F <> none)
- **off** Disabled
- **on** Abled
17.6 Heating Break-Down Group (\textit{Hbd\textit{\textdollar}})

<table>
<thead>
<tr>
<th>\textit{hcEn}</th>
<th>MEASUREMENT OF CURRENT of LEAKAGE AND BREAK-DOWN</th>
</tr>
</thead>
<tbody>
<tr>
<td>\textit{off}</td>
<td>Disabled</td>
</tr>
<tr>
<td>\textit{on}</td>
<td>Abled</td>
</tr>
</tbody>
</table>

\textit{hcEn} \quad SPAN LOAD CURRENT (available with \textit{HCEn} = \textit{On})

Value between 10A e 100°

17.7 Loop break Group (\textit{lb\textit{\textdollar}})

<table>
<thead>
<tr>
<th>\textit{lbA}</th>
<th>LOOP BREAK ALARM CONFIGURATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>\textit{d\textunderscore S}</td>
<td>Disabled</td>
</tr>
<tr>
<td>\textit{Enb}</td>
<td>Abled</td>
</tr>
</tbody>
</table>

\textit{lb\textit{\textdollar}} \quad LOOP BREAK DEVIATION ALARM (available with \textit{LBA} = \textit{Enb})

Value between 0 e 500

\textit{lb\textit{\textdollar}} \quad LOOP BREAK ALARM TIMER (available with \textit{LBA} = \textit{Enb})

Value between 00.01 and 40.00 mm.ss

\textit{lb\textit{\textdollar}} \quad LOOP BREAK ALARM HYSTERESIS (available with \textit{LBA} = \textit{Enb})

Value between 1 e 50
17.8 SELFTUNE Group (\textit{tunE})

<table>
<thead>
<tr>
<th>\textit{tunE}</th>
<th>ENABLING SELFTUNE</th>
</tr>
</thead>
<tbody>
<tr>
<td>\textit{d}</td>
<td>Disabled</td>
</tr>
<tr>
<td>\textit{e}</td>
<td>Enabled</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>\textit{rcE}n</th>
<th>RELATIVE COOLING GAIN CALCULATION (available only if O2Fn = Cool)</th>
</tr>
</thead>
<tbody>
<tr>
<td>\textit{off}</td>
<td>Not calculated from selftune</td>
</tr>
<tr>
<td>\textit{on}</td>
<td>calculated from selftune</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>\textit{hPb}</th>
<th>UPPER LIMIT OF PROPORTIONAL BAND</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Valore compreso tra LPb1 o LPb2 e 100.0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>\textit{iPb1}</th>
<th>LOWER LIMIT OF PROPORTIONAL BAND with heating/cooling</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(available if O2Fn = Cool)</td>
</tr>
<tr>
<td></td>
<td>Value between 1.5% and HPb</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>\textit{iPb2}</th>
<th>LOWER LIMIT OF PROPORTIONAL BAND with OUT1 heating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(available if O2Fn ≠ Cool)</td>
</tr>
<tr>
<td></td>
<td>Value between 1.0% and HPb</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>\textit{lit}</th>
<th>LOWER LIMIT INTEGRAL TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Value between 00.01 and 02.00 mm.ss</td>
</tr>
</tbody>
</table>
### 17.9 SOFT START Group (Soft)

- **$FFn** SOFT START FUNCTION
  - **Enb** Abled
  - **d $S** Disabled

- **$h$** INPUT THRESHOLD FOR ENABLING SOFT START
  Value between thr limits of span

- **$t o l$** SOFT START TIMEOUT
  Value between 1 e 540 minuti.

### 17.10 Gruppo PARAMETRI VARI (n iSc)

- **$FFn** MANUAL FUNCTION
  - **None** None
  - **$A u N n$** Automatic / manual (out 0 (-100%) / 100%)
  - **OFF** OUT1 = 0
  - **$I S H u$** Show the load current

- **$t a d$** STARTUP STATE
  - **Auto** In automatic mode
  - **$s h d J$** Same settings of switch off:
  If in manual mode, the setting of power out it’s the same when it was off.
  - **$s h d 0$** If in manual mode, the setting of power out it’s 0.
CONDITION FOR OUTPUT SET TO VALUE OF SAFETY

0
Standard – NO out set to value of safety.

1
Value of safety in over-range and under-range

2
Value of safety only in over-range

3
Value of safety only in under-range

VALUE OF SAFETY (available only if SECf ≠ 0)

O2Fn = Cool
Value between -100% and 100%

O2Fn ≠ Cool
Value between 0% and 100%

CONTROL ACTION

P
Process controlled by algorithm PI

PID
Process controlled by algorithm PID

ON/OFF
Process controlled by algorithm ON/OFF

SETPOINT VIEW

FINAL
View of the final set point in normal operative conditions

OPERATIVE
View of the operative set point in normal operative conditions
FILTER ON MEASURE

NonE  NO filter

1 sec

2

3

4

5

6

7

8

9

10

DIRECT ENABLING MODE SP

OFF  MODE disabled

on  MODE abled
### 17.11 RS485 Group (r485)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SErE</strong></td>
<td>ENABLING RS485 COMMUNICATION</td>
</tr>
<tr>
<td><strong>off</strong></td>
<td>Disabled</td>
</tr>
<tr>
<td><strong>on</strong></td>
<td>Able with Modbus protocol</td>
</tr>
<tr>
<td><strong>Add</strong></td>
<td>DEVICE ADDRESS (disabled if SErE = Off)</td>
</tr>
<tr>
<td></td>
<td>Value between 1 e 255</td>
</tr>
<tr>
<td><strong>bAud</strong></td>
<td>BAUD RATE (disabled if SErE = Off)</td>
</tr>
<tr>
<td></td>
<td>Value between 600 e 115200 baud</td>
</tr>
<tr>
<td><strong>Par</strong></td>
<td>BYTE FORMAT (disabled if SErE = Off)</td>
</tr>
<tr>
<td><strong>EVEN</strong></td>
<td>8 bit with even parity</td>
</tr>
<tr>
<td><strong>odd</strong></td>
<td>8 bit with odd parity</td>
</tr>
<tr>
<td><strong>none</strong></td>
<td>8 bit without parity</td>
</tr>
<tr>
<td><strong>mbSt</strong></td>
<td>SELECTION OF TABLE MODBUS ADDRESSES</td>
</tr>
<tr>
<td></td>
<td>0 - 4</td>
</tr>
</tbody>
</table>
17.12 Default Configuration Group (DEF)

<table>
<thead>
<tr>
<th>European</th>
<th>Loading European parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>No action</td>
</tr>
<tr>
<td>ON</td>
<td>Loading</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>American</th>
<th>Loading American parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>No action</td>
</tr>
<tr>
<td>ON</td>
<td>Loading</td>
</tr>
</tbody>
</table>
17.13 Notes

(1) The range of span must be greater (in absolute units) of:
   • 100 units for linear inputs
   • 300°C (550°F) for TC inputs
   • 100°C (200°F) for RTD inputs

(2) If O2Fn = Cool the parameter O1AC is forced on “rEV”

(3) The default value of cycle time CY2 and rC (relative cooling gain) are adjusted according to the type of cooling agent selected:

<table>
<thead>
<tr>
<th></th>
<th>CY2</th>
<th>rC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air</td>
<td>10 s</td>
<td>1.00</td>
</tr>
<tr>
<td>Oil</td>
<td>4 s</td>
<td>0.80</td>
</tr>
<tr>
<td>Water</td>
<td>2 s</td>
<td>0.40</td>
</tr>
</tbody>
</table>

The parameters CY2 and rC are automatically updated during the storing of the new value of PAL.

(4) The dedicated out of signals Alarm2 / OUT1 break-down, OUT1 leakage current alarm and loop break alarm are in logic – OR.

(5) For Band Alarm, H.A. and H.m. means outside band alarm.
    L.A. and L.m. means inside band alarm.

(6) If the alarm is programmed as band alarm or deviation, the standby function masks the alarm condition in startup and after a variation off set point until the value of process variable reaches the alarm threshold with hysteresis.
    If it’s a process alarm masks alarm conditions only during startup.

(7) The alarm of break-down and leakage current are reported on OUT3

(8) In the setting of the manual reset and actions see AL2m and AL2o

(9) At startup the device initializes the timer limit (tOL) of output by setting its output power OLH, if the value of process variable is below the threshold.
18 Serial communications

18.1 introduction to Modbus Protocol

This protocol half duplex takes a master and one or more slaves.
A single multidrop connection can support up to 128 devices.
The computer must be programmed to serve as a master that controls which slave
can have access to the line. All other slaves are waiting. Each slave has a unique address
from 1 to 255.

NOTE:
The numerical values in this text are expressed as:
Binary value if followed by b
Decimal value if not followed by any letter
Hexadecimal value if they are followed by h

The Modbus codes supported are:
Function Code 1 And 2: Reading Bits
Function Code 3 and 4: Reading Words
Function Code 5: Single Bit Writing
Function Code 6: Single Word Writing
Function Code 15: Writing Multiple Bits
Function Code 16: Multiple Words Writing.

The codes 1 – 2 can request up to 24 bits.
The code 15 can write up to 24 bits.
The codes 3 – 4 can request up to 64 words
The code 16 can write up to 64 words.

In case of error the instruments gives the following error code:

2   illegal address
3   Value out of bounds
9   illegal Number of bits or words requested
10  Bits or words not modifiable.
All the words and bits can be read in every situation.
Can only be changed if the instrument is in the condition described in column WRITE:

RT       During normal operation
Conf    During the configurations.
Calibr  During calibration operations
Always  Always

To move from one state to another must write in the word 503 a specific code to put an instrument in the desired condition:

0x5A    Configuration    The instrument show SEr Cnf
0xAA    Calibration      The instrument show SEr CAL
0x55    Test             The instrument show SEr tESt
0xA5    Run Time         The instrument returns to normal operation.

The following procedure are illegal  RT > Conf , Conf > RT
                                     RT > Calibr , Calibr > RT
                                     RT > Test , Test > RT

To check the status of the single parameter you can control the bit at offset 5000

Bit 0  0=Invalid  1=Valid
Bit 7  0=Not Editable  1= Editable

Es: SP  Add=100        Par Staus = 5100
### 18.2 TABLE 0

Address table for data exchange

### 18.3 WORDS ADDRESS

<table>
<thead>
<tr>
<th>Descriz.</th>
<th>Addr</th>
<th>Read</th>
<th>Modif.</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP</td>
<td>100</td>
<td>Always</td>
<td>RT</td>
<td></td>
</tr>
<tr>
<td>Stun</td>
<td>101</td>
<td>Always</td>
<td>RT</td>
<td>0 = Excluded 1 = Included (a)</td>
</tr>
<tr>
<td>SP1</td>
<td>102</td>
<td>Always</td>
<td>RT</td>
<td></td>
</tr>
<tr>
<td>rL</td>
<td>103</td>
<td>Always</td>
<td>RT</td>
<td></td>
</tr>
<tr>
<td>rH</td>
<td>104</td>
<td>Always</td>
<td>RT</td>
<td></td>
</tr>
<tr>
<td>SPu</td>
<td>105</td>
<td>Always</td>
<td>RT</td>
<td>1-100 (101 = Infinite)</td>
</tr>
<tr>
<td>SPd</td>
<td>106</td>
<td>Always</td>
<td>RT</td>
<td>1-100 (101 = Infinite)</td>
</tr>
<tr>
<td>mRS1</td>
<td>107</td>
<td>Always</td>
<td>RT</td>
<td>1 = alarm ACK (a)</td>
</tr>
<tr>
<td>AL1</td>
<td>108</td>
<td>Always</td>
<td>RT</td>
<td>Only if AL1F &lt;&gt; None</td>
</tr>
<tr>
<td>HSA1</td>
<td>109</td>
<td>Always</td>
<td>RT</td>
<td>Only if AL1F &lt;&gt; None</td>
</tr>
<tr>
<td>AL2</td>
<td>110</td>
<td>Always</td>
<td>RT</td>
<td>Only if AL2F &lt;&gt; None</td>
</tr>
<tr>
<td>HSA2</td>
<td>111</td>
<td>Always</td>
<td>RT</td>
<td>Only if AL2F &lt;&gt; None</td>
</tr>
<tr>
<td>AL3</td>
<td>112</td>
<td>Always</td>
<td>RT</td>
<td>Only if AL3F &lt;&gt; None</td>
</tr>
<tr>
<td>HSA3</td>
<td>113</td>
<td>Always</td>
<td>RT</td>
<td>Only if AL3F &lt;&gt; None</td>
</tr>
<tr>
<td>Pb</td>
<td>114</td>
<td>Always</td>
<td>RT</td>
<td>10 (15 w/C)/1000</td>
</tr>
<tr>
<td>HYS</td>
<td>115</td>
<td>Always</td>
<td>RT</td>
<td>1/100 (only with CntF = 0)</td>
</tr>
<tr>
<td>Ti</td>
<td>116</td>
<td>Always</td>
<td>RT</td>
<td>1/1200 (1201 = excluded)(only with CntF &lt;&gt; 0)</td>
</tr>
<tr>
<td>Td</td>
<td>117</td>
<td>Always</td>
<td>RT</td>
<td>1/600 (1 = excluded)(only for CntF = 2)</td>
</tr>
<tr>
<td>IP</td>
<td>118</td>
<td>Always</td>
<td>RT</td>
<td>0(-100 w/C)/100 (only with CntF &lt;&gt; 0)</td>
</tr>
<tr>
<td>rC</td>
<td>119</td>
<td>Always</td>
<td>RT</td>
<td>20/100 (Note 3)</td>
</tr>
<tr>
<td>OLAP</td>
<td>120</td>
<td>Always</td>
<td>RT</td>
<td>-20/50 (Note 3)</td>
</tr>
<tr>
<td>CY1</td>
<td>121</td>
<td>Always</td>
<td>RT</td>
<td>only with Out 1 &lt;&gt; mA</td>
</tr>
<tr>
<td>OLH</td>
<td>122</td>
<td>Always</td>
<td>RT</td>
<td>0 (-100 w/C)/100</td>
</tr>
<tr>
<td>SOut</td>
<td>123</td>
<td>Always</td>
<td>RT</td>
<td>0 (-100 w/C)/100</td>
</tr>
<tr>
<td>CY2</td>
<td>124</td>
<td>Always</td>
<td>RT</td>
<td>1 (10 relay)/2000 (Note 3)</td>
</tr>
<tr>
<td>rmP</td>
<td>125</td>
<td>Always</td>
<td>RT</td>
<td>1/25 (26 = step)</td>
</tr>
<tr>
<td>Hbd</td>
<td>126</td>
<td>Always</td>
<td>RT</td>
<td>Only with HCEn = 1 (enabled)</td>
</tr>
<tr>
<td>HbdH</td>
<td>127</td>
<td>Always</td>
<td>RT</td>
<td>Only with HCEn = 1 (enabled)</td>
</tr>
<tr>
<td>SCA</td>
<td>128</td>
<td>Always</td>
<td>RT</td>
<td>Only with HCEn = 1 (enabled)</td>
</tr>
<tr>
<td>Descriz.</td>
<td>Addr</td>
<td>Read</td>
<td>Modif.</td>
<td>Note</td>
</tr>
<tr>
<td>----------</td>
<td>------</td>
<td>------</td>
<td>--------</td>
<td>------</td>
</tr>
<tr>
<td>mnOP Tune operation mode</td>
<td>129</td>
<td>Always</td>
<td>RT</td>
<td>Only if l1tY or l2tY = 2 0 = Keyboard/serial 1 = switches</td>
</tr>
<tr>
<td>SPOP SP operation mode</td>
<td>130</td>
<td>Always</td>
<td>RT</td>
<td>Only if l1tY or l2tY = 3 0 = Keyboard/serial 1 = switches</td>
</tr>
<tr>
<td>tnOP Autotune operation mode</td>
<td>131</td>
<td>Always</td>
<td>RT</td>
<td>Only if l1tY or l2tY = 1 0 = Keyboard/serial 1 = switches</td>
</tr>
<tr>
<td>ArOP Alarm ACK operat. mode</td>
<td>132</td>
<td>Always</td>
<td>RT</td>
<td>Only if l1tY or l2tY = 4 0 = Keyboard/serial 1 = switches</td>
</tr>
<tr>
<td>PSOP Palette operation mode</td>
<td>133</td>
<td>Always</td>
<td>RT</td>
<td>Only if l1tY or l2tY = 5 0 = Keyboard/serial 1 = switches</td>
</tr>
<tr>
<td>RT RTdefault loading</td>
<td>134</td>
<td>Always</td>
<td>RT</td>
<td>1 = load</td>
</tr>
<tr>
<td>Pb1 Proportional band 1</td>
<td>135</td>
<td>Always</td>
<td>RT</td>
<td>10(15 w/C)/1000</td>
</tr>
<tr>
<td>HYS1 Hysteresis 1</td>
<td>136</td>
<td>Always</td>
<td>RT</td>
<td>1/100 (only with CntF = 0)</td>
</tr>
<tr>
<td>Ti1 Integral time 1</td>
<td>137</td>
<td>Always</td>
<td>RT</td>
<td>1/1200 (1201 = excluded)(only with CntF &lt;&gt; 0)</td>
</tr>
<tr>
<td>Td1 Derivative time 1</td>
<td>138</td>
<td>Always</td>
<td>RT</td>
<td>1/600 (1 = excluded)(only for CntF = 2)</td>
</tr>
<tr>
<td>IP1 Integral preload 1</td>
<td>139</td>
<td>Always</td>
<td>RT</td>
<td>0(-100 w/C)/100 (only with CntF &lt;&gt; 0)</td>
</tr>
<tr>
<td>rC1 Relative cooling gain 1</td>
<td>140</td>
<td>Always</td>
<td>RT</td>
<td>20/100 (only with CntF &lt;&gt; 0 and O2Fn = Cool)</td>
</tr>
<tr>
<td>OLAP OLAP 1</td>
<td>141</td>
<td>Always</td>
<td>RT</td>
<td>-20/50 (only with CntF &lt;&gt; 0 and O2Fn = Cool)</td>
</tr>
<tr>
<td>Pb2 Proportional band 2</td>
<td>142</td>
<td>Always</td>
<td>RT</td>
<td>10(15 w/C)/1000</td>
</tr>
<tr>
<td>HYS2 Hysteresis 2</td>
<td>143</td>
<td>Always</td>
<td>RT</td>
<td>1/100 (only with CntF = 0)</td>
</tr>
<tr>
<td>Ti2 Integral time 2</td>
<td>144</td>
<td>Always</td>
<td>RT</td>
<td>1/1200 (1201 = excluded)(only with CntF &lt;&gt; 0)</td>
</tr>
<tr>
<td>Td2 Derivative time 2</td>
<td>145</td>
<td>Always</td>
<td>RT</td>
<td>1/600 (1 = excluded)(only for CntF = 2)</td>
</tr>
<tr>
<td>IP2 Integral preload 2</td>
<td>146</td>
<td>Always</td>
<td>RT</td>
<td>0(-100 w/C)/100 (only with CntF &lt;&gt; 0)</td>
</tr>
<tr>
<td>rC2 Relative cooling gain 2</td>
<td>147</td>
<td>Always</td>
<td>RT</td>
<td>20/100 (only with CntF &lt;&gt; 0 and O2Fn = Cool)</td>
</tr>
<tr>
<td>OLAP OLAP 2</td>
<td>148</td>
<td>Always</td>
<td>RT</td>
<td>-20/50 (only with CntF &lt;&gt; 0 and O2Fn = Cool)</td>
</tr>
<tr>
<td>Pb3 Proportional band 3</td>
<td>149</td>
<td>Always</td>
<td>RT</td>
<td>10(15 w/C)/1000</td>
</tr>
<tr>
<td>HYS3 Hysteresis 3</td>
<td>150</td>
<td>Always</td>
<td>RT</td>
<td>1/100 (only with CntF = 0)</td>
</tr>
<tr>
<td>Ti3 Integral time 3</td>
<td>151</td>
<td>Always</td>
<td>RT</td>
<td>1/1200 (1201 = excluded)(only with CntF &lt;&gt; 0)</td>
</tr>
<tr>
<td>Td3 Derivative time 3</td>
<td>152</td>
<td>Always</td>
<td>RT</td>
<td>1/600 (1 = excluded)(only for CntF = 2)</td>
</tr>
<tr>
<td>IP3 Integral preload 3</td>
<td>153</td>
<td>Always</td>
<td>RT</td>
<td>0(-100 w/C)/100 (only with CntF &lt;&gt; 0)</td>
</tr>
<tr>
<td>rC3 Relative cooling gain 3</td>
<td>154</td>
<td>Always</td>
<td>RT</td>
<td>20/100 (only with CntF &lt;&gt; 0 and O2Fn = Cool)</td>
</tr>
<tr>
<td>OLAP OLAP 3</td>
<td>155</td>
<td>Always</td>
<td>RT</td>
<td>-20/50 (only with CntF &lt;&gt; 0 and O2Fn = Cool)</td>
</tr>
<tr>
<td>IntY Input type</td>
<td>300</td>
<td>Always</td>
<td>Conf</td>
<td>Table 1</td>
</tr>
<tr>
<td>nDEC Decimal point position</td>
<td>301</td>
<td>Always</td>
<td>Conf</td>
<td>Only for linear</td>
</tr>
<tr>
<td>LOSC Low scale</td>
<td>302</td>
<td>Always</td>
<td>Conf</td>
<td></td>
</tr>
<tr>
<td>HISC High scale</td>
<td>303</td>
<td>Always</td>
<td>Conf</td>
<td></td>
</tr>
<tr>
<td>OFFS Input offset</td>
<td>304</td>
<td>Always</td>
<td>Conf</td>
<td>Only for TC and RTD</td>
</tr>
<tr>
<td>Descriz.</td>
<td>Addr</td>
<td>Read</td>
<td>Modif</td>
<td>Note</td>
</tr>
<tr>
<td>----------</td>
<td>------</td>
<td>------</td>
<td>-------</td>
<td>------</td>
</tr>
</tbody>
</table>
| O1Fn Output 1 function | 305 | Always | Conf | 0 = none  
1 = heating  
2 = cooling  
3 = alarm 1  
4 = alarm 2  
5 = alarm 3 |
| O1Fn Out 1 function (uscita mA) 1 = heating | 306 | Always | Conf | 0 = none  
2 = cooling  
3 = SP retrasmission  
4 = Pv retrasmission |
| O1ty Output 1 type | 307 | Always | Conf | 0 = 0-20mA  
1 = 4-20mA  
2 = 0-10 V  
3 = 2-10 V |
| O1LS Output 1 retrasm. low scale | 308 | Always | Conf | |
| O1HS Output 1 retrasm. high scale | 309 | Always | Conf | |
| O2Fn Output 2 function | 310 | Always | Conf | 0 = None  
1 = heating  
2 = cooling  
3 = alarm 1  
4 = alarm 2  
5 = alarm 3 |
| O3Fn Output 3 function | 312 | Always | Conf | 0 = none  
1 = heating  
2 = cooling  
3 = alarm 1  
4 = alarm 2  
5 = alarm 3 |
| O3Fn Out 3 function (uscita mA) | 313 | Always | Conf | 0 = none  
1 = heating  
2 = cooling  
3 = SP retrasmission  
4 = Pv retrasmission |
<table>
<thead>
<tr>
<th>Descriz.</th>
<th>Addr</th>
<th>Read</th>
<th>Modif</th>
<th>Note</th>
</tr>
</thead>
</table>
| O3ty     | 314  | Always | Conf | 0 = 0-20mA  
|          |      |       |      | 1 = 4-20mA  
|          |      |       |      | 2 = 0-10 V  
|          |      |       |      | 3 = 2-10 V  |
| O3LS     | 315  | Always | Conf |      |
| O3HS     | 316  | Always | Conf |      |
| I1tY     | 317  | Always | Conf | Note 7  
|          |      |       |      | Only with O3Fn = None  
|          |      |       |      | 0 = None  
|          |      |       |      | 1 = Auto/Manual  
|          |      |       |      | 2 = Tune/Adaptive ON/OFF  
|          |      |       |      | 3 = SP/SP1 selection  
|          |      |       |      | 4 = Alarm reset  
|          |      |       |      | 5 = Control table selection |
| O4Fn     | 318  | Always | Conf | 0 = None  
|          |      |       |      | 1 = heating  
|          |      |       |      | 2 = cooling  
|          |      |       |      | 3 = alarm 1  
|          |      |       |      | 4 = alarm 2  
|          |      |       |      | 5 = alarm 3  |
| I2tY     | 319  | Always | Conf | Note 8  
|          |      |       |      | Only with O4Fn = None  
|          |      |       |      | 0 = None  
|          |      |       |      | 1 = Auto/Manual  
|          |      |       |      | 2 = Tune/Adaptive ON/OFF  
|          |      |       |      | 3 = SP/SP1 selection  
|          |      |       |      | 4 = Alarm reset  
|          |      |       |      | 5 = Control table selection |
| CLmd     | 311  | Always | Conf | Note 3  
|          |      |       |      | 0 = Air  
|          |      |       |      | 1 = Oil |
| HACt     | 361  | Always | Conf | 0 = Reverse  
|          |      |       |      | 1 = Direct  
<p>|          |      |       |      | 2 = H2O  |</p>
<table>
<thead>
<tr>
<th>Descriz.</th>
<th>Addr</th>
<th>Read</th>
<th>Modif</th>
<th>Note</th>
</tr>
</thead>
</table>
| AL1F Alarm 1 function | 320  | Always | Conf  | 0 = None  
|             |      |        |       | 1 = Process  
|             |      |        |       | 2 = Band  
|             |      |        |       | 3 = Deviation |
| AL1m Alarm 1 operating mode | 321  | Always | Conf  | 0 = High (ACK Auto)  
|             |      |        |       | 1 = Low (ACK Auto)  
|             |      |        |       | 2 = High (ACK Manual)  
|             |      |        |       | 3 = Low (ACK Manual) |
| AL1o Alarm 1 action | 322  | Always | Conf  | 0 = Reverse  
|             |      |        |       | 1 = Direct |
| A1mS Alarm 1 stand by | 323  | Always | Conf  | 0 = ON  
|             |      |        |       | 1 = OFF |
| AL2F Alarm 2 function | 324  | Always | Conf  | 0 = None  
|             |      |        |       | 1 = Process  
|             |      |        |       | 2 = Band  
|             |      |        |       | 3 = Deviation |
| AL2m Alarm 2 operating mode | 325  | Always | Conf  | 0 = High (ACK Auto)  
|             |      |        |       | 1 = Low (ACK Auto)  
|             |      |        |       | 2 = High (ACK Manual)  
|             |      |        |       | 3 = Low (ACK Manual) |
| AL2o Alarm 2 action | 326  | Always | Conf  | 0 = Reverse  
|             |      |        |       | 1 = Direct |
| A2mS Alarm 2 stand by | 327  | Always | Conf  | 0 = ON  
|             |      |        |       | 1 = OFF |
| AL3F Alarm 3 function | 328  | Always | Conf  | 0 = None  
|             |      |        |       | 1 = Process  
|             |      |        |       | 2 = Band  
|             |      |        |       | 3 = Deviation |
| AL3m Alarm 3 operating mode | 329  | Always | Conf  | 0 = High (ACK Auto)  
|             |      |        |       | 1 = Low (ACK Auto)  
|             |      |        |       | 2 = High (ACK Manual)  
<p>|             |      |        |       | 3 = Low (ACK Manual) |</p>
<table>
<thead>
<tr>
<th>Descriz.</th>
<th>Addr.</th>
<th>Read</th>
<th>Modif.</th>
<th>Note</th>
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</table>
| AL3o Alarm 3 action | 330 | Always | Conf | 0 = Reverse  
1 = Direct |
| A3mS Alarm 3 stand by | 331 | Always | Conf | 0 = ON  
1 = OFF |
| HCEn Breakdown alarm enable | 332 | Always | Conf | 0 = Disabled  
1 = Enabled |
| HCHS TA high scale | 333 | Always | Conf | 5/1000 (Only with HCEn = 1) |
| LbAl Loop alarm enable | 334 | Always | Conf | 0 = Disabled  
1 = Enabled |
| LbdU Loop alarm deviation | 335 | Always | Conf | 0/500 (Only with LbAl = 1) |
| Lbt Loop alarm time | 336 | Always | Conf | 0/600 (Only with LbAl = 1) |
| LbHS Loop alarm hysteresis | 337 | Always | Conf | 1/50 (Only with LbAl = 1) |
| TnFn Tune enable | 338 | Always | Conf | 0 = Disabled  
1 = Enabled |
| rCEn RC computed by tune | 339 | Always | Conf | 0 = Disabled  
1 = Enabled (Only with TnFn = 1) |
| HPb Max PB computed by tune | 340 | Always | Conf | Only with TnFn = 1  
LPb1/1000 with O2Fn <> Cool  
LPb2/1000 with O2Fn = Cool |
| LPb1 Min Pb with only Heat | 341 | Always | Conf | 15/HPb (Only with TnFn = 1 and O2Fn <> Cool) |
| LPb2 Min Pb with Heat/Cool. | 342 | Always | Conf | 10/HPb (Only with TnFn = 1 and O2Fn = Cool) |
| LTi Min T1 computed by tune | 343 | Always | Conf | 1/120 (Only with TnFn = 1) |
| SFFn Soft start enable | 344 | Always | Conf | 0 = Disabled  
1 = Enabled |
| tHSS Soft start threshold | 345 | Always | Conf | Only with SFFn = 1 |
| tOL Soft start time | 346 | Always | Conf | 1/540 (Only with SFFn = 1) |
| mnFn Manual function | 347 | Always | Conf | 0 = None  
1 = Auto/Manual  
2 = OFF  
3 = TA display |
| SECF Condition for output safety value | 348 | Always | Conf | 0 = None  
1 = In over-range and under-range  
2 = In over-range  
3 = In under-range |
<p>| SECO Output safety value | 349 | Always | Conf | 0(-100 w/C)/100 (only with SECF &lt;&gt; 0) |</p>
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<th>Modif</th>
<th>Note</th>
</tr>
</thead>
</table>
| Control action type | 350 | Always | Conf | 0 = ON/OFF  
1 = PID  
2 = PI |
| Displayed SP | 351 | Always | Conf | 0 = Final SP  
1 = Operative SP |
| RS485 enable | 352 | Always | Conf | 0 = Disabled  
1 = Enabled |
| RS485 address | 353 | Always | Conf | Only with SErE = 1 |
| RS485 BAud rate | 354 | Always | Conf | Only with SErE = 1 |
| RS485 Bits | 355 | Always | Conf | Only with SErE = 1 |
| Load Eur default | 359 | Always | Conf | 1 = Load |
| Load Amer default | 360 | Always | Conf | 1 = Load |
| Device status (automa) | 503 | Always | Always | Read  
0 = Run time (set up)  
1 = Configuration (keyboard)  
2 = Run time (Home)(PV+SP)  
3 = Run time Manual (PV+OUT)  
4 = Run Time (Special)  
5 = Lamp Test  
6 = Configuration (serial)  
7 = Configuration (serial)  
8 = Calibration (serial)  
9 = Calibration (Farm)  
10 = Test (Farm)  
11 = Test (Farm)  
12 = Configuration PSW  
13 = Calibration PSW  
14 = Exit  
15 = Error  
Write  
0x5A = Serial Configuration  
0xAA = Serial Calibration  
0x55 = Run time  
0x55 = Serial Test |
<p>| PV in counts | 504 | Always | Never | Note 1 |
| PV | 505 | Always | Never | Note 1 |</p>
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<td>only in manual mode</td>
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<td>Output cool value</td>
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<tr>
<td>Final SP</td>
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<td>Comp.TA value (O1 ON)</td>
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<td>TA value (O1 OFF)</td>
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<td>RJ measure (counts)</td>
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<td>Always</td>
<td>Never</td>
<td></td>
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<tr>
<td>RJ measure (degree)</td>
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<td>Table 2</td>
</tr>
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<td>Out3 module code</td>
<td>520</td>
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<td>Table 2</td>
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<tr>
<td>Out4 module code</td>
<td>521</td>
<td>Always</td>
<td>Never</td>
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<td>Control param. group selected by switches</td>
<td>514</td>
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| Control param. group selected by serial | 515 | Always | RT | 0 = Standard Control Param Group (a)  
1 = Control Param Group 1  
2 = Control Param Group 2  
3 = Control Param Group 3 |

**Status word**

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<td>status Out3 (RO)</td>
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<td>status Out4 (RO)</td>
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<td>status Alarm3 (RO)</td>
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<td>status alarm leakage (RO)</td>
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<td>status alarm loop break (RO)</td>
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<td>status alarm sensor failure (RO)</td>
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<tr>
<td>15</td>
<td>status alarm overrange (RO)</td>
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<td>Descriz.</td>
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<td>--------------------</td>
<td>-------</td>
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<td>Test Output Status</td>
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</tr>
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<td>TA value (counts)(O1 OFF)</td>
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### 18.4 BITS

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<td>102</td>
<td>Status Out 2</td>
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<td>1 = ON</td>
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<tr>
<td>103</td>
<td>Status Out 3</td>
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<td>Never</td>
<td>1 = ON</td>
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<td>104</td>
<td>Status Out 4</td>
<td>Always</td>
<td>Never</td>
<td>1 = ON</td>
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<td>105</td>
<td>Status Allarme 1</td>
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<td>Never</td>
<td>1 = alarm</td>
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<td>106</td>
<td>Status Allarme 2</td>
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<td>1 = alarm</td>
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<tr>
<td>107</td>
<td>Status Allarme 3</td>
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<td>108</td>
<td>Status Heater Breack (HB)</td>
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<td>Never</td>
<td>1 = alarm</td>
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<tr>
<td>109</td>
<td>Status Loop Alarm</td>
<td>Always</td>
<td>Never</td>
<td>1 = alarm</td>
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<tr>
<td>110</td>
<td>Status Pretune</td>
<td>Always</td>
<td>Never</td>
<td>0 = excluded 1 = included</td>
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<tr>
<td>111</td>
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<td>Never</td>
<td>0 = excluded 1 = included</td>
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<td>Status Auto/Manual</td>
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<td>RT</td>
<td>0 = auto 1 = manual (Note 9)</td>
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<td>113</td>
<td>Status Input 1</td>
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<td>0 = open 1 = closed</td>
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<td>114</td>
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<td>116</td>
<td>Status sensor break</td>
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<td>118</td>
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<td>Never</td>
<td>1 = alarm</td>
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<td>1 = Valida 0 = to update</td>
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<td>1 = Valida 0 = to update</td>
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<td>1 = alarm</td>
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<td>122</td>
<td>ON/OFF</td>
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<td>503</td>
<td>Parameter Chanded</td>
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<td>1 = if it change (is resetted when reading)</td>
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</table>

**NOTE:**
- a. Valid only if present in the out module on Out 2
- b. Valid only if present in the out module on Out 2 e O2Fn = 1 (cooling out)
- c. Valid only if present in the out module on Out 2 <> mA/V e O2Fn = 1 (cooling out)
- d. Valid only if present in the out module on Out 3
- e. Valid only if present in the out module on Out 4
- f. Valid only if present in the out module or contact on Out 3
- g. Valid only if present in the out module or contact on Out 4
- h. Valid only if the switch from selection is not abled
## 18.5 TABLE 1 (WEST 6600)

The Table 1 Redirect only some of the parameters maintain compatibility the compatibility with the West 6600
For parameters that do not appear in the list refer to the table 0

**WORDS ADDRESSES**

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<th>Modif</th>
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<tr>
<td>39</td>
<td>Reserved</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 18.6 Status Table (Word 7)

<table>
<thead>
<tr>
<th>Bit</th>
<th>Desc</th>
<th>RO/RW</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Comm write en</td>
<td>RO</td>
<td>1 = Enable</td>
</tr>
<tr>
<td>1</td>
<td>Auto Man</td>
<td>RW</td>
<td>1 = Manual , 0= Auto</td>
</tr>
<tr>
<td>2</td>
<td>Self-Tune</td>
<td>RW</td>
<td>1 = Active, 0 = Not Active</td>
</tr>
<tr>
<td>3</td>
<td>Pre-Tune</td>
<td>RW</td>
<td>1 = Active, 0 = Not Active</td>
</tr>
<tr>
<td>4</td>
<td>Alarm 1 Status</td>
<td>RO</td>
<td>1 = Active, 0 = Not Active</td>
</tr>
<tr>
<td>5</td>
<td>Alarm 2 Status</td>
<td>RO</td>
<td>1 = Active, 0 = Not Active</td>
</tr>
<tr>
<td>6</td>
<td>Alarm 3 status</td>
<td>RO</td>
<td>1 = Active, 0 = Not Active</td>
</tr>
<tr>
<td>7</td>
<td>Par changed</td>
<td>RO</td>
<td>1 = parameter changed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NOTE :reset after each reading of bit 7 or Word 7</td>
</tr>
<tr>
<td>8</td>
<td>On/off contr (standby)</td>
<td>RW</td>
<td>1 = OFF, 0 = ON</td>
</tr>
<tr>
<td>9</td>
<td>Reserved</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>HB low</td>
<td>RO</td>
<td>1 = Active, 0 = Not Active</td>
</tr>
<tr>
<td>11</td>
<td>HB short Circuit</td>
<td>RO</td>
<td>1 = Active, 0 = Not Active</td>
</tr>
<tr>
<td>12</td>
<td>Reserved</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Reserved</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Reserved</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Reserved</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bit</td>
<td>Desc</td>
<td>Read</td>
<td>Modif</td>
</tr>
<tr>
<td>-----</td>
<td>----------------</td>
<td>--------</td>
<td>---------------------</td>
</tr>
<tr>
<td>1</td>
<td>Comm write en</td>
<td>Always</td>
<td>Never</td>
</tr>
<tr>
<td>2</td>
<td>Auto Man</td>
<td>Always</td>
<td>RT</td>
</tr>
<tr>
<td>3</td>
<td>Self-Tune</td>
<td>Always</td>
<td>RT</td>
</tr>
<tr>
<td>4</td>
<td>Pre-Tune</td>
<td>Always</td>
<td>RT</td>
</tr>
<tr>
<td>5</td>
<td>Alarm 1 Status</td>
<td>Always</td>
<td>Never</td>
</tr>
<tr>
<td>6</td>
<td>Alarm 2 Status</td>
<td>Always</td>
<td>Never</td>
</tr>
<tr>
<td>7</td>
<td>Alarm 3 Status</td>
<td>Always</td>
<td>Never</td>
</tr>
<tr>
<td>8</td>
<td>Par changed</td>
<td>Always</td>
<td>Never</td>
</tr>
<tr>
<td>9</td>
<td>On/off contr (standby)</td>
<td>Always</td>
<td>RT</td>
</tr>
<tr>
<td>10</td>
<td>Reserved</td>
<td>Always</td>
<td>Never</td>
</tr>
<tr>
<td>11</td>
<td>HB low</td>
<td>Always</td>
<td>Never</td>
</tr>
<tr>
<td>12</td>
<td>HB short Circuit</td>
<td>Always</td>
<td>Never</td>
</tr>
<tr>
<td>13</td>
<td>Reserved</td>
<td>Always</td>
<td>Never</td>
</tr>
<tr>
<td>14</td>
<td>Reserved</td>
<td>Always</td>
<td>Never</td>
</tr>
<tr>
<td>15</td>
<td>Reserved</td>
<td>Always</td>
<td>Never</td>
</tr>
<tr>
<td>16</td>
<td>Reserved</td>
<td>Always</td>
<td>Never</td>
</tr>
</tbody>
</table>

**NOTA:** reset after each reading of bit 7 or Word 7
19 Default Parameter Loading

19.1 User procedure

In each operative mode (operative, programming and calibration) is possible at any time to invoke the set of default values to be assigned to their parameters.

19.2 Loading Default operative parameter

The performed procedure consists of the following steps:

- Press **func** key to enter in the edit menu.
- With Keys ▲ and ▼ select the group “deF” and press **FUNC**.
- On the upper display appears writing “rt”; On lower display “on”.
- Press **FUNC** key to load the default
- Press **MAN** key to cancel.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setpoint</td>
<td>Lower range limit</td>
</tr>
<tr>
<td>Selftune</td>
<td>Disabled</td>
</tr>
<tr>
<td>Manual Reset of alarm condition</td>
<td>Off</td>
</tr>
<tr>
<td>Auxiliary Setpoint</td>
<td>Upper range limit</td>
</tr>
<tr>
<td>Software protection Key</td>
<td>Unlocked</td>
</tr>
<tr>
<td>Threshold Alarm 1</td>
<td>Lower range limit (process alarm)</td>
</tr>
<tr>
<td></td>
<td>0 (Band alarm or di deviation)</td>
</tr>
<tr>
<td>Hysteresis alarm 1</td>
<td>0.1%</td>
</tr>
<tr>
<td>Threshold Alarm 2</td>
<td>Lower range limit (process alarm)</td>
</tr>
<tr>
<td></td>
<td>0 (Band alarm or di deviation)</td>
</tr>
<tr>
<td>Hysteresis alarm 2</td>
<td>0.1%</td>
</tr>
<tr>
<td>Threshold Alarm 3</td>
<td>Lower range limit (process alarm)</td>
</tr>
<tr>
<td></td>
<td>0 (Band alarm or di deviation)</td>
</tr>
<tr>
<td>Hysteresis alarm 3</td>
<td>0.1%</td>
</tr>
<tr>
<td>Proportional band</td>
<td>4.0%</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>0.5%</td>
</tr>
<tr>
<td>Integral time</td>
<td>04.00 (4 minutes)</td>
</tr>
<tr>
<td>Derivative time</td>
<td>01.00 (1 minit)</td>
</tr>
<tr>
<td>Integral preload</td>
<td>30 (Only one control Out)</td>
</tr>
<tr>
<td></td>
<td>0 (Two control Out)</td>
</tr>
<tr>
<td>Parameter</td>
<td>Value</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>Cycle time out1</td>
<td>15 seconds (relay)</td>
</tr>
<tr>
<td></td>
<td>4 seconds (SSR)</td>
</tr>
<tr>
<td>Cycle time out2</td>
<td>10 seconds (Cooling by air)</td>
</tr>
<tr>
<td></td>
<td>4 seconds (Cooling by oil)</td>
</tr>
<tr>
<td></td>
<td>2 seconds (Cooling by Water)</td>
</tr>
<tr>
<td>Relative cooling gain</td>
<td>1.00 (Cooling by air)</td>
</tr>
<tr>
<td></td>
<td>0.80 (Cooling by oil)</td>
</tr>
<tr>
<td></td>
<td>0.40 (Cooling by Water)</td>
</tr>
<tr>
<td>Dead-band / overlap</td>
<td>between</td>
</tr>
<tr>
<td>Out heating / cooling</td>
<td>0</td>
</tr>
<tr>
<td>Lower setpoint limit</td>
<td>Lower range Input limit</td>
</tr>
<tr>
<td>Upper setpoint limit</td>
<td>Upper range Input limit</td>
</tr>
<tr>
<td>Rate-of-change for positive changes of sp</td>
<td>Infinite</td>
</tr>
<tr>
<td>Rate-of-change for negative changes of sp</td>
<td>Infinite</td>
</tr>
<tr>
<td>Superior Out Limiter</td>
<td>100%</td>
</tr>
<tr>
<td>Timeout soft-start</td>
<td>Infinito</td>
</tr>
<tr>
<td>Break-down alarm threshold out1</td>
<td>50.0% fo span value</td>
</tr>
<tr>
<td>Leakage alarm threshold out1</td>
<td>100.0% fo span value</td>
</tr>
<tr>
<td>Limit of output of control changes</td>
<td>Infinite</td>
</tr>
</tbody>
</table>

### 19.3 Default configuration parameter Loading

The performed procedure consists of the following steps:

- enter in configuration as described above.
- With Keys ▲ and ▼ select the group “deF” and press **FUNC**.
- With Keys ▲ e ▼ select the desired table type (European or American)
- Press **FUNC** key
- With Keys ▲ and ▼ select “on”
- Press **FUNC** key to load the default
- Press **MAN** key to cancel.
### 19.3.1 European table

<table>
<thead>
<tr>
<th>Par</th>
<th>Desc</th>
<th>Val</th>
</tr>
</thead>
<tbody>
<tr>
<td>Menu</td>
<td><strong>inP</strong></td>
<td></td>
</tr>
<tr>
<td><strong>inP</strong></td>
<td>Input type and range</td>
<td><strong>TEC J</strong> (-100 ↔ 1000 °C)</td>
</tr>
<tr>
<td><strong>ndEC</strong></td>
<td>Decimal point position</td>
<td>“-----.” (no decimals)</td>
</tr>
<tr>
<td><strong>LoSC</strong></td>
<td>Initial scale value for linear inputs</td>
<td>0</td>
</tr>
<tr>
<td><strong>HiSC</strong></td>
<td>Full scale value for linear inputs</td>
<td>400</td>
</tr>
<tr>
<td><strong>oFFS</strong></td>
<td>Offset</td>
<td>0</td>
</tr>
<tr>
<td>Menu</td>
<td><strong>io1</strong></td>
<td></td>
</tr>
<tr>
<td><strong>io1Fn</strong></td>
<td>OUT1 logic function</td>
<td><strong>hEAt</strong> Heating</td>
</tr>
<tr>
<td><strong>io1FA</strong></td>
<td>OUT1 analogic function</td>
<td><strong>hEAt</strong> Heating</td>
</tr>
<tr>
<td><strong>io1ty</strong></td>
<td>Output type 1 if analog</td>
<td>4-20 4-20mA</td>
</tr>
<tr>
<td><strong>io1LS</strong></td>
<td>Lower limit for the retransmission</td>
<td>= <strong>LoSC</strong></td>
</tr>
<tr>
<td><strong>io1HS</strong></td>
<td>Upper limit for the retransmission</td>
<td>= <strong>HiSC</strong></td>
</tr>
<tr>
<td><strong>io2Fn</strong></td>
<td>OUT2 logic function</td>
<td><strong>AL1</strong> out alarm1</td>
</tr>
<tr>
<td><strong>io3Fn</strong></td>
<td>OUT3 logic function</td>
<td><strong>AL2</strong> out alarm2</td>
</tr>
<tr>
<td><strong>io1 ty</strong></td>
<td>Digital Input 1 Function</td>
<td>Auto/Auto Manual</td>
</tr>
<tr>
<td><strong>io3FA</strong></td>
<td>Analogic OUT3 Function</td>
<td><strong>PuLt</strong> Retransmission PV</td>
</tr>
<tr>
<td><strong>io3ty</strong></td>
<td>Output type 1 if analog</td>
<td>4-20 4-20mA</td>
</tr>
<tr>
<td><strong>io3LS</strong></td>
<td>Lower limit for the retransmission</td>
<td>= <strong>LoSC</strong></td>
</tr>
<tr>
<td><strong>io3HS</strong></td>
<td>Upper limit for the retransmission</td>
<td>= <strong>HiSC</strong></td>
</tr>
<tr>
<td><strong>io4Fn</strong></td>
<td>OUT4 function</td>
<td><strong>AL3</strong> out alarm3</td>
</tr>
<tr>
<td><strong>io2 ty</strong></td>
<td>Digital Input 2 Function</td>
<td><strong>SP</strong> 2° SP</td>
</tr>
<tr>
<td><strong>CLnd</strong></td>
<td>Type of cooling agent</td>
<td><strong>Air</strong></td>
</tr>
<tr>
<td><strong>HACT</strong></td>
<td>OUT1 Action</td>
<td><strong>rEUV</strong> reverse</td>
</tr>
<tr>
<td>Menu</td>
<td>AL</td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>-----</td>
<td>---</td>
</tr>
<tr>
<td><strong>AL1F</strong></td>
<td>ALARM1 Function</td>
<td><strong>dE u</strong> Deviation+ automatic reset</td>
</tr>
<tr>
<td><strong>AL1n</strong></td>
<td>ALARM1 Configuration</td>
<td><strong>LA</strong> Low + automatic reset</td>
</tr>
<tr>
<td><strong>AL1o</strong></td>
<td>ALARM1 Action</td>
<td><strong>dIr</strong> Direct</td>
</tr>
<tr>
<td><strong>AL1nS</strong></td>
<td>ALARM1 standby Function</td>
<td>Off</td>
</tr>
<tr>
<td><strong>AL2F</strong></td>
<td>ALARM2 Function</td>
<td><strong>dE u</strong> Deviation+ automatic reset</td>
</tr>
<tr>
<td><strong>AL2n</strong></td>
<td>ALARM2 Configuration</td>
<td><strong>LA</strong> Low + automatic reset</td>
</tr>
<tr>
<td><strong>AL2o</strong></td>
<td>ALARM2 Action</td>
<td><strong>dIr</strong> Direct</td>
</tr>
<tr>
<td><strong>A2nS</strong></td>
<td>ALARM2 standby Function</td>
<td>Off</td>
</tr>
<tr>
<td><strong>AL3F</strong></td>
<td>ALARM3 Function</td>
<td><strong>dE u</strong> Deviation+ automatic reset</td>
</tr>
<tr>
<td><strong>AL3n</strong></td>
<td>ALARM3 Configuration</td>
<td><strong>LA</strong> Low + automatic reset</td>
</tr>
<tr>
<td><strong>AL3o</strong></td>
<td>ALARM3 Action</td>
<td><strong>dIr</strong> Direct</td>
</tr>
<tr>
<td><strong>A3nS</strong></td>
<td>ALARM3 standby Function</td>
<td>Off</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Menu</th>
<th>Hbdu</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HCEn</strong></td>
<td>break-down and leakage current measure</td>
</tr>
<tr>
<td><strong>HCHS</strong></td>
<td>Full scale value for load current</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Menu</th>
<th>LbAL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LbAL</strong></td>
<td>loop break alarm configuration</td>
</tr>
<tr>
<td><strong>lbdu</strong></td>
<td>loop break alarm deviation</td>
</tr>
<tr>
<td><strong>lb t</strong></td>
<td>loop break time alarm</td>
</tr>
<tr>
<td><strong>lb hs</strong></td>
<td>loop break hysteresis alarm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Menu</th>
<th>tunE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>tnFn</strong></td>
<td>Selftune enabling</td>
</tr>
<tr>
<td><strong>rCEn</strong></td>
<td>calculation of relative cooling gain</td>
</tr>
<tr>
<td><strong>hPb</strong></td>
<td>Superior Limit of proportional band</td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------</td>
</tr>
<tr>
<td><strong>lpb 1</strong></td>
<td>Lower Limit of proportional band with <em>heating / cooling</em></td>
</tr>
<tr>
<td><strong>lpb 2</strong></td>
<td>Lower Limit of proportional band with OUT1 heating</td>
</tr>
<tr>
<td><strong>lt</strong></td>
<td>Lower Limit of integral time</td>
</tr>
</tbody>
</table>

**Menu Soft**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SFn</strong></td>
<td>SOFT START FUNCTION</td>
</tr>
<tr>
<td><strong>thSS</strong></td>
<td>Threshold input for enabling soft start</td>
</tr>
<tr>
<td><strong>to t</strong></td>
<td>Soft start timeout</td>
</tr>
</tbody>
</table>

**Menu nisc**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>nnFn</strong></td>
<td>MANUAL function</td>
</tr>
<tr>
<td><strong>snd</strong></td>
<td>Alarm State at Startup</td>
</tr>
<tr>
<td><strong>secF</strong></td>
<td>Condition for output set to the security value</td>
</tr>
<tr>
<td><strong>sco</strong></td>
<td>Security value</td>
</tr>
<tr>
<td><strong>cntF</strong></td>
<td>Control of Action</td>
</tr>
<tr>
<td><strong>spUS</strong></td>
<td>Setpoint view</td>
</tr>
<tr>
<td>** filt**</td>
<td>Filter on measure</td>
</tr>
<tr>
<td><strong>spdr</strong></td>
<td>Direct modify enabling SP</td>
</tr>
</tbody>
</table>

**Menu r485**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SErE</strong></td>
<td>Communication RS485 Abled</td>
</tr>
<tr>
<td><strong>Add</strong></td>
<td>Device address</td>
</tr>
<tr>
<td><strong>baud</strong></td>
<td>Baud rate</td>
</tr>
<tr>
<td><strong>Par</strong></td>
<td>Parità checksum</td>
</tr>
<tr>
<td><strong>mbSt</strong></td>
<td>MODBUS table selection</td>
</tr>
</tbody>
</table>
### 19.3.2 Americana table

<table>
<thead>
<tr>
<th>Par</th>
<th>Desc</th>
<th>Val</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Menu</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\text{n}P$</td>
<td>Input type and range</td>
<td>$\text{EC J F}$ (-150 ↔ 1830 °F)</td>
</tr>
<tr>
<td>$\text{ndEC}$</td>
<td>Decimal point position</td>
<td>“----.” (no decimal)</td>
</tr>
<tr>
<td>$\text{LoSC}$</td>
<td>Initial scale value for linear inputs</td>
<td>0</td>
</tr>
<tr>
<td>$\text{HiSC}$</td>
<td>Full scale value for linear inputs</td>
<td>1830</td>
</tr>
<tr>
<td>$\text{oFFS}$</td>
<td>Offset</td>
<td>0</td>
</tr>
<tr>
<td><strong>Menu</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\text{io}$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\text{o1Fn}$</td>
<td>OUT1 logic function</td>
<td>Heating</td>
</tr>
<tr>
<td>$\text{o1FA}$</td>
<td>OUT1 analogic function</td>
<td>Heating</td>
</tr>
<tr>
<td>$\text{o1ty}$</td>
<td>Output type 1 if analogic</td>
<td>4-20mA</td>
</tr>
<tr>
<td>$\text{o1LS}$</td>
<td>Lower limit for the retransmission</td>
<td>$\text{LoSC}$</td>
</tr>
<tr>
<td>$\text{o1HS}$</td>
<td>Upper limit for the retransmission</td>
<td>$\text{HiSC}$</td>
</tr>
<tr>
<td>$\text{o2Fn}$</td>
<td>OUT2 logic function</td>
<td>OUT1 allarm1</td>
</tr>
<tr>
<td>$\text{o3Fn}$</td>
<td>OUT3 logic function</td>
<td>OUT2 allarm2</td>
</tr>
<tr>
<td>$\text{i1ty}$</td>
<td>Digital Input 1 Function</td>
<td>Auto/Manual</td>
</tr>
<tr>
<td>$\text{o3FA}$</td>
<td>Analogic OUT3 Function</td>
<td>Retrasmision PV</td>
</tr>
<tr>
<td>$\text{O3ty}$</td>
<td>Output type 1 if analogic</td>
<td>4-20mA</td>
</tr>
<tr>
<td>$\text{o3LS}$</td>
<td>Lower limit for the retransmission</td>
<td>$\text{LoSC}$</td>
</tr>
<tr>
<td>$\text{o3HS}$</td>
<td>Upper limit for the retransmission</td>
<td>$\text{HiSC}$</td>
</tr>
<tr>
<td>$\text{o4Fn}$</td>
<td>OUT4 function</td>
<td>OUT3 allarm3</td>
</tr>
<tr>
<td>$\text{i2ty}$</td>
<td>Digital Input 2 Function</td>
<td>$\text{SP}$ 2° SP</td>
</tr>
<tr>
<td>$\text{Clnd}$</td>
<td>Type of cooling agent</td>
<td>Air</td>
</tr>
<tr>
<td>$\text{HACT}$</td>
<td>OUT1 Action</td>
<td>reverse</td>
</tr>
<tr>
<td>AL</td>
<td>AL F</td>
<td>ALARM1 Function</td>
</tr>
<tr>
<td>-----</td>
<td>------</td>
<td>-----------------</td>
</tr>
<tr>
<td>AL</td>
<td>AL n</td>
<td>ALARM1 Configuration</td>
</tr>
<tr>
<td>AL</td>
<td>AL o</td>
<td>ALARM1 Action</td>
</tr>
<tr>
<td>AL</td>
<td>AL s</td>
<td>ALARM1 standby Function</td>
</tr>
<tr>
<td>AL</td>
<td>AL F</td>
<td>ALARM2 Function</td>
</tr>
<tr>
<td>AL</td>
<td>AL n</td>
<td>ALARM2 Configuration</td>
</tr>
<tr>
<td>AL</td>
<td>AL o</td>
<td>ALARM2 Action</td>
</tr>
<tr>
<td>AL</td>
<td>AL s</td>
<td>ALARM2 standby Function</td>
</tr>
<tr>
<td>AL</td>
<td>AL F</td>
<td>ALARM3 Function</td>
</tr>
<tr>
<td>AL</td>
<td>AL n</td>
<td>ALARM3 Configuration</td>
</tr>
<tr>
<td>AL</td>
<td>AL o</td>
<td>ALARM3 Action</td>
</tr>
<tr>
<td>AL</td>
<td>AL s</td>
<td>ALARM3 standby Function</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Hbdv</th>
<th>HC E</th>
<th>break-down and leakage current measure</th>
<th>Off</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCHS</td>
<td>Full scale value for load current</td>
<td>30</td>
<td></td>
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<table>
<thead>
<tr>
<th>LBAL</th>
<th>Loop break alarm configuration</th>
<th>Dis</th>
</tr>
</thead>
<tbody>
<tr>
<td>LBd</td>
<td>Loop break alarm deviation</td>
<td>50</td>
</tr>
<tr>
<td>LBT</td>
<td>Loop break time alarm</td>
<td>10.00 mm.ss</td>
</tr>
<tr>
<td>LBS</td>
<td>Loop break hysteresis alarm</td>
<td>10</td>
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<table>
<thead>
<tr>
<th>TUN</th>
<th>TNF</th>
<th>Selftune enabling</th>
<th>Abled</th>
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<tr>
<td>RCE</td>
<td>calculation of relative cooling gain</td>
<td>OFF Disabled</td>
<td></td>
</tr>
<tr>
<td>HPB</td>
<td>Superior Limit of proportional band</td>
<td>30.0%</td>
<td></td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
<td>Value</td>
<td></td>
</tr>
<tr>
<td>-----------</td>
<td>-------------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>LPB1</td>
<td>Lower Limit of proportional band with heating/cooling</td>
<td>1.5%</td>
<td></td>
</tr>
<tr>
<td>LPB2</td>
<td>Lower Limit of proportional band with OUT1 heating</td>
<td>1.0%</td>
<td></td>
</tr>
<tr>
<td>ITI</td>
<td>Lower Limit of integral time</td>
<td>00.50 mm.ss</td>
<td></td>
</tr>
</tbody>
</table>

**Menu Soft**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFFN</td>
<td>SOFT START FUNCTION</td>
<td>Disabled</td>
</tr>
<tr>
<td>THSS</td>
<td>Threshold input for enabling soft start</td>
<td>0</td>
</tr>
<tr>
<td>ITOS</td>
<td>Soft start timeout</td>
<td>0</td>
</tr>
</tbody>
</table>

**Menu nSCE**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>NNFN</td>
<td>MANUAL function</td>
<td>OFF</td>
</tr>
<tr>
<td>STND</td>
<td>Alarm State at Startup</td>
<td>Shdw</td>
</tr>
<tr>
<td>SECFS</td>
<td>Condition for output set to the security value</td>
<td>0</td>
</tr>
<tr>
<td>SEC0</td>
<td>Security value</td>
<td>0</td>
</tr>
<tr>
<td>CNTF</td>
<td>Control of Action</td>
<td>PID</td>
</tr>
<tr>
<td>SPUS</td>
<td>Setpoint view</td>
<td>FnSP</td>
</tr>
<tr>
<td>FILT</td>
<td>Filter on measure</td>
<td>1</td>
</tr>
<tr>
<td>SPDUR</td>
<td>Direct modify enabling SP</td>
<td>On</td>
</tr>
</tbody>
</table>

**Menu r485**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SERE</td>
<td>Communication RS485 Abled</td>
<td>On</td>
</tr>
<tr>
<td>ADD</td>
<td>Device address</td>
<td>1</td>
</tr>
<tr>
<td>BAUD</td>
<td>Baud rate</td>
<td>192</td>
</tr>
<tr>
<td>PAR</td>
<td>Parità checksum</td>
<td>0</td>
</tr>
<tr>
<td>MBST</td>
<td>MODBUS table selection</td>
<td>0</td>
</tr>
</tbody>
</table>
2 Part
20 Calibration Procedure

20.1 Description

From the operating mode you can access the calibration mode by pressing \textbf{FUNC} + ▼ keys for at least 3 seconds and by entering the appropriate password protection (upper display shows “PSuC”). The value have to be setted at value “5” by ▲ and ▼ keys, and confirmed by \textbf{FUNC} KEY.

The lower display show
Il display inferiore visualizza the identifier of the actual group, while the upper display show the string “CAL” permanently: The keys ▲ and ▼ allows to choose the group to calibrate, the \textbf{FUNC} key allows to enter in the active group.

For each calibration point in the group selected, the upper display will show the ID parameter while the lower display shows the currently stored value: to switch to other parameters of the group acts on the ▲ and ▼ keys.

By pressing the \textbf{FUNC} key allows to enter into calibration mode of the parameter shown (the upper display starts flashing).

The lower display will show the values (in count) read from the conversion circuit.
The value can get to 30000, so the counts are displayed on both displays.
To end the calibration process, press MAN until appears on the upper display END and select YES: By selecting NO the instrument returns to the first group available.

20.2 Guidelines for calibration

For an accurate calibration proceed as follows:

a) - To calibrate the instrument must be mounted in its case, to obtain a stable internal temperature.
b) - The ambient temperature must be stable. Should be avoided all the variations due to the temperature conditioner or other.
c) - The relative humidity must not exceed 70%.
d) - The instrument must be switched on for at least 20 minutes.
e) - If possible work in ambient without electromagnetic interference.
f) - During calibration, connect an input at a time.

For calibration is necessary to use calibrators with the following resolutions:

\textbf{ACCURACY}

1) For Current Input + 0.025% output + 0.0025% range + 0.01 mA
2) For voltage inputs: + 0.005% output + 0.001% range + 5 mV
3) For TC inputs: + 0.005% output + 0.001% range + 5 mV
4) For RTD inputs: + 0.02% + 0.0025 W/decade.
5) For cold junction compensation: better than 0.1 °C
20.3 Calibration from keypad

The calibration parameters are divided into groups. Each group includes two parameters (initial scale and full scale) and one control point. Follows a list of groups of calibration:

A) Input TC
B) Cold junction
C) Input RTD
D) Linear Input mA
E) Linear input 10 V
F) Current Input TA
G) Default configuration parameter loading

NOTE:
During calibration, the display of measured counts, may also involve the upper display. In fact, if the value exceeds 9999 to display the first digit to the right of the upper display is used for the most significant digit of the counts. If instead of viewing the data currently stored, if the 9999 figure exceeds the lower display will show "uuuu".
20.3.1 TC and linear input calibration

Link the instrument as shown:

![Image of the instrument setup]

"tCL" – Initial scale value

The upper display shows “tCL” while the lower display shows the value in counts actually stored:

- Link the instrument in calibration mode to calibrator.
- Set calibrator on 0.000 mV
- Press FUNC key. The upper display shows “C” letter; the lower display shows the measured counts.
- After several seconds, necessary to stabilize the measure eventually, press FUNC. The new data is stored.

"tCH" – Final scale value

The upper display shows “tCH” while the lower display shows the value in counts actually stored:

- Link the instrument in calibration mode to calibrator.
- Set calibrator on 60.000 mV
- Press FUNC key. The upper display shows “C” letter; the lower display shows the measured counts.
- After several seconds, necessary to stabilize the measure eventually, press FUNC. The new data is stored.

Calibration Check

The upper display shows “t” while the lower display shows the value in counts actually stored:

- Check that, by setting the calibrator at 0.000 mV, the display shows 0 ± 10 counts.
- Check that, by setting the calibrator at 60.000 mV, the display shows 30000 ± 10 counts.
- Check that, by setting the calibrator at 30.000 mV, the display shows 15000 ± 10 counts.
20.3.2 Cold Junction Calibration

The upper display shows “tCJ” while the lower display shows the value in counts actually stored:

- Place a precision thermometer on the input terminals.
- Wait a few seconds to stabilize all the devices (sensors, instrument calibration, thermometer).
- Read the value on the thermometer
- Press **FUNC** key.
- With ▲ and ▼ keys set on lower display the temperature value.
- Press **FUNC** key.
20.3.3 RTD Input Calibration

"rtdL" – Initial scale value

The upper display shows “rtdL” while the lower display shows the value in counts actually stored:

- Put on short circuit terminals 13, 14 and 15 of M3 of calibration instruments.
- Press FUNC key. The upper display will show "C"; The lower display the measured counts.
- After few seconds, maybe necessary to stabilize the measure, press FUNC. The new data will be stored

"rtdH" – Final scale value

Link the instrument as shown:

The upper display shows “rtdH” while the lower display shows the value in counts actually stored:

- Link the instrument in calibration mode to calibrator.
- Set calibrator on 375.00 Ohm.
- Press FUNC key. The upper display shows “C” letter; the lower display shows the measured counts.
- After several seconds, necessary to stabilize the measure eventually, press FUNC. The new data is stored.

Calibration Check

The upper display shows “t” while the lower display shows the value in counts actually stored:

- Check that, by setting the calibrator at 50.00 Ohm, the display shows 4100 ± 10 counts.
- Check that, by setting the calibrator at 250.00 Ohm, the display shows 20189 ± 10 counts
- Check that, by setting the calibrator at 375 Ohm, the display shows 30000 ± 10 counts
20.3.4 Input Calibration mA

Link the instrument as shown:

"mAL" – Initial scale value

The upper display shows “mAL” while the lower display shows the value in counts actually stored:

- Link the instrument in calibration mode to calibrator.
- Set calibrator on 0.000 mA
- Press FUNC key. The upper display shows “C” letter; the lower display shows the measured counts.
- After several seconds, necessary to stabilize the measure eventually, press FUNC. The new data is stored.

"mAH" – Final scale value

The upper display shows “mAH” while the lower display shows the value in counts actually stored:

- Link the instrument in calibration mode to calibrator.
- Set calibrator on 20.000 mA
- Press FUNC key. The upper display shows “C” letter; the lower display shows the measured counts.
- After several seconds, necessary to stabilize the measure eventually, press FUNC. The new data is stored.

Calibration Check

The upper display shows “t” while the lower display shows the value in counts actually stored:

- Check that, by setting the calibrator at 0.000 mA, the display shows 0 ± 10 counts.
- Check that, by setting the calibrator at 20.000 mA, the display shows 30000 ± 10 counts
- Check that, by setting the calibrator at 10.000 mA, the display shows 15000 ± 10 counts
### 20.3.5 Input 10 V Calibration

Link the instrument as shown:

"UL" – Initial scale value

The upper display shows “UL” while the lower display shows the value in counts actually stored:

- Link the instrument in calibration mode to calibrator.
- Set calibrator on 0.000 V
- Press FUNC key. The upper display shows “C” letter; the lower display shows the measured counts.
- After several seconds, necessary to stabilize the measure eventually, press FUNC. The new data is stored.

"UH" – Final scale value

The upper display shows “UH” while the lower display shows the value in counts actually stored:

- Link the instrument in calibration mode to calibrator.
- Set calibrator on 10.000 V
- Press FUNC key. The upper display shows “C” letter; the lower display shows the measured counts.
- After several seconds, necessary to stabilize the measure eventually, press FUNC. The new data is stored.

**Calibration Check**

The upper display shows “t” while the lower display shows the value in counts actually stored:

- Check that, by setting the calibrator at 0.000 V, the display shows 0 ± 10 counts.
- Check that, by setting the calibrator at 10.000 V, the display shows 30000 ± 10 counts
- Check that, by setting the calibrator at 5.000 V, the display shows 15000 ± 10 counts
20.3.6 Current transformer Input calibration

Link the instrument as shown:

"tAL" – Initial scale value

The upper display shows “tAL” while the lower display shows the value in counts actually stored:

- Link the instrument in calibration mode to calibrator.
- Set calibrator on 0.000 mA AC
- Press **FUNC** key. The upper display shows “C” letter; the lower display shows the measured counts.
- After several seconds, necessary to stabilize the measure eventually, press **FUNC**. The new data is stored.

"tAH" – Final scale value

The upper display shows “tAH” while the lower display shows the value in counts actually stored:

- Link the instrument in calibration mode to calibrator.
- Set calibrator on 50.000 mA AC
- Press **FUNC** key. The upper display shows “C” letter; the lower display shows the measured counts.
- After several seconds, necessary to stabilize the measure eventually, press **FUNC**. The new data is stored.

Calibration Check

The upper display shows “t” while the lower display shows the value in counts actually stored:

- Check that, by setting the calibrator at 0.000 mA AC, the display shows 0 +- 10 counts.
- Check that, by setting the calibrator at 50.000 mA AC, the display shows 1000 +- 10 counts
- Check that, by setting the calibrator at 25.000 mA, the display shows 500 +- 10 counts
20.4 Calibration from serial

To calibrate the instrument by serial you must first set the instrument under calibration by setting the word 503 on value 0xAA.

The upper display shows “Ser”.
The lower display shows “CAL”

20.4.1 Input TC and LINEAR Input calibration

Link the instrument as shown:

![Diagram of instrument setup]

Initial scale value

- Link the instrument in calibration mode to calibrator.
- Set calibrator on 0.000 mV
- After several seconds, necessary to stabilize the measure eventually, write 1 in word 900 (tCL). The new data is stored.

Final scale value

- Link the instrument in calibration mode to calibrator.
- Set calibrator on 60.000 mV
- After several seconds, necessary to stabilize the measure eventually, write in word 901 (tCH). The new data is stored.

Calibration Check

The upper display shows “t” while the lower display shows the value in counts actually stored:

- Check that, by setting the calibrator at 0.000 mV, the word 902 shows 0 + - 10 counts
- Check that, by setting the calibrator at 60.000 mV, the word 902 shows 30000 + - 10 counts
- Check that, by setting the calibrator at 30.000 mV, the word 902 shows 15000 + - 10 counts
20.4.2 Cold Junction Calibration

- Place a precision thermometer on the input terminals.
- Wait a few seconds to stabilize all the devices (sensors, instrument calibration, thermometer).
- Read the value on the thermometer.
- Write the value (in tenths of degree) in the word 903 (CJ).

20.4.3 RTD Input Calibration

Initial scale value

- Put on short circuit terminals 1, 2 and 3 of J2 of the calibration instruments.
- After few seconds, maybe necessary to stabilize the measure, write 1 in 905 (rtdL). The new data will be stored.

Final scale value

Link the instrument as shown:

- Link the instrument in calibration mode to calibrator.
- Set calibrator on 375.00 Ohm.
- After several seconds, necessary to stabilize the measure eventually, write 1 in 906 (rtdH) word. The new data is stored.

Calibration Check

- Check that, by setting the calibrator at 50.00 Ohm, the word 907 shows 4100 ± 10 counts.
- Check that, by setting the calibrator at 250.00 Ohm, the word 907 shows 20189 ± 10 counts.
- Check that, by setting the calibrator at 375 Ohm, the word 907 shows 30000 ± 10 counts.
20.4.4 Input Calibration mA

Link the instrument as shown:

Initial scale value

- Link the instrument in calibration mode to calibrator.
- Set calibrator on 0.000 mA
- After several seconds, necessary to stabilize the measure eventually, write 1 in 908 (mAL) word.
  The new data is stored.

Final scale value

- Link the instrument in calibration mode to calibrator.
- Set calibrator on 20.000 mA
- After several seconds, necessary to stabilize the measure eventually, write 1 in 909 (mAH) word.
  The new data is stored.

Calibration Check

- Check that, by setting the calibrator at 0.000 mA, the word 910 shows 0 ± 10 counts.
- Check that, by setting the calibrator at 20.000 mA, the word 910 shows 30000 ± 10 counts
- Check that, by setting the calibrator at 10.000 mA, the word 910 shows 15000 ± 10 counts
20.4.5 Input 10 V Calibration

Link the instrument as shown:

![Diagram of instrument connection]

**Initial scale value**

- Link the instrument in calibration mode to calibrator.
- Set calibrator on 0.000 V
- After several seconds, necessary to stabilize the measure eventually, write 1 in 911 (VLH). The new data is stored.

**Final scale value**

- Link the instrument in calibration mode to calibrator.
- Set calibrator on 10.000 V
- After several seconds, necessary to stabilize the measure eventually, write 1 in 912 (VLH). The new data is stored.

**Calibration Check**

- Check that, by setting the calibrator at 0.000 V, the word 913 shows 0 ± 10 counts
- Check that, by setting the calibrator at 10.000 V, the word 913 shows 30000 ± 10 counts
- Check that, by setting the calibrator at 5.000 V, the word 913 shows 15000 ± 10 counts
20.4.6 Calibrazione Input Trasformatore Amperometrico

Link the instrument to calibrator as shown:

![Diagram of instrument connection](image)

**Initial scale value**

- Link the instrument in calibration mode to calibrator.
- Set calibrator on 0.000 mA AC
- After several seconds, necessary to stabilize the measure eventually, write 1 in 914 (tAL). The new data is stored.

**Final scale value**

- Link the instrument in calibration mode to calibrator.
- Set calibrator on 50.000 mA AC
- After several seconds, necessary to stabilize the measure eventually, write 1 in 915 (tAH). The new data is stored.

**Calibration Check**

- Check that, by setting the calibrator at 0.000 mA AC, the word 916 shows 0 +- 10 counts.
- Check that, by setting the calibrator at 50.000 mA AC, the word 916 shows 1000 +- 10 counts
- Check that, by setting the calibrator at 25.000 mA, the word 916 shows +- 10 counts

20.5 Caricamento valori di calibrazione di default

By writing 1 in 917 (deF) word the default value are loaded.
### 21.1 Table 1

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>TC type L 0 400.0 °C DIN 43710 - 1977</td>
</tr>
<tr>
<td>1</td>
<td>TC type L 0 900 °C</td>
</tr>
<tr>
<td>2</td>
<td>TC type L 0 1650 °F DIN 43710 - 1977</td>
</tr>
<tr>
<td>3</td>
<td>TC type J -100.0 400.0 °C IEC 584-1</td>
</tr>
<tr>
<td>4</td>
<td>TC type J -100 1000 °C</td>
</tr>
<tr>
<td>5</td>
<td>TC type J -150 1830 °F IEC 584-1</td>
</tr>
<tr>
<td>6</td>
<td>TC type K -100.0 400.0 °C IEC 584-1</td>
</tr>
<tr>
<td>7</td>
<td>TC type K -100 1370 °C</td>
</tr>
<tr>
<td>8</td>
<td>TC type K -150 2500 °F IEC 584-1</td>
</tr>
<tr>
<td>9</td>
<td>TC type N -100 1400 °C</td>
</tr>
<tr>
<td>10</td>
<td>TC type N -150 2550 °F IEC 584-1</td>
</tr>
<tr>
<td>11</td>
<td>TC type S 0 1760 °C</td>
</tr>
<tr>
<td>12</td>
<td>TC type S 0 3200 °F IEC 584-1</td>
</tr>
<tr>
<td>13</td>
<td>TC type R 0 1760 °C</td>
</tr>
<tr>
<td>14</td>
<td>TC type R 0 3200 °F IEC 584-1</td>
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<tr>
<td>15</td>
<td>TC type T -199.9 400.0 °C</td>
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<tr>
<td>16</td>
<td>TC type T -330 750 °F IEC 584-1</td>
</tr>
<tr>
<td>17</td>
<td>RTD tipo Pt100 -199.9 400.0 °C DIN 43760</td>
</tr>
<tr>
<td>18</td>
<td>RTD tipo Pt100 -199.9 400.0 °F DIN 43760</td>
</tr>
<tr>
<td>19</td>
<td>RTD tipo Pt100 -200 800 °C</td>
</tr>
<tr>
<td>20</td>
<td>RTD tipo Pt100 -330 1470 °F DIN 43760</td>
</tr>
<tr>
<td>21</td>
<td>Lineare 0 20 mA</td>
</tr>
<tr>
<td>22</td>
<td>Lineare 4 20 mA</td>
</tr>
<tr>
<td>23</td>
<td>Lineare 0 60 mV</td>
</tr>
<tr>
<td>24</td>
<td>Lineare 12 60 mV</td>
</tr>
<tr>
<td>25</td>
<td>Lineare 0 10 V</td>
</tr>
<tr>
<td>26</td>
<td>Lineare 2 10 V</td>
</tr>
</tbody>
</table>

### 21.2 Table 2

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Relay type</td>
</tr>
<tr>
<td>1</td>
<td>SSR type</td>
</tr>
<tr>
<td>2</td>
<td>mA type</td>
</tr>
<tr>
<td>3</td>
<td>Digital type</td>
</tr>
<tr>
<td>4</td>
<td>Contact type</td>
</tr>
<tr>
<td>7</td>
<td>None</td>
</tr>
</tbody>
</table>
# 22 Test Hardware via seriale

By writing on word 920 a number from 1 to 28 it's possible to make a series of tests on hardware instrument. The tests are:

<table>
<thead>
<tr>
<th></th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Fine test</td>
</tr>
<tr>
<td>1</td>
<td>Display Test</td>
</tr>
<tr>
<td>2</td>
<td>Led Test</td>
</tr>
<tr>
<td>3</td>
<td>FUNC key Test</td>
</tr>
<tr>
<td>4</td>
<td>MAN key Test</td>
</tr>
<tr>
<td>5</td>
<td>UP key Test</td>
</tr>
<tr>
<td>6</td>
<td>DOWN key Test</td>
</tr>
<tr>
<td>7</td>
<td>Eeprom Test</td>
</tr>
<tr>
<td>8</td>
<td>RS485 Test</td>
</tr>
<tr>
<td>9</td>
<td>USB Test</td>
</tr>
<tr>
<td>10</td>
<td>Rele 1 Test</td>
</tr>
<tr>
<td>11</td>
<td>Rele 2 Test</td>
</tr>
<tr>
<td>12</td>
<td>Rele 3 Test</td>
</tr>
<tr>
<td>13</td>
<td>Rele 4 Test</td>
</tr>
<tr>
<td>14</td>
<td>Out 4 mA Test</td>
</tr>
<tr>
<td>15</td>
<td>Out 20 mA Test</td>
</tr>
<tr>
<td>16</td>
<td>Input 1 Test</td>
</tr>
<tr>
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<td>Input 2 Test</td>
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<td>18</td>
<td>10 mV measure Test</td>
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<td>19</td>
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<td>4 mA measure Test</td>
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<td>21</td>
<td>20 mA measure Test</td>
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<tr>
<td>22</td>
<td>0 ohm measure Test</td>
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</table>
22.1 Display Test
Appear in sequence all the cipher and numbers.
The check must be done visually. There is no feedback on the serial.

22.2 Led Test
All the LEDs are switched on in sequence.
Also decimal points are considered of the two numbers to the right LEDs.
The check must be done visually. There is no feedback on the serial.

22.3 FUNC key Test
It's necessary to press and release the FUNC key. The tool writes 1 on 702 word on when the key is pressed and 0 when it is released.

22.4 MAN Key Test
It's necessary to press and release the MAN key. The tool writes 1 on 702 word on when the key is pressed and 0 when it is released.

22.5 UP key Test
It's necessary to press and release the UP key. The tool writes 1 on 702 word on when the key is pressed and 0 when it is released.

22.6 DOWN key Test
It's necessary to press and release the DOWN key. The tool writes 1 on 702 word on when the key is pressed and 0 when it is released.

22.7 EEPROM Test
The instrument performs a control read / write to all locations of EEPROM.
At the end write 1 on 702 word if the test result positive, 0 if negative.

22.8 Relè 1 Test
This test is possible only if there is a relay module or SSR, or digital on output 1.
Relay 1 is energized and de-energized cyclically
The word 702 is written to 1 when the relay is energized, 0 when it is de-energized.
There is no control if the relay is energized actually.

22.9 Relè 2 Test
This test is possible only if there is a relay module or SSR, or digital on output 2.
Relay 2 is energized and de-energized cyclically
The word 702 is written to 1 when the relay is energized, 0 when it is de-energized.
There is no control if the relay is energized actually.
22.10 Relè 3 Test
This test is possible only if there is a relay module or SSR, or digital on output 3.
Relay 3 is energized and de-energized cyclically
The word 702 is written to 1 when the relay is energized, 0 when it is de-energized.
There is no control if the relay is energized actually.

22.11 Relè 4 Test
This test is possible only if there is a relay module or SSR, or digital on output 4.
Relay 4 is energized and de-energized cyclically
The word 702 is written to 1 when the relay is energized, 0 when it is de-energized.
There is no control if the relay is energized actually.

22.12 Out 4 mA Test
This test is possible only if there is a mA module on output 1.
The output is set with the value corresponding to 4 mA.
The control must be performed externally. There is no feedback on the serial.

22.13 Out 20 mA Test
This test is possible only if there is a mA module on output 1.
The output is set with the value corresponding to 20 mA.
The control must be performed externally. There is no feedback on the serial.

22.14 Input 1 Test
This test is possible only if there is a contact or digital I/O module on output 3.
It's necessary to close and open contact 1. The instrument write 1 on word 702 when the contact is close and 0 when it's open.

22.15 Input 2 Test
This test is possible only if there is a contact or digital I/O module on output 4.
It's necessary to close and open contact 2. The instrument write 1 on word 702 when the contact is close and 0 when it's open.
22.16 10 mV measure Test

- Connect the terminals input to calibrator, as described in the calibration chapter.
- Generate 10 mV.
- After few seconds, necessary to stabilize the measure, write 18 in word 920.
- On word 702 is written 3 until the measurement is completed. At the end will be written 0 if the measure will be in the limits, otherwise 1.

22.17 60 mV measure Test

- Connect the terminals input to calibrator, as described in the calibration chapter.
- Generate 60 mV.
- After few seconds, necessary to stabilize the measure, write 19 in word 920.
- On word 702 is written 3 until the measurement is completed. At the end will be written 0 if the measure will be in the limits, otherwise 1.

22.18 4 mA measure Test

- Connect the terminals input to calibrator, as described in the calibration chapter.
- Generate 4 mA.
- After few seconds, necessary to stabilize the measure, write 20 in word 920.
- On word 702 is written 3 until the measurement is completed. At the end will be written 0 if the measure will be in the limits, otherwise 1.

22.19 20 mA measure Test

- Connect the terminals input to calibrator, as described in the calibration chapter.
- Generate 20 mA.
- After few seconds, necessary to stabilize the measure, write 21 in word 920.
- On word 702 is written 3 until the measurement is completed. At the end will be written 0 if the measure will be in the limits, otherwise 1.
22.20 0 ohm measure Test

- Connect the terminals input to calibrator, as described in the calibration chapter.
- Generate 0 Ohm.
- After few seconds, necessary to stabilize the measure, write 22 in word 920.
- On word 702 is written 3 until the measurement is completed. At the end will be written 0 if the measure will be in the limits, otherwise 1.

22.21 300 ohm measure Test

- Connect the terminals input to calibrator, as described in the calibration chapter.
- Generate 300 ohm.
- After few seconds, necessary to stabilize the measure, write 23 in word 920.
- On word 702 is written 3 until the measurement is completed. At the end will be written 0 if the measure will be in the limits, otherwise 1.

22.22 1 V measure Test

- Connect the terminals input to calibrator, as described in the calibration chapter.
- Generate 1V.
- After few seconds, necessary to stabilize the measure, write 24 in word 920.
- On word 702 is written 3 until the measurement is completed. At the end will be written 0 if the measure will be in the limits, otherwise 1.

22.23 10 V measure Test

- Connect the terminals input to calibrator, as described in the calibration chapter.
- Generate 10V.
- After few seconds, necessary to stabilize the measure, write 25 in word 920.
- On word 702 is written 3 until the measurement is completed. At the end will be written 0 if the measure will be in the limits, otherwise 1.
22.24 RJ Test

By writing 26 on the word 920, on word 702 will be written the temperature (in tenths of a degree) measured from the junction.

22.25 TA 5 mA measure Test

- Connect the terminals input to calibrator, as described in the calibration chapter.
- Generate 5 mA AC.
- After few seconds, necessary to stabilize the measure, write 27 in word 920.
- On word 702 is written 3 until the measurement is completed. At the end will be written 0 if the measure will be in the limits, otherwise 1.

22.26 TA 50 mA measure Test

- Connect the terminals input to calibrator, as described in the calibration chapter.
- Generate 50 mA AC.
- After few seconds, necessary to stabilize the measure, write 28 in word 920.
- On word 702 is written 3 until the measurement is completed. At the end will be written 0 if the measure will be in the limits, otherwise 1.