Gefran 650/1250/1350 Temperature Controller – Abbreviated Manual

This booklet contains excerpts from the manufacturer's Temperature Controller manual. Sections have been removed that are either not pertinent to the operation or provide detail for advanced programming. As such, section and page numbers in this manual are not continuous, but rather duplicate the complete programming manual. The complete Installation and Instruction Manual for programming the controller can be accessed at www.gefran.com.
# TABLE OF CONTENTS

**Excerpts from controller manual**

## 3. Commissioning

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1. Information on displays and use of keys</td>
<td>33</td>
</tr>
<tr>
<td>3.1.1. Navigating the menus</td>
<td>33</td>
</tr>
<tr>
<td>3.1.2. Displays</td>
<td>33</td>
</tr>
<tr>
<td>3.1.2.1. Display characters</td>
<td>33</td>
</tr>
<tr>
<td>3.1.2.2. Scrolling messages</td>
<td>34</td>
</tr>
<tr>
<td>3.2. Sequence at power-on</td>
<td>34</td>
</tr>
<tr>
<td>3.3. First power-on</td>
<td>35</td>
</tr>
<tr>
<td>3.3.1. Fast configuration</td>
<td>35</td>
</tr>
<tr>
<td>3.4. Setting up quick configuration</td>
<td>39</td>
</tr>
<tr>
<td>3.4.1. Setting up the Alarm</td>
<td>39</td>
</tr>
<tr>
<td>3.4.2. Setting up the Heater Break Alarm</td>
<td>40</td>
</tr>
<tr>
<td>3.4.3. Setting up the PID</td>
<td>41</td>
</tr>
</tbody>
</table>

## 4. Configuration

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1. Programming/Configuration Menu</td>
<td>43</td>
</tr>
<tr>
<td>4.1.1. First: know what you're doing</td>
<td>43</td>
</tr>
<tr>
<td>4.1.2. Passwords</td>
<td>43</td>
</tr>
<tr>
<td>4.2. Main menu</td>
<td>44</td>
</tr>
<tr>
<td>4.3. Legend for submenus and parameters</td>
<td>45</td>
</tr>
<tr>
<td>4.3.1. Submenu</td>
<td>45</td>
</tr>
<tr>
<td>4.3.2. Parameters</td>
<td>45</td>
</tr>
<tr>
<td>4.4. INFO Submenu - information display</td>
<td>46</td>
</tr>
<tr>
<td>4.4.1. SW.VER - Versione software</td>
<td>47</td>
</tr>
<tr>
<td>4.4.2. CODE - Identifying code of controller</td>
<td>47</td>
</tr>
<tr>
<td>4.4.3. ERROR - Main input error</td>
<td>47</td>
</tr>
<tr>
<td>4.4.4. SAPC - SAP code</td>
<td>47</td>
</tr>
<tr>
<td>4.4.5. SE.rn - Serial number of controller</td>
<td>47</td>
</tr>
<tr>
<td>4.4.6. xxxx - Model of controller</td>
<td>48</td>
</tr>
<tr>
<td>4.4.7. xxxx - Type of controller</td>
<td>48</td>
</tr>
<tr>
<td>4.4.8. L.Func - Option Logic Functions available</td>
<td>48</td>
</tr>
<tr>
<td>4.4.9. IN.SPR - Remote setpoint input available</td>
<td>48</td>
</tr>
<tr>
<td>4.4.10. OUT.1 - Analog output 1 available</td>
<td>48</td>
</tr>
<tr>
<td>4.4.11. Ctx - Current transformer input available</td>
<td>49</td>
</tr>
<tr>
<td>4.4.12. x.IN.DG - Digital input available</td>
<td>49</td>
</tr>
<tr>
<td>4.4.13. RS485 - RS485 serial port available</td>
<td>49</td>
</tr>
<tr>
<td>4.4.14. Out1 - Type of output 1</td>
<td>50</td>
</tr>
<tr>
<td>4.4.15. Out2 - Type of output 2</td>
<td>50</td>
</tr>
<tr>
<td>4.4.16. Out3 - Type of output 3</td>
<td>50</td>
</tr>
<tr>
<td>4.4.17. Out4 - Type of output 4</td>
<td>50</td>
</tr>
<tr>
<td>4.4.18. OUT1S - Number of switchings output 1</td>
<td>51</td>
</tr>
<tr>
<td>4.4.19. OUT2S - Number of switchings output 2</td>
<td>51</td>
</tr>
<tr>
<td>4.4.20. OUT3S - Number of switchings output 3</td>
<td>51</td>
</tr>
<tr>
<td>4.4.21. OUT4S - Number of switchings output 3</td>
<td>51</td>
</tr>
<tr>
<td>4.4.22. T.DAYS - Total working days</td>
<td>51</td>
</tr>
<tr>
<td>4.4.23. P.DAYS - Partial working days</td>
<td>51</td>
</tr>
<tr>
<td>4.4.24. T.INT - Internal temperature of controller</td>
<td>51</td>
</tr>
<tr>
<td>4.4.25. T.MIN - Minimum internal temperature of the controller</td>
<td>51</td>
</tr>
<tr>
<td>4.4.26. T.MAX - Maximum internal temperature of the controller</td>
<td>51</td>
</tr>
<tr>
<td>4.4.27. t.IME - Internal time</td>
<td>52</td>
</tr>
<tr>
<td>4.4.28. d.AE - Internal date</td>
<td>52</td>
</tr>
<tr>
<td>4.5. PR.OPT Submenu - Configuring programs</td>
<td>53</td>
</tr>
<tr>
<td>4.5.1. PR.OPT - Selecting program</td>
<td>54</td>
</tr>
<tr>
<td>4.5.2. FL.STP - Number of first step assigned to program</td>
<td>54</td>
</tr>
<tr>
<td>4.5.3. LA.STP - Number of last step assigned to program</td>
<td>54</td>
</tr>
<tr>
<td>4.5.4. Strt - Restart mode</td>
<td>54</td>
</tr>
<tr>
<td>4.5.5. RST.SP - Type of control after program restart</td>
<td>55</td>
</tr>
<tr>
<td>4.5.6. WAIT.S - Option to start execution of program</td>
<td>55</td>
</tr>
<tr>
<td>4.5.7. End - Action at end of program</td>
<td>55</td>
</tr>
<tr>
<td>4.5. PR.OPT Submenu - Configuring programs</td>
<td>53</td>
</tr>
<tr>
<td>4.5.8. LIMIT - Limitation of step duration</td>
<td>55</td>
</tr>
</tbody>
</table>

**TABLE OF CONTENTS**
4.19. MODE Submenu – Configuring functioning mode..................110
4.19.1. PID.GN - Number of groups of control parameters 111
4.19.2. MA.AU - Defining transition from Manual to Automatic. 111
4.19.3. AU.MA - Transition from Automatic to Manual. 111
4.19.4. LO.rE - Defining transition from remote SP to local SP. 111
4.19.5. On.OF - Enabling software on/off ..........................112
4.19.6. MA.PL - Enabling manual power latch ......................112
4.19.7. MAn.P - Enabling change of manual power value...112
4.19.8. dtG - Defining type of digital inputs ..........................112
4.19.9. ALRM.N - Number of alarms enabled .....................112
4.19.10. tMEr - Enabling Timer function ..............................113
4.19.11. MULSP - Enabling Multiuser function .....................113
4.19.12. SPREM - Enabling the remote setpoint.................113
4.19.13. Spr.t - Defining absolute or deviation remote setpoint...113
4.19.14. PROGR - Enabling the setpoint programmer ..........113
4.19.15. tPro - Setting the programmer base time ...............114
4.19.16. ENERG - Enabling the energy counter function.........114
4.19.17. T.SAMP - Main input sample time .........................114
4.19.18. FREQZ - Defining power line frequency ...............114
4.20. TIMER Submenu – Configuring timer parameters ..............115
4.20.1. FiTm - Selecting Timer function mode..................116
4.20.2. StSt - Selecting the Start/Stop timer command .........116
4.20.3. S.S.t - Defining the Start/Stop timer command logic ...116
4.20.4. rESE - Selecting the Reset timer command ..............116
4.20.5. rES.t - Defining the reset timer command logic ......117
4.20.6. BAND - Band for timer count ..............................117
4.20.7. End - Selecting the function activated at end of count .117
4.20.8. TIMER - Timer value ........................................117
4.20.9. MSG.TM - Selecting the message assigned to the 118
   active count
4.22. SERIA Submenu – Configuring serial communication ..........121
4.22.1. CODE - Identification code .................................122
4.22.2. KBAUD - Selecting communication speed ................122
4.22.3. PAR - Selecting parity ........................................122
4.23. HMI Submenu – Configuring the display and keypad .........123
4.23.1. but.1 - Selecting function key 1 ..........................124
4.23.2. but.2 - Selecting function key 2 ..........................124
4.23.3. but.3 - Selecting function key 3 ..........................124
4.23.4. dSP - Selecting the SV display ...........................125
4.23.5. dSF - Selecting the F display .............................125
4.23.6. bArG - Selecting the bargraph display .................125
4.23.7. MSG.LO - Selecting the message assigned to Low 126
4.23.8. MSG.HI - Selecting the message assigned to HIGH ...126
4.23.9. MSG.ER - Selecting the message assigned to Err 126
4.23.10. MSG.SB - Selecting the message assigned to Sbr 127
4.23.11. LAnG - Selecting language for messages ................127
4.23.12. SPEED - Message scrolling speed .......................127
4.23.13. BACKL - Backlighting level .............................127
4.23.14. QUICK - Quick configuration menu ......................128
4.25. US.CAL Submenu – User calibrations ..........................131
4.25.1. U.CAL - Selecting the user calibration ..................132
4.25.2. FI.CAL - Resetting the factory calibration ..............132
4.25.3. C.LOW - Calibrating minimum current / voltage ....132
4.25.4. C.HIGH - Calibrating maximum current / voltage ....133
4.25.5. RTD.LO - Calibrating minimum resistance value ......133
4.25.6. RTD.HI - Calibrating maximum resistance value ......133
4.25.7. HOUR - Setting hours .....................................133
4.25.8. MIN - Setting minutes ....................................133
4.25.9. SEC - Setting seconds ....................................134
4.25.10. dAY - Setting day of week ..............................134
4.25.11. DATE - Setting day .....................................134
4.25.12. Mont - Setting month ....................................134
4.25.13. YEAR - Setting year .....................................134
4.25.14. C.LO - Setting analog output minimum ...............135
4.25.15. C.HIG - Setting analog output maximum .............135
4.26. PASC1 - Setting level 1 password ................................136
4.27. PASC2 - Setting level 2 password ..............................136
4.28. FI.CFG - Entering the reset code ..............................136
5. Examples and application notes .................................137
5.6. Alarms .........................................................142
5.6.1. Generic alarms AL1...AL4 ...............................142
5.8. Switching the software on/off ...............................144
5.8.1. How to switch it off ........................................144
5.8.2. How to switch it on ........................................144
5.9. Soft-Start ....................................................144
5.10. Tuning .......................................................144
5.10.1. Tuning actions .............................................144
5.10.1.1. Influence of Proportional, Derivative and Integral actions on 144
   response of controlled process
5.10.2. Manual tuning .............................................144
5.10.3. Self-Tuning ................................................145
5.10.4. Auto-Tuning ..............................................146
5.10.5. Examples of tuning ........................................146
5.11. Timer .......................................................147
5.11.1. Start/Stop Timer ..........................................147
5.11.2. Stabilization timer .........................................148
5.11.3. Start timer ................................................148
5.11.4. Variables available for the user configuration menu 148
5.13. Setpoint programmer ..........................................149
5.13.1. What is a program ........................................149
5.13.2. Programmer functions ....................................149
5.13.3. Programmer behavior .....................................150
5.13.4. Program examples .........................................150
5.13.4.1. ONE STEP program ....................................150
5.13.4.2. ONE STEP program ....................................150
5.13.4.3. Program with assigned events .......................150
5.13.4.4. Cyclical program with 3 setpoints and 3 steps ........152
5.13.4.5. Program with HBB (hold back band) function ......152
5.13.5. Fast simulation of program ................................152
5.13.6. Controlling the program from the ........................................
   keypad ........................................152
5.13.7. Programmer Reset mode ..................................152
5.13.8. Restart with step search ...................................152
3. COMMISSIONING

3.1. Information on displays and use of keys

The general description of the displays and keys for each model is in paragraphs “1.3.1. Display and keys” on page 13 for the 650, “1.4.1. Display and keys” on page 15 for the 1250, and “1.5.1. Display and keys” on page 17 for the 1350.

3.1.1. Navigating the menus

4 keys are used for navigating the menus and submenus and for changing parameters and confirming choices. Their function depends on the context and on how long they are pressed.

The LEDs above the keys not only give confirmation that each key has been pressed (by flashing), but also show which keys can be used in each situation.

The navigation functions assigned to the keys are:

- **At first power-on, scrolls the fast configuration menu; otherwise, the user configuration menu (Setpoint, Alarm limits, Control output, etc.).**
  
  Each time you press the key, the value of the displayed parameter is confirmed and you go to the next menu item.
  
  Keep the key pressed for more than 2 seconds to enter the Programming/Configuration menu.

- **Each time you press the key, you return to the previous menu item or to the higher menu level, as appropriate.**
  
  Keep the key pressed for more than 2 seconds to return to the Main menu.

- **Press the key to enter a submenu or to reduce the value of the displayed parameter, as appropriate.**
  
  Keep the key pressed to progressively increase the speed of reduction of the displayed parameter.

- **Press the key to raise the value of the displayed parameter.**
  
  Keep the key pressed to progressively increase the speed of raising the displayed parameter.

When the process variable is displayed, in standard configuration the key switches the controller function mode (manual/automatics).

3.1.2. Displays

The controllers have 2 or 3 displays, depending on the model. The Main menu shows:

- **PV display:** value of process variable.
- **SV display:** value of parameter (default = setpoint, if parameter dS.SP = SETP).
- **F Display (models 1250 and 1350 only):** value of control output (if parameter dS.F = OUT.PW).

On models 1250 and 1350, the percentage value of the control output is also shown graphically on a bargraph.

On model 1350, an additional display shows the program number, step number, and unit of measurement (% A kW kWh).

According to the situation (programming, alarm, etc.), the controller displays can show other information, such as the name of the parameter, description of the parameter, diagnostics messages and alarm messages.

Attention! The displays show only the parameters and menus for a defined configuration.

3.1.2.1. Display characters

The displays reproduce the various characters by combining 7 or 14 segments.

The following tables show the shape of the various characters.

<table>
<thead>
<tr>
<th>Character</th>
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</tr>
<tr>
<td>v</td>
<td>v</td>
<td>v</td>
</tr>
<tr>
<td>w</td>
<td>w</td>
<td>w</td>
</tr>
<tr>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>y</td>
<td>y</td>
<td>y</td>
</tr>
<tr>
<td>z</td>
<td>z</td>
<td>z</td>
</tr>
</tbody>
</table>

Figure 15 - 14-segment font
3.1.2.2. Scrolling messages

The SV (650) and F (1250 and 1350) displays can show scrolling alphameric messages. These messages, up to 32 characters in length, appear:

- during configuration, describing the active parameter;
- during functioning, after the tripping of alarms, digital inputs and logic function outputs, if the relative messages were enabled.

Message texts can be set via PC with GF_eXpress software.

There are 3 message groups, one for each of the 3 languages provided, selectable from the HMI menu with the LANG.n parameter. Each group contains up to 25 messages.

3.2. Sequence at power-on

The following diagram shows the controller sequence at power-on.

**Note:** the USB-TTL programming cable must be disconnected.

1. Program code self-diagnostics.
2. Configuration read by EEPROM.
3. Check of data consistency.*
4. Recognition of available options.

![Diagram of controller sequence at power-on](image-url)

- **Initialization of input and output devices based on configuration.**
- **DISPLAY ON**
  - All display segments are on.
  - 3 flashes at interval of about 1 second
- **CONTROL ON**
  - As per the set configuration.

**HOME**
- The displays show the process variable and the % value of power.

**MANUAL CONTROL**
- **True**
  - AUTOMATIC/MANUAL switching via key or digital input or serial communication.
- **False**
  - HOME
  - The displays show the process variable, the setpoint or other defined parameter.

*) Any error is signaled by the message EEPROM CHECKSUM ERROR.
**) Only if MANUAL mode was used before the controller was powered off.
3.3. First power-on

At first power-on, after the controller has run the self-diagnostics test, press the F key to access the Fast Configuration Menu. The parameters shown are a subset of all the controller parameters and let you rapidly configure the inputs and outputs.

The number and type of the parameters shown depends on the controller HW configuration and on the choices made with the parameters previously shown.

For example, minimum and maximum scale limits are shown only if you have chosen an mA or V type temperature sensor.

Fast Configuration also appears if the HMI menu is set to parameter Quick = On

3.3.1. Fast configuration

- **Home**

- **Selecting sensor type**
  - Type
  - Selects the type of sensor used.
  - Press A to switch between different types of sensors.

- **Selecting unit of measurement**
  - Unit
  - Selects the unit of measurement.
  - Only if a TC or Rtd sensor is selected.
  - Press A to switch between °C or °F.

- **Minimum scale limit**
  - Loscl
  - Sets the lower scale limit.
  - Press A to raise the value.
  - Press V to lower the value.
  - Only if the selected sensor is in mV or V.

- **Maximum scale limit**
  - Hiscl
  - Sets the upper scale limit.
  - Press A to raise the value.
  - Press V to lower the value.
  - Only if the selected sensor is in mV or V.
Selecting output 1 function
The proposed functions depend on output type (relay, logic).

Selecting output 2 function
The proposed functions depend on output type (relay, logic).

Selecting output 3 function
The menu item appears only if the optional output is available.

Selecting output 4 function
The menu item appears only if the optional output is available.

Selecting analog output function
The menu item appears only if the output continuous Out1 4-20mA.

Selecting remote setpoint type
The menu item appears only if the optional input is available. The setpoint scale depends on the sensor selected.
3. COMMISSIONING

Full-scale value of current transformer CT1
The menu item appears only if the optional input is available

Full-scale value of current transformer CT2
The menu item appears only if the optional input is available

Selecting digital input 1 function
The menu item appears only if the optional input is available

Selecting digital input 2 function
The menu item appears only if the optional input is available

Selecting digital input 3 function
The menu item appears only if the optional input is available

Selecting digital input 4 function
The menu item appears only if the optional input is available (for models 1250 and 1350 only).
3. COMMISSIONING

Selecting digital input 5 function
The menu item appears only if the optional input is available (for models 1250 and 1350 only).

Setting Setpoint

Setting Alarm 1

Setting Modbus address
The menu item appears only if the optional RS485 port is available.

Selecting baudrate
The menu item appears only if the optional RS485 port is available.

Enabling / disabling Fast Configuration

Selection of probe type
3.4. Setting up quick configuration

The quick configuration menu lets you quickly configure and start a controller. To do this, it uses default values for many of the parameters assigned to the functions and other parameters are not activated. With this configuration, the controller can satisfy the majority of operating requirements.

You can set up the first configuration with the main configuration menu (see paragraph “4.1 Programming/Configuration Menu” on page 43), which gives access to all of the parameters. For purposes of example, some of the controller’s main functions are listed below, with a list of parameters to be changed after running fast configuration to adapt the controller to specific working conditions.

3.4.1. Setting up the Alarm

If at least one output was configured as Alarm in the fast configuration:

- Select the Alarm number (default = 1) with the and keys
  - Description of parameter and list of options on page 77
- Set the alarm as direct or inverse (default = Direct) with the and keys
  - Description of parameter and list of options on page 77
- Set the alarm as absolute or deviation (default = Absolute) with the and keys
  - Description of parameter and list of options on page 77
- Set hysteresis (default = -1) with the and keys
  - Description of parameter and list of options on page 79
- Select the message assigned to the alarm (default = 0) with the and keys
  - Description of parameter and list of options on page 79

The ALARM submenu also lets you:
- select the input or value to be monitored for the alarm (parameter rEF.x, default = PV);
- select the method for applying hysteresis (parameter n.S.x, default = NORML);
- enable or disable the power-on alarm (parameter PWON.E, default = OFF);
- latch/not latch the active alarm state (parameter LATCH, default = OFF);
- set the alarm trip delay (parameter DELAY, default = 0.00);
- activate or deactivate flashing of the PV display in case of alarm (parameter BLK.AL, default = OFF).
3. COMMISSIONING

3.4.2. Setting up the Heater Break Alarm

If at least one output was configured as Heater Break Alarm in the fast configuration.

The AL.HB submenu also lets you:
- set an HB alarm due to low current draw (parameter LOW.ON, default = 0.0);
- set an HB alarm due to high current draw (parameter HIG.ON, default = 0.0);
- set an HB alarm due to excess current draw (parameter HI.OFF, default = 0.0);
- set the HB alarm trip delay (parameter TIME, default = 0);
- select the control output assigned to the HB alarm (parameter OUT, default = 1);
- activate or deactivate flashing of the PV display in case of alarm (parameter BLK.AL, default = OFF).
3.4.3. Setting up the PID

The PID submenu also lets you:

- set the Soft-Start time (parameter SOFT.T, default = 0.0);
- select the type of Auto-Tuning used (parameter Aut.t, default = CONTI);
- set the derivative time (parameter DERVS, default = 1.0);
- set the proportional heating band or hysteresis in ON-OFF control (parameter H.PB, default = 1.0);
- set the integral heating time (parameter H.IT, default = 4.00);
- set the derivative heating time (parameter H.DT, default = 1.00);
- set the maximum heating power limit (parameter H.PHI, default = 100.0);
- set the minimum heating power limit (parameter H.PLO, default = 0.0);
- select the cooling fluid (parameter COOL, default = FAN);
- set the cooling setpoint compared to the heating setpoint (parameter C.SP, default = 0.0);
- set the proportional cooling band or hysteresis in ON-OFF control (parameter C.PB, default = 1.0);
- set the integral cooling time (parameter C.IT = 4.00);
- set the derivative cooling time (parameter C.DT = 1.00);
- set the maximum cooling power limit (parameter C.PHI, default = 100.0);
- set the minimum cooling power limit (parameter C.PLO, default = 0.0);
- set the Manual Reset value (parameter RESET, default = 0.0);
- set the Reset Power value (parameter RRST, default = 0.0);
- set the Antireset value (parameter A.RST, default = 0.0);
- set the Feedforward Power value (parameter FF, default = 0.0);
- set the deadband (parameter DEAD.B, default = 0.0);
- set the fault action power (parameter FAULT, default = 0.0);
- set the setpoint gradient in raise (parameter GRAD.I, default = 0.0);
- set the setpoint gradient in lower (parameter GRAD.D, default = 0.0);
- select the gradient unit of measurement (parameter Unit, default = DIG/S);
- set the control output gradient (parameter GRAD.O, default = 0.0).
3. COMMISSIONING

- set the LBA alarm trip delay LBA (parameter LBA.TM, default = 30.0);
- set the value of power delivered when the LBA alarm trips (parameter LBA.PW, default = 25.0).
4. CONFIGURATION

The fast configuration described in the previous chapter lets you rapidly put the controller into operation. To do this, the procedure configures the controller's main parameters only, which satisfies the most common application requirements.

On the other hand, to satisfy all application requirements and to configure the controller in detail, you have to set the parameters that are accessible only on the Programming/Configuration menu.

This type of configuration is also useful for common applications (the ones covered by fast configuration), because optimum controller function depends a great deal on correct configuration and programming of the control parameters provided.

The controller can be configured with the buttons on its panel and from the PC with GF_eXpress software (see chapter "7. Programming with PC" on page 159).

4.1. Programming/Configuration Menu

4.1.1. First: know what you're doing

Correctly setting the parameters needed to configure the controller requires thorough knowledge of the problems and techniques involved.

If you are unsure of your know-how, or are not fully aware of the consequences of incorrectly setting the parameters, we advise you not to configure the controller with this menu.

Attention! To prevent harm to persons and damage to property, the user must check that the parameters are correctly set before commissioning the controller.

In case of doubts, or if you need any explanations, please consult www.gefran.com or contact Gefran Customer Care.

4.1.2. Passwords

The configuration menu is protected by 2 passwords that allow access to two different menu sections.

The first section, accessed with password 1, groups the most operative submenus and parameters, i.e., the ones most involved in daily functioning of the controlled machine or system.

The second section, accessed with password 2, groups the submenus and parameters used to configure HW resources.

The factory password settings are:
- Password 1 = 1
- Password 2 = 2

The passwords can be changed and even disabled if you want. See paragraphs "4.27. Submenu PASC1 - Setting level 1 password" on page 136 and "4.28. Submenu PASC2 - Setting level 2 password" on page 136.
4. CONFIGURATION

4.2. Main menu

Display information
Configuration of programs
Configuration of program steps
Configuration of main input
Configuration of remote setpoint input
Configuration of CT1 current transformer input
Configuration of CT2 current transformer input
Configuration of intercepts
Configuration of Heater Break alarm
Configuration of control parameters
Configuration of groups of control parameters
Configuration of digital inputs
Configuration of outputs
Configuration of analog retransmission output
Configuration of valve parameters
Configuration of function modes
Configuration of timer parameters
Configuration of energy counter parameters
Configuration of serial
Configuration of display and keypad
Configuration of custom linearization
User calibrations
Setting level 1 password
Setting level 2 password
Entering reset code (optional)
ATTENTION!
The reset procedure is not reversible.
4.3. Legend for submenus and parameters

The purposes and characteristics of submenus and parameters are described and summarized in the following tables.

4.3.1. Submenu

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Password</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFO</td>
<td>INSTRUMENT STATUS</td>
<td>Level 1</td>
<td>Gives information on controller state and HW configuration</td>
</tr>
</tbody>
</table>

1. Acronym of submenu as it appears on controller display.
2. Text of scrolling message as it appears on controller display.
3. Password needed to access submenu items.
4. Description of functions that manage submenu.

4.3.2. Parameters

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Out1</td>
<td>OUTPUT TYPE</td>
<td>INFO</td>
<td>R</td>
</tr>
</tbody>
</table>

- The parameter specifies the type of output 1

- Unit of measurement:
  - RELAY = Relay output
  - DIGIT = 24 V logic output
  - CONTS = Continuous output

1. Acronym of parameter as it appears on controller display.
2. Text of scrolling message as it appears on controller display.
3. Submenu to which parameter belongs.
   If only R, the operator or technician can read the parameter value but cannot change it.
5. Description of use of parameter, including any warnings or suggestions.
6. Unit of measurement of value managed by parameter.
   The unit of measurement can be unique or depend on other configuration choices, for example, the unit of measurement of temperature, which can be set in degrees Centigrade or Fahrenheit. Not all parameters require the use of units of measurement.
7. Description of parameter values or information that can be read or written, as appropriate.
8. Value that the parameter can have. Value can be two types: discrete or pertaining to an interval of values, typically numerical. For a discrete value, all possible values are listed as they appear on the controller display. For intervals of values, the minimum and maximum parameter values are shown.
9. Any additional description of value of individual parameter.
### 4.4. INFO Submenu - information display

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Password</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFO</td>
<td>INSTRUMENT STATUS</td>
<td>Level 1</td>
<td>Gives information on controller state and HW configuration.</td>
</tr>
</tbody>
</table>

#### Parameter

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW.VER</td>
<td>47</td>
</tr>
<tr>
<td>CODE</td>
<td>47</td>
</tr>
<tr>
<td>ERROR</td>
<td>47</td>
</tr>
<tr>
<td>SAP.C</td>
<td>47</td>
</tr>
<tr>
<td>Ser.n</td>
<td>47</td>
</tr>
<tr>
<td>650.LV</td>
<td>47</td>
</tr>
<tr>
<td>CONTR</td>
<td>47</td>
</tr>
<tr>
<td>L.FUNC</td>
<td>47</td>
</tr>
<tr>
<td>IN.SPR</td>
<td>47</td>
</tr>
<tr>
<td>OUT.A1</td>
<td>47</td>
</tr>
<tr>
<td>CT1</td>
<td>47</td>
</tr>
<tr>
<td>1.IN.DG</td>
<td>48</td>
</tr>
<tr>
<td>RS485</td>
<td>49</td>
</tr>
<tr>
<td>Out1</td>
<td>49</td>
</tr>
<tr>
<td>Out2</td>
<td>49</td>
</tr>
<tr>
<td>Out3</td>
<td>49</td>
</tr>
<tr>
<td>Out4</td>
<td>50</td>
</tr>
<tr>
<td>OUT1.S</td>
<td>50</td>
</tr>
<tr>
<td>OUT2.S</td>
<td>50</td>
</tr>
<tr>
<td>OUT3.S</td>
<td>50</td>
</tr>
<tr>
<td>OUT4.S</td>
<td>50</td>
</tr>
<tr>
<td>T.DAYS</td>
<td>51</td>
</tr>
<tr>
<td>P.DAYS</td>
<td>51</td>
</tr>
<tr>
<td>T.INT</td>
<td>51</td>
</tr>
<tr>
<td>T.MIN</td>
<td>51</td>
</tr>
<tr>
<td>T.MAX</td>
<td>51</td>
</tr>
<tr>
<td>time</td>
<td>52</td>
</tr>
<tr>
<td>dAtE</td>
<td>52</td>
</tr>
</tbody>
</table>

* Appears only if function is available on controller.
** Appears only if output 1 is relay or logic.
*** Appears only if relative output is available and is relay or logic.
4.4.1. SW.VER - Versione software

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Password</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW.VER</td>
<td>SOFTWARE VERSION</td>
<td>INFO</td>
<td>R</td>
</tr>
</tbody>
</table>

The parameter shows the version (major.minor) of the controller software.

*Unit of measurement:* -

*Options:* -

4.4.2. CODE - Identifying code of controller

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Password</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CODE</td>
<td>INSTRUMENT ID CODE FOR SERIAL COMM</td>
<td>INFO</td>
<td>R</td>
</tr>
</tbody>
</table>

The parameter shows identifying code of the device for serial communication.

*Unit of measurement:* -

*Options:* 0...247

4.4.3. ERROR - Main input error

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Password</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERROR</td>
<td>MAIN INPUT ERROR</td>
<td>INFO</td>
<td>R</td>
</tr>
</tbody>
</table>

The parameter shows error detected by the main input.

*Unit of measurement:* -

*Options:* 

- **nonE** = No error
- **Lou** = Process variable (PV) is below lower scale limit
- **HIGH** = Process variable (PV) is higher than upper scale limit
- **Err** = PT100 in short circuit or input values below lower limit (for example, TC with incorrect connection)
- **Sbr** = Sensor break or input values higher than upper limit

4.4.4. SAP.C - SAP code

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Password</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAP.C</td>
<td>SAP ORDER CODE</td>
<td>INFO</td>
<td>R</td>
</tr>
</tbody>
</table>

The parameter shows the product number (Fxxxxxx).

*Unit of measurement:* -

*Options:* -

4.4.5. SEr.n - Serial number of controller

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Password</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEr.n</td>
<td>SERIAL NUMBER</td>
<td>INFO</td>
<td>R</td>
</tr>
</tbody>
</table>

The parameter shows the serial number of the controller (number shown on data plate).

The serial number is displayed in the form **yy.ww nnnn**, where

- **yy** = last two digits of year of production
- **ww** = week of production
- **nnnn** = progressive in week of production

*Unit of measurement:* -

*Options:* -
4.4.6. xxxx - Model of controller

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>xxxx</td>
<td>MODEL</td>
<td>INFO</td>
<td>R</td>
</tr>
</tbody>
</table>

The parameter shows the model of the controller. xxxx indicates the controller model (650LV, 650HV, 1250LV, 1250HV, 1350LV, 1350HV).

**Unit of measurement:** -

**Options:**
- 650.LV = 650 controller powered at 20...27 VAC/VDC
- 650.HV = 650 controller powered at 100...240 VAC/VDC
- 125.LV = 1250 controller powered at 20...27 VAC/VDC
- 125.HV = 1250 controller powered at 100...240 VAC/VDC
- 135.LV = 1350 controller powered at 20...27 VAC/VDC
- 135.HV = 1350 controller powered at 100...240 VAC/VDC

4.4.7. xxxx - Type of controller

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>xxxx</td>
<td>MODEL OPTION</td>
<td>INFO</td>
<td>R</td>
</tr>
</tbody>
</table>

The parameter shows the type (xxxxx) of function of the controller.

**Unit of measurement:** -

**Options:**
- CONTR = The device functions only as a controller
- PROGR = The device functions as a programmer and controller
- VALVE = The device functions as a controller with valve control
- PR+VA = The device functions as a programmer and controller with valve control

4.4.8. L.FUNC - Option Logic Functions available

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>L.FUNC</td>
<td>LOGIC FUNCTION AVAILABLE</td>
<td>INFO</td>
<td>R</td>
</tr>
</tbody>
</table>

If present, this parameter indicates that the controller option is installed Logic Functions.

**Unit of measurement:** -

**Options:** -

4.4.9. IN.SPR - Remote setpoint input available

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN.SPR</td>
<td>REMOTE SETPOINT AVAILABLE</td>
<td>INFO</td>
<td>R</td>
</tr>
</tbody>
</table>

If present, the parameter indicates that the remote setpoint input is installed on the controller.

**Unit of measurement:** -

**Options:** -

4.4.10. OUT.A1 - Analog output 1 available

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUT.A1</td>
<td>ANALOG OUTPUT AVAILABLE</td>
<td>INFO</td>
<td>R</td>
</tr>
</tbody>
</table>

If present, the parameter indicates that the analog output in voltge or current is installed on the controller.

**Unit of measurement:** -

**Options:** -
4.4.11. CTx - Current transformer input available

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTx</td>
<td>CURRENT TRASFORMER AVAILABLE</td>
<td>INFO</td>
<td>R</td>
</tr>
</tbody>
</table>

If present, the parameter indicates that one or more current transformer inputs are installed on the controller.

**Unit of measurement:** -

**Options:**
- CT1 = The device has 1 current transformer input
- CT1+2 = The device has 2 current transformer inputs

4.4.12. x.IN.DG - Digital input available

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>x.IN.DG</td>
<td>DIGITAL INPUT AVAILABLE</td>
<td>INFO</td>
<td>R</td>
</tr>
</tbody>
</table>

If present, the parameter indicates how many digital inputs are installed on the controller.

**Unit of measurement:** -

**Options:**
- 1.IN.DG = 1 digital input installed on the controller
- 2.IN.DG = 2 digital input installed on the controller
- 3.IN.DG = 3 digital input installed on the controller
- 5.IN.DG = 4 digital input installed on the controller

4.4.13. RS485 - RS485 serial port available

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS485</td>
<td>FIELDBUS AVAILABLE</td>
<td>INFO</td>
<td>R</td>
</tr>
</tbody>
</table>

If present, the parameter indicates that an RS485 is installed on the controller.

**Unit of measurement:** -

**Options:** -

4.4.14. Out1 - Type of output 1

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Out1</td>
<td>OUTPUT TYPE</td>
<td>INFO</td>
<td>R</td>
</tr>
</tbody>
</table>

The parameter specifies the type of output 1.

**Unit of measurement:** -

**Options:**
- RELAY = Relay output
- DIGIT = 24 V logic output
- CONTS = Continuous current output

4.4.15. Out2 - Type of output 2

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Out2</td>
<td>OUTPUT TYPE</td>
<td>INFO</td>
<td>R</td>
</tr>
</tbody>
</table>

present, the parameter indicates that output 2 is available on the controller and specifies the type.

**Unit of measurement:** -

**Options:**
- RELAY = Relay output
- DIGIT = 24 V logic output
### 4.4.16. Out3 - Type of output 3

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Out3</td>
<td>OUTPUT TYPE</td>
<td>INFO</td>
<td>R</td>
</tr>
</tbody>
</table>

If present, the parameter indicates that output 3 is available on the controller and specifies the type.

**Unit of measurement:** -

**Options:**
- **RELAY** = Relay output
- **TRIAC** = Triac output (only for 650 model)

### 4.4.17. Out4 - Type of output 4

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Out4</td>
<td>OUTPUT TYPE</td>
<td>INFO</td>
<td>R</td>
</tr>
</tbody>
</table>

If present, the parameter indicates that output 4 is available on the controller and specifies the type.

**Unit of measurement:** -

**Options:**
- **RELAY** = Relay output
- **TRIAC** = Triac output (only for 1250 and 1350 models)

### 4.4.18. OUT1.S - Number of switchings output 1

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUT1.S</td>
<td>NUMBER X 1000 RELAY CYCLES</td>
<td>INFO</td>
<td>R</td>
</tr>
</tbody>
</table>

If output 1 is relay or logic, the parameter shows the number of switchings (in thousands).

**Unit of measurement:** Number (× 1000)

**Options:** -

### 4.4.19. OUT2.S - Number of switchings output 2

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUT2.S</td>
<td>NUMBER X 1000 RELAY CYCLES</td>
<td>INFO</td>
<td>R</td>
</tr>
</tbody>
</table>

If output 2 is available on the controller, and if it is relay or logic, the parameter shows the number of switchings (in thousands).

**Unit of measurement:** Number (× 1000)

**Options:** -

### 4.4.20. OUT3.S - Number of switchings output 3

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUT3.S</td>
<td>NUMBER X 1000 RELAY CYCLES</td>
<td>INFO</td>
<td>R</td>
</tr>
</tbody>
</table>

If output 3 is available on the controller, the parameter shows the number of switchings (in thousands).

**Unit of measurement:** Number (× 1000)

**Options:** -
4.4.21. OUT4.S - Number of switchings output 3

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUT4.S</td>
<td>NUMBER X 1000 RELAY CYCLES</td>
<td>INFO</td>
<td>R</td>
</tr>
</tbody>
</table>

If output 4 is available on the controller, the parameter shows the number of switchings (in thousands).

*Unit of measurement:* Number (× 1000)

*Options:* -

4.4.22. T.DAYS - Total working days

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>T.DAYS</td>
<td>TOTAL DAYS OF OPERATION</td>
<td>INFO</td>
<td>R</td>
</tr>
</tbody>
</table>

The parameter shows total number of working days of the controller since first power-on. Each working day equals 24 hours of actual functioning.

*Unit of measurement:* Day

*Options:* 0...9999

4.4.23. P.DAYS - Partial working days

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>P.DAYS</td>
<td>PARTIAL DAYS OF OPERATION</td>
<td>INFO</td>
<td>R</td>
</tr>
</tbody>
</table>

The parameter shows the number of working days of the controller since the last counter reset. Each working day equals 24 hours of actual functioning. The counter can be reset with the Us.cal function.

*Unit of measurement:* Day

*Options:* 0...9999

4.4.24. T.INT - Internal temperature of controller

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>T.INT</td>
<td>INTERNAL TEMPERATURE</td>
<td>INFO</td>
<td>R</td>
</tr>
</tbody>
</table>

The parameter shows the instantaneous internal temperature of the controller.

*Unit of measurement:* °C

*Options:* -

4.4.25. T.MIN - Minimum internal temperature of the controller

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>T.MIN</td>
<td>MIN INTERNAL TEMPERATURE</td>
<td>INFO</td>
<td>R</td>
</tr>
</tbody>
</table>

The parameter shows the minimum internal temperature of the controller measured during work.

*Unit of measurement:* °C

*Options:* -
4.4.26.  **T.MAX - Maximum internal temperature of the controller**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>T.MAX</td>
<td>MAX INTERNAL TEMPERATURE</td>
<td>INFO</td>
<td>R</td>
</tr>
</tbody>
</table>

The parameter shows the maximum internal temperature of the controller measured during work.

*Unit of measurement:* °C

*Options:* -

---

4.4.27.  **tiME - Internal time**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>tiME</td>
<td>INTERNAL TIME</td>
<td>INFO</td>
<td>R</td>
</tr>
</tbody>
</table>

The parameter shows the internal time in 24-hour format. Hours, minutes and seconds are shown with scrolling text: hours, minutes and seconds.

*Unit of measurement:* hh:mm:ss

*Options:* -

---

4.4.28.  **dAtE - Internal date**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>dAtE</td>
<td>INTERNAL DATE</td>
<td>INFO</td>
<td>R</td>
</tr>
</tbody>
</table>

The parameter shows the complete internal date of the controller: month, day, year, day of week, with scrolling text.

*Unit of measurement:* MM / DD / YYYY

*Options:* -
### 4.5. PR.OPT Submenu - Configuring programs

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Password</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PR.OPT</td>
<td>PROGRAMMER CONFIGURATION</td>
<td>Levelo</td>
<td>Lets you configure the 4 programs manageable by the programmer. The parameters are configured for each program to be used. The Programmer function must first be enabled with the menu MODE, parameter PROGR = On. For more information on configuring the programmer, see paragraph “5.13. et point programmer” at page 149.</td>
</tr>
</tbody>
</table>

**Parameter page**

- **Selecting program** 54
- **Number of first step assigned to program** 54
- **Number of last step assigned to program** 54
- **Restart mode** 54
- **Type of control after program restart** 54
- **Option to start execution of program** 55
- **Action at end of program** 55
- **Limitation of step duration** 55
4. CONFIGURATION

4.5.1. PR.OPT - Selecting program

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>PR.OPT</td>
<td>PROGRAM NUMBER</td>
<td>PR.OPT</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter lets you select the program to be configured. During normal functioning, the controller shows the number of the program running and its state P:STAT, viewable in the User Configuration menu.

*Unit of measurement:* Number

*Options:* 1...4

4.5.2. FI.STP - Number of first step assigned to program

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>FI.STP</td>
<td>FIRST STEP OF PROGRAM</td>
<td>PR.OPT</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter lets you select the first step of the program.

*Unit of measurement:* Number

*Options:* 1...12

4.5.3. LA.STP - Number of last step assigned to program

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>LA.STP</td>
<td>LAST STEP OF PROGRAM</td>
<td>PR.OPT</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter lets you select the last step of the program.

*ATTENTION:* LA.STP cannot be less than FI.STP.

*Unit of measurement:* Number

*Options:* 1...12

4.5.4. Strt - Restart mode

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strt</td>
<td>RESTART TYPE AFTER POWER-ON</td>
<td>PR.OPT</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter defines program restart mode after Power-on.

*Unit of measurement:* -

*Options:*
- FI.STP = Program restarts from first step, with setpoint attributed or equal to PV based on the following parameter RST.SP
- ST.STP = Program restarts from condition in which it stopped (last step in execution, setpoint
- RSRCH = Program restarts with search for step (see programmer function...).

4.5.5. RST.SP - Type of control after program restart

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>RST.SP</td>
<td>CONTROL TYPE AFTER RESET</td>
<td>PR.OPT</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter defines the type of control that the controller runs after a reset while waiting for restart. With RST.SP = On the setpoint takes the value of PV with reset command active.

*Unit of measurement:* -

*Options:*
- OFF = The controller continues the control, maintaining the active setpoint
- On = The setpoint assumes the value of the process variable (PV) by imposing the control output to zero.
4.5.6. **WAIT.S - Option to start execution of program**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>WAIT.S</td>
<td>DEF OF START EXEC PROGRAM</td>
<td>PR.OPT</td>
<td>R W</td>
</tr>
</tbody>
</table>

Il parametro abilita o disabilita l’esecuzione automatica del reset della base tempi del programma dopo una commutazione STOP/START.

**Unit of measurement:** -

**Options:**
- **OFF** = Disables automatic execution
- **On** = Enables automatic execution

4.5.7. **End - Action at end of program**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>End</td>
<td>CONDITION AT END OF CYCLE</td>
<td>PR.OPT</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter defines what happens when the program in execution ends (last step done).

**Unit of measurement:** -

**Options:**
- **NONE** = Nothing happens. The controller continues control
- **rESE** = switching in the RESET state, the control type will depend on the parameter RST.SP
- **LOOP** = The program restarts from the first step
- **OFF** = The program ends and puts the controller in the OFF position, with control output to zero

4.5.8. **LIMIT - Limitation of step duration**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIMIT</td>
<td>DEF OF STEP TIMING LIMITATION</td>
<td>PR.OPT</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter enables or disables limitation of step duration. It is useful for quick execution of the program. Eventuale HBB è disabilitato e l’uscita di controllo è forzata al valore di FAULT.

**Unit of measurement:** -

**Options:**
- **OFF** = Disables limitation of step duration
- **On** = Enables limitation of step duration: limits ramp times to 20 seconds and hold times to 10 seconds, in order to have a step time that never exceeds 30 seconds.

4.6. **PR.STP Submenu - Configuration of program steps**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Password</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PR.STP</td>
<td>STEP DEFINITION</td>
<td>Level 1</td>
<td>Lets you configure the steps that make up the program. The parameters are configured for each step to be used. The Programmer function must first be enabled with the MODE menu, parameter PROGR = On. For more information on configuring the programmer, see paragraph “5.13. Set point programmer” page 149.</td>
</tr>
</tbody>
</table>
4.6.1. PR.STP - Programming step

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>PR.STP</td>
<td>PROGRAMMER ACTUAL STEP</td>
<td>PR.SPT</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the number of the programming step being configured.

*Unit of measurement:* Step number

*Options:* 1...12

4.6.2. SETP - Programming step setpoint

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>SETP</td>
<td>STEP SETPOINT</td>
<td>PR.SPT</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the setpoint for the current programming step.
The selectable values are between the low setpoint (LO.SP) and the high setpoint (HI.SP), settable with submenu I.MAIN.

*Unit of measurement:* °C, °F, % based on chosen scale

*Options:* LO.SP...HI.SP

4.6.3. RAMP.T - Step time ramp

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAMP.T</td>
<td>STEP RAMP TIME</td>
<td>PR.SPT</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the time taken to go from the previous setpoint to the setpoint of the current programming step.

*Unit of measurement:* hh.mm or mm.ss (hours.minutes or minutes.seconds). Depends on time base set with submenu MODE, parameter t.Pro

*Options:* 00.00...99.59

4.6.4. HOLD.T - Hold time in step

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>HOLD.T</td>
<td>STEP HOLD TIME</td>
<td>PR.SPT</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the time the program waits before going to the next step.

*Unit of measurement:* hh.mm or mm.ss (ore.minuti o minuti.secondi). Depends on time base set with submenu MODE, parameter t.Pro

*Options:* 00.00...99.59

4.6.5. HBB - Enable Hold Back Band function

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>HBB</td>
<td>HOLD BACK BAND FUNCTION</td>
<td>PR.SPT</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter enables and disables the Hold Back Band function

The HBB function checks that the variable remains in the required tolerance interval. If the maximum deviation is exceeded, the program time base is stopped. The function is settable independently for each programming step. In addition, it can be enabled for the time ramp only, for the hold time only, or for both.

*Unit of measurement:* -

*Options:* OFF = Disables HBB function
            On  = Enables HBB function
### 4.6.6. **BAND - Maximum deviation for HBB**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>BAND</td>
<td>HOLD BACK BAND VALUE</td>
<td>PR.SPT</td>
<td>R W</td>
</tr>
</tbody>
</table>

If the HBB function is enabled, the parameter shows and sets the maximum deviation allowed for PV compared to SV.

**Unit of measurement:** °C, °F, % based on chosen scale

**Options:** 0...999

### 4.6.7. **HBB.R - Enabling HBB during ramp**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>HBB.R</td>
<td>ENABLE HOLD BACK BAND DURING STEP RAMP</td>
<td>PR.SPT</td>
<td>R W</td>
</tr>
</tbody>
</table>

If the HBB function is enabled, the parameter enables and disables it during the step ramp time.

**Unit of measurement:** -

**Options:**
- OFF = Disables HBB function during ramp time
- On = Enables HBB function during ramp time

### 4.6.8. **HBB.H - Enabling HBB during hold**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>HBB.H</td>
<td>ENABLE HOLD BACK BAND DURING STEP HOLD</td>
<td>PR.SPT</td>
<td>R W</td>
</tr>
</tbody>
</table>

If the HBB function is enabled, the parameter enables and disables it during hold in the step.

**Unit of measurement:** -

**Options:**
- OFF = Disables HBB function during hold in step
- On = Enables HBB function during hold in step

### 4.6.9. **HBB2 - Enabling HBB with respect to I.SPR**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>HBB2</td>
<td>HOLD BACK BAND FUNCTION REFERRED TO I.SPR INPUT</td>
<td>PR.SPT</td>
<td>R W</td>
</tr>
</tbody>
</table>

If the HBB function is enabled, the parameter enables and disables it with respect to the remote setpoint input, which can be enabled on the MODE submenu, SP.REM parameter = On and submenu I.SPR, parameter F.SPr = SETP. When the function is enabled with respect to the remote setpoint, if deviation PV-SPR exceeds value BAND, the program time base is stopped.

**Unit of measurement:** -

**Options:**
- OFF = Disables HBB function with respect to remote setpoint input
- On = Enables HBB function with respect to remote setpoint input

### 4.6.10. **S.SP.EN - Enabling retransmission of setpoint**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.SP.EN</td>
<td>SUBDUED SETPOINT RETRANSMITTED ENABLE</td>
<td>PR.SPT</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter enables and disables retransmission of the setpoint value to other slaved controllers. The set point value is sent by configured analog output A1, OUT.AN submenu, parameter F.o.A1 = SLV.SP.

**Unit of measurement:** -

**Options:**
- OFF = Disables retransmission
- On = Enables retransmission
4.6.11. **SUB.SP - Setpoint value of slaved controller**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUB.SP</td>
<td>SUBDUED SETPOINT ASSOCIATED TO STEP</td>
<td>PR,SPT</td>
<td>R W</td>
</tr>
</tbody>
</table>

If the S.SP.EN function is enabled, the parameter shows and sets the setpoint value to be retransmitted as a percentage of the controller setpoint value.

**EXAMPLE**  
If the setpoint of the main controller is 180°C and you want the setpoint of the secondary controller to be 85°C, then SUB.SP should be set to 47.2 (47.2% of 180 is about 85).

**Unit of measurement:**  %

**Options:**  0.0...100.0

4.6.12. **S.RM.EN - Enabling ramp for slaved controller**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.RM.EN</td>
<td>SUBDUED SETPOINT RAMP ENABLE</td>
<td>PR,SPT</td>
<td>R W</td>
</tr>
</tbody>
</table>

If the S.SP.EN function is enabled, the parameter enables and disables the setpoint ramp for the slaved controller.

**Unit of measurement:**  -

**Options:**  
- OFF = Disables setpoint ramp for slaved controller
- On = Enables setpoint ramp for slaved controller

4.6.13. **ENBL.1 - Consent 1 to execute step**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENBL.1</td>
<td>STEP ENABLE FOR STEP START</td>
<td>PR,SPT</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets consent 1 condition to enable execution of the step.

The consents automatically check that certain conditions have been met before the program continues. There are 4 different consents (1, 2, 3 and 4) and, at the start of the step, the state of each must match the programmed state. Consents can be set via digital inputs, function block outputs, and the RS485 serial input. If even one of the consents does not match the programmed state, the step is not executed. If all consents are set to nonE, execution of the step is not conditioned and is always executed.

**Unit of measurement:**  -

**Options:**  
- nonE = Consent state is ignored, i.e., step is always executed
- On = Consent must be on to execute step
- OFF = Consent does not have to be on to execute step

4.6.14. **ENBL.2 - Consent 2 to execute step**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENBL.2</td>
<td>STEP ENABLE FOR STEP START</td>
<td>PR,SPT</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets consent 2 condition to enable execution of the step.

See ENBL.1 for details.
4. CONFIGURATION

4.6.15. ENBL.3 - Consent 3 to execute step

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENBL.3</td>
<td>STEP ENABLE FOR STEP START</td>
<td>PR,SPT</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets consent 3 condition to enable execution of the step.

See ENBL.1 for details.

4.6.16. ENBL.4 - Consent 4 to execute step

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENBL.4</td>
<td>STEP ENABLE FOR STEP START</td>
<td>PR,SPT</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets consent 4 condition to enable execution of the step.

See ENBL.1 for details.

4.6.17. EVN.R.1 - Event 1 during step ramp

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVN.R.1</td>
<td>EVENT DURING STEP RAMP</td>
<td>PR,SPT</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the configuration of event 1 during the step ramp.

*Unit of measurement:* -

*Options:*
- nonE = Event not modified
- On  = Event becomes active
- OFF = Event becomes inactive

4.6.18. EVN.R.2 - Event 2 during step ramp

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVN.R.2</td>
<td>EVENT DURING STEP RAMP</td>
<td>PR,SPT</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the configuration of event 2 during the step ramp.

*Unit of measurement:* -

*Options:*
- nonE = Event not modified
- On  = Event becomes active
- OFF = Event becomes inactive

4.6.19. EVN.R.3 - Event 3 during step ramp

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVN.R.3</td>
<td>EVENT DURING STEP RAMP</td>
<td>PR,SPT</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the configuration of event 3 during the step ramp.

*Unit of measurement:* -

*Options:*
- nonE = Event not modified
- On  = Event becomes active
- OFF = Event becomes inactive
4.6.20. EVN.R.4 - Event 3 during step ramp

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVN.R.4</td>
<td>EVENT DURING STEP RAMP</td>
<td>PR,SPT</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the configuration of event 4 during the step ramp.

*Unit of measurement:* -

*Options:*
- nonE = Event not modified
- On = Event becomes active
- OFF = Event becomes inactive

4.6.21. EVN.H.1 - Event 1 during step hold

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVN.H.1</td>
<td>EVENT DURING STEP HOLD</td>
<td>PR,SPT</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the configuration of event 1 during the step hold.

*Unit of measurement:* -

*Options:*
- nonE = Event not modified
- On = Event becomes active
- OFF = Event becomes inactive

4.6.22. EVN.H.2 - Event 2 during step hold

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVN.H.2</td>
<td>EVENT DURING STEP HOLD</td>
<td>PR,SPT</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the configuration of event 2 during the step hold.

*Unit of measurement:* -

*Options:*
- nonE = Event not modified
- On = Event becomes active
- OFF = Event becomes inactive

4.6.23. EVN.H.3 - Event 3 during step hold

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVN.H.3</td>
<td>EVENT DURING STEP HOLD</td>
<td>PR,SPT</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the configuration of event 3 during the step hold.

*Unit of measurement:* -

*Options:*
- nonE = Event not modified
- On = Event becomes active
- OFF = Event becomes inactive

4.6.24. EVN.H.4 - Event 4 during step hold

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVN.H.4</td>
<td>EVENT DURING STEP HOLD</td>
<td>PR,SPT</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the configuration of event 4 during the step hold.

*Unit of measurement:* -

*Options:*
- nonE = Event not modified
- On = Event becomes active
- OFF = Event becomes inactive
4. CONFIGURATION

4.6.25.  GROP.R - Group of parameters assigned to ramp

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROP.R</td>
<td>CONTROL PARAMETER GROUP DURING STEP RAMP</td>
<td>PR.SPT</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the group of control parameters assigned to the step during the ramp. PID.G.N is settable on the MODE submenu.

*Unit of measurement:* Number

*Options:* 0...PID.G.N = Number of group. If 0, parameters are those for controller settable on PID submenu

4.6.26.  GROP.H - Group of parameters assigned to hold

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROP.H</td>
<td>CONTROL PARAMETER GROUP DURING STEP HOLD</td>
<td>PR.SPT</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the group of control parameters assigned to the step during the hold. PID.G.N is settable on the MODE submenu.

*Unit of measurement:* Number

*Options:* 0...PID.G.N = Number of group. If 0, parameters are those for controller settable on PID submenu

4.6.27.  MSG.R - Message associated with the ramp

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSG.R</td>
<td>SCROLLING MESSAGE DURING STEP RAMP</td>
<td>PR.SPT</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter displays and sets the message number associated with the step during the ramp, which is the message that will appear on the display to scroll to the step you are configuring. More information on the scrolling message can be found in the section “3.1.2.2 Scrolling messages” on page 34. Setting it to “0” will not show any messages.

*Unit of measurement:* ID number of the message

*Options:* 0...25

4.6.28.  MSG.H - Message associated with the maintenance

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSG.H</td>
<td>SCROLLING MESSAGE DURING STEP HOLD</td>
<td>PR.SPT</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter displays and sets the message number associated with the pitch during the maintenance, which is the message that will appear on the display to scroll to the step you are configuring. More information on the scrolling message can be found in the section “3.1.2.2 Scrolling messages” on page 34. Setting it to “0” will not show any messages.

*Unit of measurement:* ID number of the message

*Options:* 0...25
4.7. I.MAIN Submenu - Configuration of main input

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Password</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.MAIN</td>
<td>MAIN INPUT CONFIG</td>
<td>Level 1</td>
<td>Lets you configure the controller's main input.</td>
</tr>
</tbody>
</table>

Parameter page

- **tyPE**
  - Selecting sensor type

- **Lin**
  - Selecting linearization type

- **Unit**
  - Selecting the displayed unit of measurement

- **FILT**
  - Digital filter

- **FILT.D**
  - Digital filter on PV display

- **DEC.P**
  - Number of decimals displayed

- **LO.SCL**
  - Lower limit of scale

- **HI.SCL**
  - Upper limit of scale

- **OF.SCL**
  - Scale offset correction

Parameter page

- **LO.SP**
  - Lower limit for setpoint

- **HI.SP**
  - Upper limit for setpoint

- **LO.AL**
  - Lower limit for alarms

- **HI.AL**
  - Upper limit for alarms
### 4. CONFIGURATION

#### 4.7.1. type - Selecting sensor type

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>tyPE</td>
<td>MAIN INPUT TYPE OF PROBE</td>
<td>I.MAIN</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the sensor type of the main input. The functions for calibrating Custom sensors are on the US.CAL menu. When a 4...20 mA input is used and the current is less than 2 mA, an Err message is generated and the relay state specified with the FAULT parameters is activated.

The table shows the scale limits for each sensor type or input based on the set number of decimals.

<table>
<thead>
<tr>
<th>Sensor type</th>
<th>Sensor</th>
<th>Unit of measurement</th>
<th>Scale limits for DEC.P = 0</th>
<th>Scale limits for DEC.P = 1</th>
<th>Error @ 25°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermocouple</td>
<td>J °C</td>
<td>0...1000</td>
<td>0.0...999.9</td>
<td>&lt; 1.6°C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>K °C</td>
<td>0...1300</td>
<td>0.0...999.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>R °C</td>
<td>0...1750</td>
<td>0.0...999.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S °C</td>
<td>0...1750</td>
<td>0.0...999.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>T °C</td>
<td>-200...400</td>
<td>-199.9...400.0</td>
<td>&lt; 1.6°C (T &gt; 100 °C)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C °C</td>
<td>0...2300</td>
<td>0.0...999.9</td>
<td>&lt; 1.6°C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>D °C</td>
<td>0...2300</td>
<td>0.0...999.9</td>
<td>&lt; 1.6°C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pt20Rh °C</td>
<td>0...1880</td>
<td>0.0...999.9</td>
<td>&lt; 5.1°C (T&gt;1000°C)</td>
<td></td>
</tr>
<tr>
<td>Infrared characteristic of the Tc K model see note</td>
<td>1 °C</td>
<td>10...70</td>
<td>10.0...70.0</td>
<td>maximum error 0.5°C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 °C</td>
<td>60...120</td>
<td>60.0...120.0</td>
<td>maximum error 0.5°C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 °C</td>
<td>115...165</td>
<td>115.0...165.0</td>
<td>maximum error 0.5°C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 °C</td>
<td>140...260</td>
<td>140.0...260.0</td>
<td>maximum error 0.5°C</td>
<td></td>
</tr>
<tr>
<td>Resistance thermometer</td>
<td>PT100 °C</td>
<td>-200...850</td>
<td>-199.9...850.0</td>
<td>&lt; 1°C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PT100 °C</td>
<td>-50...100</td>
<td>-50.0...100.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>JPT100 °C</td>
<td>-200...600</td>
<td>-199.9...850.0</td>
<td>&lt; 1°C</td>
<td></td>
</tr>
<tr>
<td>Voltage /Current</td>
<td>0...60 mV</td>
<td>-1999...9999</td>
<td>-199.9...9999.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0...20 mA</td>
<td>-1999...9999</td>
<td>-199.9...9999.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4...20 mA</td>
<td>-1999...9999</td>
<td>-199.9...9999.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0...10 V</td>
<td>-1999...9999</td>
<td>-199.9...9999.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2...10 V</td>
<td>-1999...9999</td>
<td>-199.9...9999.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0...5 V</td>
<td>-1999...9999</td>
<td>-199.9...9999.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1...5 V</td>
<td>-1999...9999</td>
<td>-199.9...9999.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0...1 V</td>
<td>-1999...9999</td>
<td>-199.9...9999.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.2...1 V</td>
<td>-1999...9999</td>
<td>-199.9...9999.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Custom</td>
<td>RTD</td>
<td>-1999...9999</td>
<td>-199.9...9999.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0...60 mV</td>
<td>-1999...9999</td>
<td>-199.9...9999.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0...20 mA</td>
<td>-1999...9999</td>
<td>-199.9...9999.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4...20 mA</td>
<td>-1999...9999</td>
<td>-199.9...9999.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0...10 V</td>
<td>-1999...9999</td>
<td>-199.9...9999.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2...10 V</td>
<td>-1999...9999</td>
<td>-199.9...9999.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0...5 V</td>
<td>-1999...9999</td>
<td>-199.9...9999.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1...5 V</td>
<td>-1999...9999</td>
<td>-199.9...9999.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0...1 V</td>
<td>-1999...9999</td>
<td>-199.9...9999.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.2...1 V</td>
<td>-1999...9999</td>
<td>-199.9...9999.9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Nota:** the infrared temperature sensor has an output in voltage for direct connection to the input terminals of the temperature controller. An external thermometer is needed in order to correct the sensor error.

After identifying the work temperature range (for example, 140 – 260°C), set an SP near the minimum scale value, and after reaching it make a note of value A1 indicated by the instrument and of value A2 indicated by the external thermometer. Set an SP near the maximum scale value, and after reaching it make a note of value B1 indicated by the instrument and of value B2 indicated by the external thermometer. Enable 4-point linearization (see Correcting 4-point input) and enter the four requested values (A1, B1 and A2, B2).
4.7.2. Lin - Selecting linearization type

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lin</td>
<td>CUSTOM LINEARIZATION</td>
<td>I.MAIN</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter sets linearization for the selected sensor type.
The function corrects any linearity and proportionality errors in the correlation between the value sent by the input and the actual value of the physical quantity measured.

This correction can be made with two different algorithms: 32-step linearization and 4-point linearization. Values are set (33 for 32-step linearization and 4 for 4-point linearization) with the LINRZ submenu parameters.

For an explanation of 4-point linearization, see paragraph "5.4. 4-point input correction page 141.

Unit of measurement: -

Options: NONE = No linearization
32.STP = 32-step linearization
4.POIN = 4-point linearization
4. CONFIGURATION

4.7.3. Unit - Selecting the displayed unit of measurement

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit</td>
<td>UNIT OF MEASURE</td>
<td>I.MAIN</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the unit of measurement displayed for input 1. The unit appears on the Home page of the display.
For thermocouple or resistance thermometer inputs, the °C / °F selection automatically converts the temperature value; the related scale limits and setpoint limits must be set.

*Unit of measurement:* -

*Options:*
- **NONE** = No unit of measurement
- **°C** = Degrees Celsius
- **°F** = Degrees Fahrenheit
- **CUST** = Custom, settable with GF_eXpress

4.7.4. FILT - Digital filter

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>FILT</td>
<td>DIGITAL FILTER</td>
<td>I.MAIN</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the value of the digital filter time constant.
With 0.00 no filter is applied.

*Unit of measurement:* Seconds

*Options:*
- **0.00...20.00**

4.7.5. FILT.D - Digital filter on PV display

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>FILT.D</td>
<td>DIGITAL FILTER ON DISPLAY PV</td>
<td>I.MAIN</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the allowed tolerance between the real PV value and the value on the PV display: if the variation in real PV is within the interval displayed value - FILT.D... displayed value + FILT.D the displayed value does not change.
With 0.00 no filter is applied.

*Unit of measurement:* The one set with the Unit parameter

*Options:*
- **0.0...9.9**

4.7.6. DEC.P - Number of decimals displayed

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEC.P</td>
<td>DECIMAL POINT POSITION</td>
<td>I.MAIN</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the decimal point position for the process value (PV) displayed, i.e., defines its number of decimal figures.
The number of decimal set may reduce the limits of the measurement scale used.

*Unit of measurement:* Number

*Options:*
- **0...3** = Number of decimals displayed
- **0 / 1** = Number of decimals displayed, only for TC and RTD sensors
### 4.7.7. LO.SCL - Lower limit of scale

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
</tr>
</thead>
<tbody>
<tr>
<td>LO.SCL</td>
<td>INPUT LOW LIMIT</td>
</tr>
</tbody>
</table>

The parameter shows and sets the lower limit of the measurement scale used for the main input, based on input (or sensor) type, unit of measurement, and number of decimals selected.

The upper value of LO.SCL is not limited by the value of HI.SCL.

**Unit of measurement:** The one set with the Unit parameter

**Options:** A numerical value within the temperature range of the input or sensor

<table>
<thead>
<tr>
<th>J.TC</th>
<th>0...1000 32...1832</th>
</tr>
</thead>
<tbody>
<tr>
<td>K.TC</td>
<td>0...1300 32...2372</td>
</tr>
<tr>
<td>R TC</td>
<td>0...1750 32...3182</td>
</tr>
<tr>
<td>S TC</td>
<td>0...1750 32...3182</td>
</tr>
<tr>
<td>T.TC</td>
<td>-200...400 -328...752</td>
</tr>
<tr>
<td>C.TC</td>
<td>0...2300 32...4172</td>
</tr>
<tr>
<td>D.TC</td>
<td>0...2300 32...4172</td>
</tr>
<tr>
<td>PT2.TC</td>
<td>0...1880 32...4208</td>
</tr>
<tr>
<td>INFR1</td>
<td>10...70 50...158</td>
</tr>
<tr>
<td>INFR2</td>
<td>60...120 140...248</td>
</tr>
<tr>
<td>INFR3</td>
<td>115...165 239...329</td>
</tr>
<tr>
<td>INFR4</td>
<td>140...260 284...500</td>
</tr>
<tr>
<td>PT100</td>
<td>-200...850 -328...1562</td>
</tr>
<tr>
<td>PT.LIM</td>
<td>-50...100 -58...212</td>
</tr>
<tr>
<td>JTP10</td>
<td>-200...600 -328...1112</td>
</tr>
<tr>
<td>60MV</td>
<td>-1999...9999 -1999...9999</td>
</tr>
<tr>
<td>20MA</td>
<td>-1999...9999 -1999...9999</td>
</tr>
</tbody>
</table>

### 4.7.8. HI.SCL - Upper limit of scale

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
</tr>
</thead>
<tbody>
<tr>
<td>HI.SCL</td>
<td>INPUT HIGH LIMIT</td>
</tr>
</tbody>
</table>

The parameter shows and sets the upper limit of the measurement scale used for the main input, based on input (or sensor) type, unit of measurement, and number of decimals selected.

The lower value of HI.SCL is limited by the value of LO.SCL.

**Unit of measurement:** The one set with the Unit parameter

**Options:** A value in the interval corresponding to the input or sensor type (see tables for LO.SCL parameter).
4. CONFIGURATION

### 4.11. ALARM Submenu - Configuration of alarms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Password</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALARM</td>
<td>ALARM CONFIG</td>
<td>Level 1</td>
<td>Lets you configure the generic alarms.</td>
</tr>
</tbody>
</table>

```
<table>
<thead>
<tr>
<th>Parameter page</th>
<th>Parameter page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALARM</td>
<td>MSG.AL</td>
</tr>
<tr>
<td>REF.x</td>
<td>BLK.AL</td>
</tr>
<tr>
<td>d.i.x</td>
<td></td>
</tr>
<tr>
<td>A.r.x</td>
<td></td>
</tr>
<tr>
<td>n.S.x</td>
<td></td>
</tr>
<tr>
<td>PWON.E</td>
<td></td>
</tr>
<tr>
<td>LATCH</td>
<td></td>
</tr>
<tr>
<td>HYSTE</td>
<td></td>
</tr>
<tr>
<td>DELAY</td>
<td></td>
</tr>
</tbody>
</table>
```

- **Selecting the alarm to be configured**
- **Selecting the alarm reference**
- **Selecting direct or inverse alarm**
- **Selecting absolute or deviation alarm**
- **Method for applying hysteresis**
- **Disabling the alarm at power-on**
- **Memorizing the alarm**
- **Hysteresis**
- **Alarm trip delay**

Message associated with tripping of alarm
Flash of PV display

---

Gefran 650/1250/1350 Temperature Controller – Abbreviated Manual

40524-04 Rev0
4.11.1. ALARM - Selecting the alarm to be configured

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALARM</td>
<td>ALARM NUMBER</td>
<td>ALARM</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the alarm to be configured, identified by its number.

**Unit of measurement:** Number

**Options:** 1...ALRM.N = Identifying number of alarm, where ALRM.N is the total number of alarms, setting by submenu MODE.

4.11.2. rEF.x - Selecting the alarm reference

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>rEF.x</td>
<td>SELECTING REFERENCE SIGNAL</td>
<td>ALARM</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the reference of alarm number “x” selected with the previous parameter ALARM, where the reference can be an input or value to be monitored.

**Unit of measurement:** -

**Options:**
- PV = Process variable
- IN.SPR = Remote setpoint input
- SP.ACT = Actual setpoint
- CURR1 = Current of current transformer CT1
- CURR2 = Current of current transformer CT2
- OUT.KW = Power transferred to the load
- ENERG = Energy transferred to load
- TOT.ENERGY = Totalizer Energy transferred to the load
- T.INT = Internal temperature

4.11.3. d.i.x - Selecting direct or inverse alarm

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>d.i.x</td>
<td>DIRECT/INVERSE DEFINITION</td>
<td>ALARM</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the behavior of alarm number “x” with respect to the alarm limit and hysteresis. Direct or inverse defines when the alarm has to trip. For a detailed explanation of this behavior, see paragraph “5.6.1. Generic alarms AL1...AL4” on page 142.

**Unit of measurement:** -

**Options:**
- DIREC = Direct Alarm
- INVRS = Inverse Alarm

4.11.4. A.r.x - Selecting absolute or deviation alarm

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.r.x</td>
<td>ABSOLUTE/DEVIATION DEFINITION</td>
<td>ALARM</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and defines the reference value of alarm number “x” for the alarm limit. For a detailed explanation of the difference between absolute and deviation, see paragraph “5.6.1. Generic alarms AL1...AL4” on page 142.

**Unit of measurement:** -

**Options:**
- ABSLT = Absolute alarm
- RELAT = Deviation alarm
4. CONFIGURATION

4.11.5. n.S.x - Method for applying hysteresis

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>n.S.x</td>
<td>NORMAL/SYMMETRIC DEFINITION</td>
<td>ALARM</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the method for applying hysteresis for alarm number “x” with respect to the alarm limit value.

With normal, hysteresis is added to / subtracted from the alarm limit(s) based on the general alarm configuration. With symmetrical, hysteresis is added to / subtracted from the alarm limit itself. For a detailed explanation of the difference between normal and symmetrical, see paragraph “5.6.1. Generic alarms AL1...AL4” on page 142.

Unit of measurement: -

Options:
- NORML = Normal alarm
- SYMMT = Symmetrical alarm (window)

4.11.6. PWON.E - Disabling the alarm at power-on

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>PWON.E</td>
<td>DISABLE AT SWITCH ON</td>
<td>ALARM</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the behavior of the alarm (being configured) when the controller is powered on.

If the parameter is “OFF,” the alarm will trip when the controller is powered on if the process variable exceeds the alarm setpoint limits.

If the parameter is “On,” the alarm will not trip until the alarm limit value is reached at least once after the controller is powered on.

ATTENTION! The setpoint can be reached in increment or in decrement, or it may never be reached. Therefore, with “On” the alarm might never trip even if the value of the process variable exceeds the alarm setpoint limits.

Example – Minimum, inverse and absolute alarm

When the system is off, the process variable equals room temperature (20 °C). The alarm setpoint is set at 150°C ± 10°C. The controller powers on with the system.

So with “OFF” the alarm trips as soon as the controller is powered on because the temperature of the process variable exceeds the alarm setpoint limits.

Instead, with “On” the alarm trips only after the temperature of 150°C is reached at least once for the process variable.

Unit of measurement: -

Options:
- OFF = Alarm enabled at power-on
- On  = Alarm disabled at power-on (until setpoint is reached)

4.11.7. LATCH - Memorizing the alarm

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>LATCH</td>
<td>MEMORY DEFINITION</td>
<td>ALARM</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets enabling of memorization of the alarm being configured.

Memorization maintains the active alarm state even after the alarm conditions are eliminated.

The alarm state can be deleted by from the digital input, serial input, or key.

Unit of measurement: -

Options:
- OFF = Alarm not latched
- On  = Alarm latched
4. CONFIGURATION

### 4.11.8. HYSTE - Hysteresis

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>HYSTE</td>
<td>Hysteresis</td>
<td>ALARM</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the hysteresis applied to the alarm setpoint value for the alarm being configured.

**Unit of measurement:** Scale points

**Options:**
- 0...999 = For absolute (A.r.x = ABSLT) and symmetrical alarm (n.S.x = SYMMT)
- -999...999 = For other types of alarms

### 4.11.9. DELAY - Alarm trip delay

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DELAY</td>
<td>Delay of activation</td>
<td>ALARM</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the alarm trip delay for the alarm being configured, i.e., the time that the value of the process variable has to exceed the alarm setpoint for the alarm to trip.

This parameter prevents repeated alarms due to instantaneous and insignificant exceeding of that value.

If the parameter is set to “0.00” the alarm will be instantaneous, regardless of the time in which the process variable exceeds the alarm setpoint.

For a detailed explanation of this behavior, see paragraph “5.6.1. Generic alarms AL1...AL4” on page 142.

**Unit of measurement:** Minutes.seconds

**Options:** 0.00...99.59

### 4.11.10. MSG.AL - Message associated with tripping of alarm

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSG.AL</td>
<td>SCROLLING MESSAGE AT ALARM ACT</td>
<td>ALARM</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the number of the message associated with tripping of the alarm being configured, i.e., the scrolling message shown on the display.

For more information on scrolling messages, see paragraph “3.1.2.2. Scrolling messages” on page 34.

If the parameter is set to “0” no message will be displayed when the alarm trips.

The same message number can be assigned to different alarms

**Unit of measurement:** Message number

**Options:** 0...25

### 4.11.11. BLK.AL - Flashing of PV display

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>BLK.AL</td>
<td>Blink display PV def</td>
<td>ALARM</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the flashing of the PV display in case of alarm, for the alarm being configured.

If the parameter is “On,” the value shown on the PV display starts to flash in case of alarm.

**Unit of measurement:** -

**Options:**
- OFF = PV display does not flash in case of alarm
- On = PV display flashes in case of alarm
### 4.13. PID Submenu – Configuring control parameters

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Password</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PID</td>
<td>PID CONFIG</td>
<td>Level 1</td>
<td>Lets you configure the control parameters</td>
</tr>
</tbody>
</table>

#### Parameter page

- **Enabling page**
  - **S.TUNE**: Enabling Self-Tuning
  - **SOFT.S**: Enabling Soft-Start
  - **SOFT.T**: Soft-Start Time
  - **A.TUNE**: Enabling Auto-Tuning
  - **Aut.t**: Selecting type of Auto-Tuning
  - **Cntr**: Selecting type of control
  - **DERV.S**: Derivative sampling time
  - **H.PB**: Proportional heating band or hysteresis in ON-OFF control
  - **H.IT**: Integral heating time
  - **H.DT**: Derivative heating time
  - **H.P.HI**: Maximum limit of heating power

- **Parameter page**
  - **H.P.LO**: Minimum limit of heating power
  - **COOL**: Selecting cooling fluid
  - **C.SP**: Cooling setpoint with respect to heating setpoint
  - **C.PB**: Proportional heating band or hysteresis in ON-OFF control
  - **C.IT**: Integral cooling time
  - **C.DT**: Derivative cooling time
  - **C.P.HI**: Maximum limit of cooling power
  - **C.P.LO**: Minimum limit of cooling power
  - **RESET**: Manual reset
  - **P.RST**: Reset power
  - **A.RST**: Antireset
  - **FEEDF**: Feedforward power
  - **DEAD.B**: Deadband
  - **FAULT**: Fault action power
  - **GRAD.I**: Setpoint gradient in increase
  - **GRAD.D**: Setpoint gradient in decrease
  - **Unit**: Unit of measurement of gradient
  - **GRAD.O**: Gradient of control output
  - **LBA.TM**: Tripping delay
  - **LBA.PW**: Power delivered when LBA alarm trips
4.13.1. S.TUNE - Enabling Self-Tuning

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.TUNE</td>
<td>SELF TUNING ENABLE</td>
<td>PID</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets enabling of Self-Tuning. For more information on the Self-Tuning function, see paragraph “5.10.3. Self-Tuning” on page 145.

Unit of measurement:  -

Options:
- OFF = Self-Tuning disabled
- On = Self-Tuning enabled at next power-on only
- On.AL = Self-Tuning enabled at all power-ons

4.13.2. SOFT.S - Enabling Soft-Start

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOFT.S</td>
<td>SOFT START ENABLE</td>
<td>PID</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets enabling of Soft-Start. For more information on the Self-Start function, see paragraph “5.9. Soft-Start” on page 144. This parameter appears only if S.TUNE = OFF.

Unit of measurement:  -

Options:
- OFF = Soft-Start disabled
- On = Soft-Start enabled at next power-on

4.13.3. SOFT.T - Soft-Start Time

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOFT.T</td>
<td>SOFT START TIME</td>
<td>PID</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets Soft-Start time, i.e., the time that the control output needs to reach the value required by the PID. This parameter appears only if SOFT.S = On.

Unit of measurement:  Minutes

Options:  0.0...500.0

4.13.4. A.TUNE - Enabling Auto-Tuning

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.TUNE</td>
<td>AUTO TUNING ENABLE</td>
<td>PID</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets enabling of Auto-Tuning. For more information on the Auto-Tuning function, see paragraph “5.10.4. Auto-Tuning” on page 146.

Unit of measurement:  -

Options:
- OFF = Auto-Tuning disabled
- On = Auto-Tuning enabled
4. CONFIGURATION

4.13.5. Aut.t - Selecting type of Auto-Tuning

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aut.t</td>
<td>AUTO TUNING SELECTION</td>
<td>PID</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the type of Auto-Tuning used.

**Unit of measurement:**

**Options:**
- CONTI = Continuous Auto-Tuning
- O.SHOT = One-shot Auto-Tuning
- DEV0.5 = One-shot Auto-Tuning with activation when \(|SP-PV| > 0.5\% \) of full scale of main input
- DEV1 = One-shot Auto-Tuning with activation when \(|SP-PV| > 1\% \) of full scale of main input
- DEV2 = One-shot Auto-Tuning with activation when \(|SP-PV| > 2\% \) of full scale of main input
- DEV4 = One-shot Auto-Tuning with activation when \(|SP-PV| > 4\% \) of full scale of main input

4.13.6. Cntr - Selecting type of control

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cntr</td>
<td>TYPE OF CONTROL</td>
<td>PID</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the type control performed by the controller.

For more information on the control function, see paragraph “5.10. Controls” on page 140.

**Unit of measurement:**

**Options:**
- H.CENT = Proportional heating
- H.PI = Proportional/integral heating
- H.PID = Proportional integral/derivative heating
- C.PROP = Proportional cooling
- C.PI = Proportional/integral cooling
- C.PID = Proportional integral/derivative cooling
- HC.P = Proportional heating/cooling
- HC.PI = Proportional/integral heating/cooling
- HC.PID = Proportional integral/derivative heating/cooling
- H.ONOF = Heating ON-OFF
- C.ONOF = Cooling ON-OFF
- HC.ONO = Heating/cooling ON-OFF
- HP.CON = PID heating / cooling ON-OFF
- HON.CP = Heating ON-OFF / PID cooling
- PID.RG = Heating / PID cooling with relative gain
4.19. **MODE Submenu – Configuring functioning mode**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Password</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>FUNCTION MODE MANAGER</td>
<td>Level 2</td>
<td>Lets you configure the controller's functioning mode.</td>
</tr>
</tbody>
</table>

**Parameter page**

- **PID.G.N**: Number of groups of control parameters
- **MA.AU**: Defining transition from Manual to Automatic
- **AU.MA**: Defining transition from Automatic to Manual
- **LO.RE**: Defining transition from remote SP to local SP or from remote manual to local manual
- **On.OF**: Enabling software on/off
- **MA.P.L**: Enabling manual power latch
- **MAN.P**: Enabling change of manual power value
- **dIG**: Defining type of digital inputs
- **ALRM.N**: Number of alarms enabled
- **TIMER**: Enabling Timer function
- **MUL.SP**: Enabling Multiset function
- **SP.REM**: Enabling the remote setpoint
- **SPr.t**: Defining absolute or deviation remote setpoint
- **PROGR**: Enabling the setpoint programmer
- **t.Pro**: Setting the programmer base time
- **ENERG**: Enabling the energy counter function
- **T.SAMP**: Main input sample time
- **FREQ2**: Defining power line frequency
4.19.1. **PID.G.N - Number of groups of control parameters**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>PID.G.N</td>
<td>NUM OF CONTROL PARAMETERS GROUP</td>
<td>MODE</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the number of the groups of PID parameters. The groups of control parameters are disabled if the parameter equals “0”.

*Unit of measurement:* Number

*Options:* 0...4

4.19.2. **MA.AU - Defining transition from Manual to Automatic**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA.AU</td>
<td>MANUAL TO AUTOMATIC TRANSITION TYPE</td>
<td>MODE</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets controller behavior when switching from manual to automatic mode.

With STAND, the POWER output assumes the value calculated by the PID based on the local or remote SP (bumpless PID with integral action based on actual PV-SP and power values).

With BUMPL, the local setpoint assumes the PV value (bumpless PID with integral action based on actual power value).

*PV-SP = 0.*

*Unit of measurement:* -

*Options:* STAND, BUMPL

4.19.3. **AU.MA - Defining transition from Automatic to Manual**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>AU.MA</td>
<td>AUTOMATIC TO MANUAL TRANSITION TYPE</td>
<td>MODE</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets controller behavior when switching from automatic to manual mode.

With STAND, the control output assumes the local or remote POWER value.

With BUMPL, the value of the control output does not change. In case of remote manual control, the control acts in raise/lower mode.

*Unit of measurement:* -

*Options:* STAND, BUMPL

4.19.4. **LO.rE - Defining transition from remote SP to local SP**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>LO.rE</td>
<td>REMOTE TO LOCAL TRANSITION TYPE</td>
<td>MODE</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets controller behavior when switching from remote to local setpoint, and is significant only with \( \text{F.SP}_{r} = \text{SETP} \).

With STAND, the setpoint switches to the value of the selected local SP or multiset, possibly with setpoint gradient (if set).

With BUMPL, the remote SP value is memorized in the selected local SP or multiset.

*Unit of measurement:* -

*Options:* STAND, BUMPL
4. CONFIGURATION

4.19.5. On.OF - Enabling software on/off

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>On.OF</td>
<td>SOFTWARE ON/OFF ENABLE</td>
<td>MODE</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets enabling of on/off of the controller's software. The software ON-OFF function is explained in detail in paragraph "5.8. Switching the software on/off" on page <?>.

**Unit of measurement:** -  
**Options:**  
ENABL = Controller software on/off enabled  
DISAB = Controller software on/off disabled

4.19.6. MA.P.L - Enabling manual power latch

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA.P.L</td>
<td>MANUAL POWER LATCH ENABLE</td>
<td>MODE</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets enabling of memorization (in non-volatile memory) of the manual power value.

**Unit of measurement:** -  
**Options:**  
LATCH = Latch enabled  
NO.LAT = Latch disabled. After Power-on, Manual power value is reset

4.19.7. MAn.P - Enabling change of manual power value

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAn.P</td>
<td>MANUAL POWER MODIFY ENABLE</td>
<td>MODE</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets enabling of change of the manual power value.

**Unit of measurement:** -  
**Options:**  
MODIF = Change allowed  
NO.MOD = Change not allowed

4.19.8. dIG - Defining type of digital inputs

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>dIG</td>
<td>DIGITAL INPUT TYPE</td>
<td>MODE</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the type of digital inputs.

**Unit of measurement:** -  
**Options:**  
NPN = NPN digital inputs or voltage-free contact  
PNP = PNP digital inputs

4.19.9. ALRM.N - Number of alarms enabled

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALRM.N</td>
<td>NUM OF ENABLE ALARMS</td>
<td>MODE</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the number of alarms enabled. No alarm is enabled if the parameter equals "0".

**Unit of measurement:** Number  
**Options:**  
0...4
4.19.10. **tMEr - Enabling Timer function**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>tMEr</td>
<td>TIMER ENABLE</td>
<td>MODE</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets enabling of the Timer function. The Timer function is explained in detail in paragraph “5.11. Timer” on page 147.

**Unit of measurement:** -

**Options:**
- OFF = Timer disabled
- ON.SEC = Timer enabled with time base Seconds
- ON.MIN = Timer enabled with time base Minutes

4.19.11. **MUL.SP - Enabling Multiset function**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUL.SP</td>
<td>MULTISET ENABLE</td>
<td>MODE</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets enabling of the Multiset function. The MULTISET function is explained in detail in paragraph “5.12. Multiset, setpoint gradient” on page 149.

**Unit of measurement:** -

**Options:**
- OFF = Multiset disabled
- On = Multiset enabled

4.19.12. **SP.REM - Enabling the remote setpoint**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP.REM</td>
<td>REMOTE SP ENABLE</td>
<td>MODE</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets enabling and the type of the remote set point. It is enabled in sub-menu I.SPR, parameter F.SPr = SETP. The remote set point must also be set as a function of the remote input F.SPr = SETP. Remote mode is enabled from the keys, digital inputs, serial line or as Function Block output by setting the LO-RE option.

**Unit of measurement:** -

**Options:**
- OFF = Remote setpoint disabled
- On = Remote setpoint enabled from analog input
- SEr = Remote setpoint enabled from serial

4.19.13. **SPr.t - Defining absolute or deviation remote setpoint**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPr.t</td>
<td>REMOTE SP TYPE</td>
<td>MODE</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and defines the setpoint as absolute or deviation. The absolute remote setpoint replaces the local setpoint in the control. The deviation remote setpoint is added algebraically to the local setpoint in the control. The parameter appears only if the parameter SP.REM is different from OFF.

**Unit of measurement:** -

**Options:**
- ABSLT = Absolute remote setpoint
- RELAT = Deviation remote setpoint

4.19.14. **PROGR - Enabling the setpoint programmer**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROGR</td>
<td>PROGRAMMER ENABLE</td>
<td>MODE</td>
<td>R W</td>
</tr>
</tbody>
</table>
4. CONFIGURATION

The parameter shows and sets enabling of the setpoint programmer for P or PV models.

**Unit of measurement:** -

**Options:**
- OFF = Setpoint programmer disabled
- On = Setpoint programmer enabled

4.19.15. t.Pro - Setting the programmer base time

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>t.Pro</td>
<td>PROGRAMMER BASE TIME DEFINITION</td>
<td>MODE</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the base time used by the programmer.
The parameter appears if the parameter PROGR = On.

**Unit of measurement:** -

**Options:**
- HH.MM = Base time calculated in hours:minutes
- MM.SS = Base time calculated in minutes:seconds

4.19.16. ENERG - Enabling the energy counter function

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENERG</td>
<td>ENERGY COUNTER ENABLE</td>
<td>MODE</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets enabling of the energy counter function.
The Energy Counter function is explained in detail in paragraph “5.15. Energy Counter” on page 154.

**Unit of measurement:** -

**Options:**
- OFF = Energy counter disabled
- On = Energy counter enabled

4.19.17. T.SAMP - Main input sample time

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>T.SAMP</td>
<td>MAIN INPUT SAMPLE TIME</td>
<td>MODE</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the main input sample time.

**Unit of measurement:** Milliseconds

**Options:**
- 60
- 120

4.19.18. FREQZ - Defining power line frequency

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>FREQZ</td>
<td>LINE FREQUENCY</td>
<td>MODE</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the power line frequency

**Unit of measurement:** Hz

**Options:**
- 50
- 60
### 4.20. TIMER Submenu – Configuring timer parameters

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Password</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIMER</td>
<td>TIMER MANAGER</td>
<td>Level 2</td>
<td>Lets you configure the timer parameters. The submenu appears only if the Timer function was enabled on the MODE submenu.</td>
</tr>
</tbody>
</table>

#### Parameter page

- **F.tim**
  - Selecting Timer function mode
  - Page 116

- **St.St**
  - Selecting the Start/Stop timer command
  - Page 116

- **S.S.t**
  - Defining the Start/Stop timer command logic
  - Page 116

- **rESE**
  - Selecting the Reset timer command
  - Page 116

- **rES.t**
  - Defining the Reset timer command logic
  - Page 117

- **BAND**
  - Timer count band
  - Page 117

- **End**
  - Selecting the function activated at end of count
  - Page 117

- **TIMER**
  - Timer value
  - Page 117

- **MSG.TM**
  - Message assigned to active Timer
  - Page 118
4.20.1. **F.tiM - Selecting Timer function mode**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>F.tiM</td>
<td>TIMER FUNCTION</td>
<td>TIMER</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the timer function mode. The Timer function is explained in detail in paragraph “5.11. Timer” on page 147.

**Unit of measurement:** -

**Options:**
- ST.STP = Start/Stop Timer
- STABL = Stabilization Timer
- SWITC = Power-on Timer

4.20.2. **St.St - Selecting the Start/Stop timer command**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>St.St</td>
<td>TIMER START STOP</td>
<td>TIMER</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the “object” that commands timer Start/Stop.

**Unit of measurement:** -

**Options:**
- IN.DIG = From digital input
- ALRM1 = From alarm 1
- ALRM2 = From alarm 2
- ALRM3 = From alarm 3
- ALRM4 = From alarm 4
- AL.HB = From HB alarm
- SERIA = From serial

4.20.3. **S.S.t - Defining the Start/Stop timer command logic**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.S.t</td>
<td>LOGIC TYPE OF TIMER START/STOP</td>
<td>TIMER</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the type of logic used to command timer Start/Stop. With positive logic, timer start corresponds to “object” active if IN.DIG input active. With negative logic, timer start corresponds to “object” inactive if IN.DIG input inactive.

**Unit of measurement:** -

**Options:**
- POSIT = Positive logic
- NEGAT = Negative logic

4.20.4. **rESE - Selecting the Reset timer command**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>rESE</td>
<td>TIMER RESET</td>
<td>TIMER</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the “object” that commands Reset of the timer.

**Unit of measurement:** -

**Options:**
- AUT.RS = For autoreset with timer in Stop
- IN.DIG = From digital input with T.RST function
- ALRM1 = From alarm 1
- ALRM2 = From alarm 2
- ALRM3 = From alarm 3
- ALRM4 = From alarm 4
- AL.HB = From HB alarm
- SERIA = From serial
4.20.5. rES.t - Defining the timer reset command logic

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>rES.t</td>
<td>LOGIC TYPE OF TIMER RESET</td>
<td>TIMER</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the type of logic used to command the timer reset.
With positive logic, the timer is reset with "object" active.
With negative logic, the timer is reset with "object" inactive.

**Unit of measurement:** -

**Options:**
- **POSIT** = Positive logic
- **NEGAT** = Negative logic

4.20.6. BAND - Band for timer count

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>BAND</td>
<td>SYMM SP BAND WHERE TIMER IS ACTIVE</td>
<td>TIMER</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the symmetrical band around the setpoint within which the timer count is on.
The parameter appears if the parameter **F.tiM = STABL**
If the parameter equals "0.0" the count is immediate as soon as the setpoint is reached for the first time.

**Unit of measurement:** % of full scale of main input

**Options:** 0.0...25.0

4.20.7. End - Selecting the function activated at end of count

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>End</td>
<td>FUNCTION WHERE TIMER IS OVER</td>
<td>TIMER</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the function that is activated when the timer ends the count.
The parameter appears if the parameter **F.tiM = ST.STP or STABL**.

**Unit of measurement:** -

**Options:**
- **NONE** = None: control continues with actual setpoint
- **OFF** = Software off
  - if the Multiset function is enabled:
  - **SP1-2** = Change setpoint SP1/SP2

4.20.8. TIMER - Timer value

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIMER</td>
<td>ACTUAL TIME</td>
<td>TIMER</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the timer value.

**Unit of measurement:** Minutes or Seconds according to the selection set in the MODE submenu, parameter tMEr

**Options:** 0...9999
4. CONFIGURATION

4.20.9. MSG.TM - Selecting the message assigned to the active count

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSG.TM</td>
<td>MSG NUMBER WHEN TIMER OVER</td>
<td>TIMER</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the number of the message assigned to the active timer count, i.e., the scrolling message shown on the display.
For more information on scrolling messages, see paragraph “3.1.2.2. Scrolling messages” on page 34. If the parameter is set to “0” no message will be displayed during the active timer count.

Unit of measurement: Message number

Options: 0...25
4.22. SERIA Submenu – Configuring serial communication

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Password</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SERIA</td>
<td>SERIAL COMMUNICATION CONFIG</td>
<td>Level 2</td>
<td>Lets you configure serial communication</td>
</tr>
</tbody>
</table>

Parameter page

- **Identification code**
- **Selecting communication speed**
- **Selecting parity**

Parameter code: 122
4. CONFIGURATION

### 4.22.1. CODE - Identification code

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>CODE</td>
<td>INSTRUMENT ID CODE FOR SERIAL COMM</td>
<td>SERIA</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the identifying code of the controller in a Modbus serial network.

*Unit of measurement:* Number

*Options:* 1...247

---

### 4.22.2. KBAUD - Selecting communication speed

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>KBAUD</td>
<td>COMMUNICATION SPEED</td>
<td>SERIA</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the communication speed for the serial port.

*Unit of measurement:* kbaud

*Options:*
- 1.2 = 1200 baud
- 2.4 = 2400 baud
- 4.8 = 4800 baud
- 9.6 = 9600 baud
- 19.2 = 19200 baud
- 38.4 = 38400 baud
- 57.6 = 57600 baud
- 115.2 = 115200 baud

---

### 4.22.3. PAr - Selecting parity

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAr</td>
<td>PARITY</td>
<td>SERIA</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the parity used in serial communication.

*Unit of measurement:* -

*Options:*
- **NONE** = No parity
- **ODD** = Odd parity
- **EVEN** = Even parity
4.23. HMI Submenu – Configuring the display and keypad

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Password</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HMI</td>
<td>DISPLAY AND KEYBOARD</td>
<td>Level 2</td>
<td>Lets you configure the controller’s display and keys</td>
</tr>
</tbody>
</table>

Parameter page

- **but.1**: Selecting function key 1
- **but.2**: Selecting function key 2
- **but.3**: Selecting function key 3
- **dS.SP**: Selecting the SV display
- **dS.F**: Selecting the F display
- **bArg**: Selecting the bargraph display
- **MSG.LO**: Selecting the message assigned to Low
- **MSG.HI**: Selecting the message assigned to HIGH
- **MSG.SB**: Selecting the message assigned to Sbr
- **dS.SP**: Selecting the message assigned to Sbr
- **LAnG**: Selecting language for messages
- **SPEED**: Message scrolling speed
- **BACKL**: Backlighting level
- **QUICK**: Quick configuration menu
4. CONFIGURATION

### 4.23.1. but.1 - Selecting function key 1

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>but.1</td>
<td>KEY FUNCTION</td>
<td>HMI</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the function assigned to key 1 (🗑️) of the controller.

**Unit of measurement:** -

**Options:**
- NONE = No function assigned
- AU-MA = Automatic-Manual control
- LO-RE = Local-remote setpoint mode
- HOLD = Hold main input value
- AL.ACK = Reset alarm latches
- S.TUNE = Activate Self-Tuning
- A.TUNE = Activate Auto-Tuning
- OUT.S.R = Set/reset outputs set with BUT.SR function
- INT.RS = General reset
- CAL.HB = Calibrate HB alarm
  
  *if the Multiset function is enabled:*
- SP.SEL = Select setpoint SETP1...SETP2
  
  *if enabled Options Logics*
- FB.IN = Input Function Blocks

### 4.23.2. but.2 - Selecting function key 2

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>but.2</td>
<td>KEY FUNCTION</td>
<td>HMI</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the function assigned to key 2 (➡️) of the 1350 controller.

**Unit of measurement:** -

**Options:** As per but.1

### 4.23.3. but.3 - Selecting function key 3

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>but.3</td>
<td>KEY FUNCTION</td>
<td>HMI</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the function assigned to key 3 (ожет) of the 1350 controller.

**Unit of measurement:** -

**Options:** As per but.1
4.23.4. dS.SP - Selecting the SV display

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>dS.SP</td>
<td>SV DISPLAY FUNCTION</td>
<td></td>
<td>HMI</td>
</tr>
</tbody>
</table>

The parameter shows and sets the display assigned to the SV display.

Unit of measurement: -

Options:
- **NONE**: Display off
- **SETP**: Local setpoint / manual power or active setpoint (read only), in case of Multiset function
- **SSP**: Active setpoint (read only)
- **IN.SPR**: Remote setpoint input
- **OUT.PW**: Power control output
- **SP-PV**: Deviation |SP-PV|
- **HEAT**: Heating power output with 0...100% control
- **COOL**: Cooling power output with 0...100% control
- **HE+CO**: Power control output -100...100% (positive for heating, negative for cooling)
- **CURR1**: Current input CT1
- **CURR2**: Current input CT2

*if the ENERG function is enabled:*
- **CURR**: Load current
- **OUT.KW**: Power on load
- **ENERG**: Energy transferred to load

*if the Timer function is enabled:*
- **TIM.RE**: Remaining timer value
- **TIM.EL**: Timer value lapsed

*if controller model with valve control:*
- **V.POSI**: Valve position

*if controller model with programmer:*
- **P.TIME**: Current ramp time or retention step execution

4.23.5. dS.F - Selecting the F display

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>dS.F</td>
<td>F DISPLAY FUNCTION</td>
<td></td>
<td>HMI</td>
</tr>
</tbody>
</table>

The parameter shows and sets the display assigned to the F display. The parameter appears only if the controller is 1250 or 1350.

Unit of measurement: -

Options:
- Same as **dS.SP**
  - if **dS.SP = SETP** and **dS.F = OUT.PW**
  - or **dS.SP = OUT.PW** and **dS.F = SETP** in manual operation

Note: **GRAD.0 = 0**: OUT.PW become **MAN.PW**
- **GRAD.0 <> 0**: SETP become **MAN.PW**
- **MAN.PW** be changed via up / down if **MAN.P = CHANGE**

4.23.6. bArG - Selecting the bargraph display

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>bArG</td>
<td>BARGRAPH FUNCTION</td>
<td></td>
<td>HMI</td>
</tr>
</tbody>
</table>

The parameter shows and sets the display assigned to the bargraph. The parameter appears only if the controller is 1250 or 1350.

Unit of measurement: -

Options:
- Same as **dS.SP**
4.23.7. MSG.LO - Selecting the message assigned to Low

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSG.LO</td>
<td>NUM SCROLLING MSG WHEN MAIN INPUT IS LOW ERR</td>
<td>HMI</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the number of the message assigned to Low (process variable < minimum scale limit), i.e., the scrolling message shown on the display.

For more information on scrolling messages, see paragraph “3.1.2.2. Scrolling messages” on page 34.

If the parameter is set to “0” no message will be displayed for Low.

As default, MSG.LO is assigned the message “1” (for LANG1 corresponds to “PROCESS VALUE UNDER LOW LIMIT”, for LANG2 corresponds to “VALORE DI PROCESSO INFERIORE AL MINIMO”).

Unit of measurement: Message number

Options: 0...25

4.23.8. MSG.HI - Selecting the message assigned to HIGH

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSG.HI</td>
<td>NUM SCROLLING MSG WHEN MAIN INPUT IS HI ERR</td>
<td>HMI</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the number of the message assigned to HIGH (process variable > maximum scale limit), i.e., the scrolling message shown on the display.

For more information on scrolling messages, see paragraph “3.1.2.2. Scrolling messages” on page 34.

If the parameter is set to “0” no message will be displayed for Hi GH.

As default, MSG.HI is assigned the message “2” (for LANG1 corresponds to “PROCESS VALUE OVER HIGH LIMIT”, for LANG2 corresponds to “VALORE DI PROCESSO SUPERIORE AL MASSIMO”).

Unit of measurement: Message number

Options: 0...25

4.23.9. MSG.ER - Selecting the message assigned to Err

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSG.ER</td>
<td>NUM SCROLLING MSG WHEN MAIN INPUT IS ERR ERR</td>
<td>HMI</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the number of the message assigned to Err (Pt100 in short circuit or input values below minimum limit), i.e., the scrolling message shown on the display.

For more information on scrolling messages, see paragraph “3.1.2.2. Scrolling messages” on page 34.

If the parameter is set to “0” no message will be displayed for Err.

As default, MSG.ER is assigned the message “3” (for LANG1 corresponds to “INPUT SENSOR FAIL CONNECTION”, for LANG2 corresponds to “ERRATA CONNESSIONE SONDA”).

Unit of measurement: Message number

Options: 0...25
4.23.10. MSG.SB - Selecting the message assigned to Sbr

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSG.SB</td>
<td>NUM SCROLLING MSG WHEN MAIN IN IS SB ERR</td>
<td>HMI</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the number of the message assigned to Err (sensor break in short circuit or input values above maximum limit), i.e., the scrolling message shown on the display.

For more information on scrolling messages, see paragraph “3.1.2.2. Scrolling messages” on page 34.

If the parameter is set to “0” no message will be displayed for Sbr.

As default, MSG.SB is assigned the message “4” (for LANG1 corresponds to “SENSOR BROKEN”, for LANG2 corresponds to “SONDA APERTA”).

**Unit of measurement:** Message number

**Options:** 0...25

4.23.11. LAnG - Selecting language for messages

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAnG</td>
<td>MESSAGE LANGUAGE</td>
<td>HMI</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the language for the scrolling messages.

**Unit of measurement:** -

**Options:**
- LANG1 = Language 1 (English)
- LANG2 = Language 2 (Italian)
- LANG3 = Language 3

4.23.12. SPEED - Message scrolling speed

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPEED</td>
<td>SCROLLING MESSAGE SPEED</td>
<td>HMI</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the message scrolling speed.

“1” corresponds to maximum scrolling speed, “10” to minimum speed.

With “0” the message does not scroll and the display shows first 5 characters (on models 650 and 1250) or the first 7 characters (on model 1350).

**Unit of measurement:** -

**Options:** 0...10 (default = 3)

**Note:** Messages with the description of the parameters always flow at a constant speed.

NOT are subjected parameter setting SPEED

4.23.13. BACKL - Backlighting level

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>BACKL</td>
<td>BACKLIGHT LEVEL</td>
<td>HMI</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the backlight level on the display (when the controller is on) 10 seconds after the last key has been pressed.

With “0,” the backlight does not switch off, but goes to the minimum useful level for reading the display.

The backlight goes to maximum level when any key is pressed.

**Unit of measurement:** -

**Options:** 0...10 (default = 8)
## 4.23.14. QUICK - Quick configuration menu

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>QUICK</td>
<td>QUICK CONFIG ENABLE</td>
<td>HMI</td>
<td>RW</td>
</tr>
</tbody>
</table>

The parameter shows and sets enabling of the quick configuration menu.

*Unit of measurement:* -

*Options:*
- **OFF** = Quick configuration menu is not displayed
- **On** = Quick configuration menu is displayed
### 4.25. US.CAL Submenu – User calibrations

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Password</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>US.CAL</td>
<td>USER CALIBRATION MANAGER</td>
<td>Level 2</td>
<td>Lets the user calibrate the controller with regard to Custom main input, HB alarm setpoints, energy reset, and partial day count.</td>
</tr>
</tbody>
</table>

#### Diagram

```
U.CAL
  ↓
FI.CAL
  ↓
C.LOW
  ↓
Calibrating minimum current / voltage
  ↓
C.HIGH
  ↓
Calibrating maximum current / voltage
  ↓
RTD_LO
  ↓
Calibrating minimum resistance value
  ↓
RTD_HI
  ↓
Calibrating maximum resistance value
  ↓
HOUR
  ↓
Setting hours
  ↓
MIN
  ↓
Setting minutes
  ↓
SEC
  ↓
Setting seconds
  ↓
Parameter page

  ↓
SELECT DAY
  ↓
Setting day of week
  ↓
DATE
  ↓
Setting day
  ↓
Mont
  ↓
Setting month
  ↓
YEAR
  ↓
Setting year
  ↓
C.LO
  ↓
Setting analog output minimum
  ↓
C.HIG
  ↓
Setting analog output maximum
  ↓
Parameter page
```

---

Gefran 650/1250/1350 Temperature Controller – Abbreviated Manual

40524-04 Rev0
4. CONFIGURATION

4.25.1. U.CAL - Selecting the user calibration

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.CAL</td>
<td>USER CALIBRATION TYPE</td>
<td>US.CAL</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the parameter, input or output to which calibration will be applied.

**Unit of measurement:** 

**Options:**

- NONE = No calibration
- AL.HB = HB calibration alarm. It is made up of 3 subsequent phases:
  - Phase 1: OUTPUT SWITCH ON message, the output is enabled to 100% when the [F] key is pressed (set in the OUT parameter in sub-menu AL.HB) and then switch to phase 2.
  - Phase 2: CALIBRATION RUNNING message, the percent of the current value is calculated when the [F] key is pressed (set in parameter THR-PE in sub menu AL.HB) and saved in parameter LOW.ON, and then switch to phase 3.
  - Phase 3: END CALIBRATION message, press the [F] key to end calibration.
- RTC = Real Time Clock setting
  - the data in the RTC at each power-on are initialized to:
    - HOUR = 0
    - MIN = 0
    - SEC = 0
    - dAY = MONDA
    - DATE = 1
    - Mont = JANUA
    - YEAR = 00
- ENERG = Reset energy count (totalizer EN.KWH and time EN.TIM)
- P.DAYS = Reset partial day count
- I.MAIN = Calibration of custom main input (selected with parameter tYPE on I.MAIN menu)
- I.SPR = Calibration of remote setpoint input (selected with parameter t.SPr on I.SPR menu)
- I.CT1 = CT1 input custom calibration
- I.CT2 = CT2 input custom calibration
- OUT.A1 = Calibration of custom retransmission output (selected with parameter t.o.A1 on OUT.AN menu)
- OUT.C = Calibration of continuous output

4.25.2. FI.CAL - Resetting the factory calibration

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>FI.CAL</td>
<td>FACTORY CALIBRATION</td>
<td>US.CAL</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets resetting of the factory calibration. This operation can be done only for inputs and outputs, if U.CAL corresponds to I.MAIN, I.SPR, I.CT1, I.CT2, OUT.A1 or OUT.C.

**Unit of measurement:** 

**Options:**

- no = Keep user calibration
- YES = Reset factory calibration

4.25.3. C.LOW - Calibrating minimum current / voltage

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>C.LOW</td>
<td></td>
<td>US.CAL</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter appears if you are calibrating a custom I.MAIN or I.SPR input in current or voltage. To calibrate:

- apply the current or voltage value corresponding to minimum scale value to the selected input;
- press the [F] key to acquire the calibration value.

**Unit of measurement:** 

**Options:**

- 

4.25.4. C.HEIGHT - Calibrating maximum current / voltage

- 

132
4. CONFIGURATION

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>C.HIGH</td>
<td></td>
<td>US.CAL</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter appears if you are calibrating a custom I.MAIN or I.SPR input in current or voltage. To calibrate:
- apply the current or voltage value corresponding to maximum scale value to the selected input;
- press the [F] key to acquire the calibration value.

*Unit of measurement:* -

*Options:* -

4.25.5. RTD.LO - Calibrating minimum resistance value

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>RTD.LO</td>
<td></td>
<td>US.CAL</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter appears if you are calibrating a custom I.MAIN RTD input. To calibrate:
- apply a resistance corresponding to minimum scale value to the main input (for example, 18.52 Ω for Pt100);
- press the [F] key to acquire the calibration value.

*Unit of measurement:* -

*Options:* -

4.25.6. RTD.HI - Calibrating maximum resistance value

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>RTD.HI</td>
<td></td>
<td>US.CAL</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter appears if you are calibrating a custom I.MAIN RTD input. To calibrate:
- apply a resistance corresponding to maximum scale value to the main input (for example, 390.48 Ω for Pt100);
- press the [F] key to acquire the calibration value.

*Unit of measurement:* -

*Options:* -

4.25.7. HOUR - Setting hours

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>HOUR</td>
<td></td>
<td>US.CAL</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the hours on the Real Time Clock, if U.CAL = RTC.

*Unit of measurement:* Hours

*Options:* 0...23

4.25.8. MIN - Setting minutes

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIN</td>
<td></td>
<td>US.CAL</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the minutes on the Real Time Clock, if U.CAL = RTC.

*Unit of measurement:* Minutes

*Options:* 0...59

4.25.9. SEC - Setting seconds
### 4. CONFIGURATION

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEC</td>
<td></td>
<td>US.CAL</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the seconds on the Real Time Clock, if U.CAL = RTC.

**Unit of measurement:** Seconds

**Options:** 0...59

---

### 4.25.10. dAY - Setting day of week

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>dAY</td>
<td></td>
<td>US.CAL</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the day of the week on the Real Time Clock, if U.CAL = RTC.

**Unit of measurement:** Day of week

**Options:** MONDA...SUNDA

---

### 4.25.11. DATE - Setting day

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATE</td>
<td></td>
<td>US.CAL</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the day on the Real Time Clock, if U.CAL = RTC.

**Unit of measurement:** Number of day

**Options:** 1...31

---

### 4.25.12. Mont - Setting month

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mont</td>
<td></td>
<td>US.CAL</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the month on the Real Time Clock, if U.CAL = RTC.

**Unit of measurement:** Month

**Options:** JANUA...DECEM

---

### 4.25.13. YEAR - Setting year

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>YEAR</td>
<td></td>
<td>US.CAL</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the year on the Real Time Clock, if U.CAL = RTC.

**Unit of measurement:** Year

**Options:** 0...99

---

### 4.25.14. C.LO - Setting analog output minimum
4. CONFIGURATION

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>C.LO</td>
<td></td>
<td>US.CAL</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the minimum analog output value. You can change the displayed value with the ▲ and ▼ keys. To check the real voltage/current value on the output during calibration, measure it with a voltmeter/ammeter.

**Unit of measurement:** Converter points

**Options:** 0...65535

4.25.15. C.HIG - Setting analog output maximum

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>C.HIG</td>
<td></td>
<td>US.CAL</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter shows and sets the maximum analog output value. You can change the displayed value with the ▲ and ▼ keys. To check the real voltage/current value on the output during calibration, measure it with a voltmeter/ammeter.

**Unit of measurement:** Converter points

**Options:** 0...65535
4. CONFIGURAZIONE

4.26. PASC1 - Setting level 1 password 1

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>PASC1</td>
<td>SET PASS1</td>
<td>Level 2</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter lets you set the password for accessing level 1 configuration submenus.

*Unit of measurement:* Number

*Options:* 0...9999

4.27. PASC2 - Setting level 2 password 2

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>PASC2</td>
<td>SET PASS2</td>
<td>Livello 2</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter lets you set the password for accessing level 2 configuration submenus.

*Unit of measurement:* Number

*Options:* 0...9999

4.28. FI.CFG - Entering the reset code

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Scrolling message</th>
<th>Submenu</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>FI.CFG</td>
<td>ENTER DEFAULT CONFIGURATION PASS</td>
<td>Livello 2</td>
<td>R W</td>
</tr>
</tbody>
</table>

The parameter lets you set the code for resetting the controller to factory configuration, which will delete all changes made.

Default code: 99.

**ATTENTION!** After you have set code 99, when you press the [Esc] key the controller runs the Power-on procedure, as described in paragraph “3.2. Sequence at power-on.”

*Unit of measurement:* Number

*Options:* 0...9999
5. Examples and applicative notes

5.6. Alarms

5.6.1. Generic alarms AL1...AL4

Generic alarms AL1...AL4 can be mainly 4 types, as described below:

Absolute alarm
AL1 inverse and absolute, AL2 direct and absolute.
Two alarm setpoints, AL1 (lower setpoint) and AL2 (upper setpoint) are set, corresponding to two specific hysteresis values, Hyst1 (positive) and Hyst2 (negative).
The alarm trips when the measured value remains less than AL1 or greater than AL2 for the set delays.
The alarm condition ends when the measured value is greater than AL1 + Hyst1, or less than AL2 - Hyst2.
This prevents repeated alarms caused by slight changes in the measured value.
Any alarm message at power-on, when the equipment is not at full speed, can be avoided by setting disable at power-on.

Symmetrical absolute alarm
A single alarm setpoint AL1 and a single hysteresis value Hyst1 are set.
When a direct alarm is set, the alarm trips when the measured value is less than AL1 - Hyst1 or greater than AL1 + Hyst1 for the set delay.
When an inverse alarm is set, the alarm trips when the measured value is greater than AL1 - Hyst1 or less than AL1 + Hyst1 for the set delay.

Deviation alarm
A single alarm setpoint AL1 and a single hysteresis value Hyst1 (negative) are set.
When a direct alarm is set, the alarm trips when the measured value is greater than SP + AL1 for the set delay.
The alarm condition ends when the measured value is less than SP + AL1 - Hyst1.
When an inverse alarm is set, the alarm trips when the measured value is less than SP + AL1 - Hyst1 for the set delay.
The alarm condition ends when the measured value exceeds SP + AL1.
The deviation alarm lets you implement dynamic setpoints that automatically follow the trend.

Symmetrical deviation alarm
A single alarm setpoint AL1 and a single hysteresis value Hyst1 are set.
When a direct alarm is set, the alarm trips when the measured value is less than SP - AL1 or greater than SP + AL1.
When an inverse alarm is set, the alarm trips when the measured value is between SP - AL1 and SP + AL2.
### 5.8.1. How to switch it off

Keep the **F** and **A** keys pressed for 5 seconds to deactivate the controller.

The device goes to an “OFF” state and assumes the behavior of a controller switched off.

The voltage is not switched off: the process variable (PV) display stays on, but the SV display is off.

All of the outputs (control and alarms) are in an OFF state (logic level 0, relays de-excited) and all controller functions are inhibited except for the “POWER-UP” function and serial communication.

### 5.8.2. How to switch it on

Keep the **F** key pressed for 5 seconds: the controller goes from “OFF” to “ON” state.

If voltage is switched off during the “OFF” state, at the next Power-up the controller returns to “OFF” state (the controller latches the “ON/OFF”).

Functioning is normally enabled. To disable it, set the parameter On.OF = disab. on the MODE configuration menu.

This function can be assigned to a digital input (F.in.x, parameter ON-OF), excluding deactivation from the keypad.

### 5.9. Soft-Start

If enabled (by setting SOFT.S = ON on the PID configuration menu), the Soft-Start function slices power based on the percentage of time lapsed since controller power-on compared to the time set in the parameter SOFT.T

Soft-Start is an alternative to Self-Tuning and is activated after every controller power-on. The Soft-Start action is reset in Automatic-Manual switching.

### 5.10. Tuning

#### 5.10.1. Tuning actions

Tuning actions are divided into 3 categories:

- **Proportional**: action in which the contribution on the output is proportional to the deviation in input.
- **Derivative**: action in which the contribution on the output is proportional to the speed of change of the deviation in input.
- **Integral**: action in which the contribution on the output is proportional to the integral in time of the deviation in input.

The deviation is the offset between the measured value of the controlled variable and the setpoint.

Tuning actions let you achieve optimum tuning of the controlled process in every phase.

- Increasing the Derivative Action, corresponding to an increase in Derivative Time, reduces the deviation and prevents oscillations up to a critical value of Derivative Time, beyond which it increases the deviation and causes prolonged oscillations.
- Increasing the Integral Action, corresponding to a decrease in Integral Time, tends to cancel the deviation at full speed between the controlled variable and the setpoint.
- If the Integral Time value is too long (weak Integral action), there may be persistence of the deviation between the controlled variable and the setpoint.

For more information on tuning actions, contact Gefran Customer Care.

#### 5.10.1.1. Influence of Proportional, Derivative and Integral actions on response of controlled process

The response of the controlled process depends on the type of control action set. Specifically:

- Increasing the Proportional Band reduces oscillations but increases the deviation.
- Decreasing the Proportional Band reduces the deviation but causes oscillations of the controlled variable (excessively low Proportional Band values make the system unstable).

#### 5.10.2. Manual tuning

Manual tuning is done as follows:

1. Set the setpoint to the working value.
2. Set the Proportional Band to 0.1% (with ON-OFF control).
3. Switch to automatic and watch the behavior of the variable.

There will be behavior similar to that shown in the following figure.
4. Calculate the PID parameters:
   • Proportional Band P.B. value
     \[ P.B. = \frac{\text{Peak}}{V_{\text{max}} - V_{\text{min}}} \times 100 \]
     where \( V_{\text{max}} - V_{\text{min}} \) is the scale interval.
   • Integral Time value \( I_t = 1.5 \times T \)
   • Derivative Time value \( d_t = I_t / 4 \)

5. Switch the controller to manual.
6. Set the calculated parameters (re-enable PID control by setting a cycle time for relay output if necessary).
7. Switch to automatic.
8. To check optimization of the parameters, change the setpoint value if possible and check transitory behavior:
   - if oscillation persists, increase the Proportional Band value; on the other hand, if the response is too slow, decrease the value.

5.10.3. **Self-Tuning**

Self-Tuning is a simplified and automatic tuning mode based on the process state. The purpose of Self-Tuning is to calculate optimum control parameters at the start of the process. The variable (for example, temperature) must be the one measurable at zero power (room temperature).

You can automatically start tuning at every power-on or start it by means of the appropriately configured (_) key. The procedure runs automatically by optimizing the approach in relation to the real temperature value, in case of (relay, solid-state, Triac) control output, with automatic calculation of optimal cycle time CY_TIM.

At the end of the procedure, the following new PID parameters are saved:
- proportional band,
- integral and derivative times, calculated for the current action (heat or cool).

In case of dual action (heat + cool) the parameters are calculated automatically separately for the two actions.

Active tuning condition is signaled on the display by an LED.

**Attention!** Self-Tuning is not applicable with an ON/OFF control.

**Notes**
- For the programmer model, if Self-Tuning starts when the controller is powered-on, the program is in STOP.
- If SP-PV deviation is less than 0.3% f.s., Self-Tuning switches to “one shot” Auto-Tuning; otherwise it calculates a point at 75% of deviation around which to start “one shot” Auto-Tuning, considering a single Heat or Cool action or a dual Heat/Cool action based on the type of set control.

**5. Examples and applicative notes**

**Example single action, PV less SP/4**

**Example dual heat/cool action, PV greater than SP/4**

**Example with SP-PV deviation less than 0.3% f.s. dual heat/cool action**
5.10.4. Auto-Tuning

Enabling the Auto-Tuning function blocks the settings of the PID parameters. There are two types: continuous and one-shot.

Continuous Auto-Tuning constantly measures system oscillations, immediately searching for PID parameter values that reduce the current oscillation. It does not act if the oscillations drop to values below 1.0% of the Proportional Band. It is interrupted if the setpoint changes and automatically resumes with a constant setpoint.

The calculated parameters are not latched if the device switches off, if it goes into manual, or if the configuration code is disabled.

The controller resumes with the parameters programmed before enabling Auto-Tuning.

One-shot Auto-Tuning can be started manually or automatically. It is useful for calculating PID parameters when the system is around the setpoint.

“One-shot” Auto-Tuning produces a change in the control output up to a maximum of ±100% of current control power (limited with H.P.HI...H.P.LO for heat and with C.P.HI...C.P.LO for cool) and evaluates the effects in time overshoot.

The calculated parameters are latched. It starts manually via digital input or via Tuning key after an undershoot/overshoot. It starts automatically (with error band of 0.5%) when the PV-SP error goes beyond the set band (programmable at 0.5%, 1%, 2%, 4% of full-scale).

⚠️ Attention! At power-on or after a setpoint change, automatic start is inhibited for a time equal to five times the integral time (with minimum of 5 minutes). The same time has to pass after running “One-shot” Auto-Tuning.

5.10.5. Examples of tuning

The two diagrams below show the time change in the monitored value and the change in the controlled tuning output.

- PV = Process variable
- SP + cSPo = cooling setpoint
- cSPo = C.SP (HI.SCL - LO.SCL) / 100
- C.PB = Proportional cooling band
- SP = heating setpoint
- H.PB = Proportional heating band
5.11. Timer

The timer is enabled on the MODE configuration menu by selecting TIMER = On.
In case of enabling, select the function F.tiM on the TIMER submenu by choosing among:
- ST.STP: Start/Stop timer
- STABL: stabilization timer
- SWITC: power-on timer

When the count is on, you can see the timer value on the SV display, on the F display, or on the bargraph by setting the parameters dS.SP = TIM.EL, dS.F = TIM.EL or bArG = TIM.EL, respectively.
You can also assign a message to be displayed when the count is on.

When the set TIMER time is reached, you can:
- activate an OUT1…OUT4 output configured with F.ou.x = TIMER,
- go to software off with End = OFF,
- select setpoint 2 with End = SP1-2.

Controlling timer from keyboard

If the digital inputs are not enabled, the timer is controlled when TIM.EL is displayed by using the \(\Delta\), \(\nabla\) keys as follows:
- \(\Delta\) pressed with timer stopped = START
- \(\nabla\) pressed with timer running = STOP
- \(\Delta\) + \(\nabla\) pressed for 2 seconds = RESET

5.11.1. Start/Stop Timer

By selecting the options, you can alternately assign the StSt start/stop timer function to:
- a digital input IN.DIG;
- an active alarm ALRM1 or ALRM2 or ALRM3 or ALRM4 or AL.HB;
- a serial SERIA.
You can select the true POSIT state or false NEGAT state for the start/stop command.

With parameter rESE, you can alternately select the timer reset mode:
- autoreset with timer in stop AUT.RS;
- from digital input IN.DIG;
- from active alarm ALRM1 or ALRM2 or ALRM3 or ALRM4 or AL.HB;
- a serial SERIA.
You can select the true POSIT state or false NEGAT state for the reset command.

The timer setpoint is settable with a full-scale of 9999 seconds.
The reset function, always active on the state, resets the Timer value and keeps it blocked even if start is present.
In the absence of enabling (stop), the autoreset condition can be active, which resets the timer at every stop.

The following diagrams show timer behavior when enabling from digital input and from alarm are used.
Switching between SETP1 and SETP2 is based on the value of the up gradient GRAD.I (if SETP2 > SETP1) or down gradient GRAD.D (if SETP2 < SETP1).
Switching is immediate if the gradient is set to 0 (zero).
SP1/SP2 are managed only if the Multiset function is enabled, as indicated in the End parameter.

### Enabling from digital input

### Enabling from alarm

The timer can also be controlled (start, stop and reset) with Function Blocks. In this case, the start and reset commands are in OR with the ones defined with the StSt and rESE parameters.
5.11.2. Stabilization timer

The stabilization timer is used to control a process at a certain temperature for a certain time. The band defining stabilization of the temperature is settable in BAND (from 0.0% to 25.0% f.s.); the time is set in TIME.

With the band set to 0.0% the count starts the first time the setpoint is reached.

When the function at end of count is End = SP1-2, the end count state activates when the setpoint reaches value SETP2 based on the value of the up gradient GRAD.I (if SETP2 > SETP1) or down gradient GRAD.D (if SETP2 < SETP1).

Switching is immediate if the gradient is set to 0 (zero).

The following diagrams show how the stabilization timer works and the state of the end count output.

5.11.3. Start timer

The start timer is used to start the control a certain time after the controller is powered-on.

The delay after start/power-on is settable in TIME. The following diagrams show how the start timer works and the state of the end count output.

5.11.4. Variables available for the user configuration menu

The variables available for the timer are TIM.RE, which shows remaining time, and TIME.EL, which shows lapsed time.
5.13.1. What is a program

A program is a set of steps, each having a number of parameters, that let you control the value of a process or of a device based on lapsed time, on specific conditions, and on reference values saved in the controller or supplied to it from the outside.

In its simplest form, a step has two parts, represented on the graphs by two segments:
• a (possible) ramp, i.e., a variable change in the setpoint value time;
• a hold, i.e., a time in which the process value is held constant after it has reached the setpoint value.

A program can have a maximum of 12 steps and up to 4 programs can be saved in the controller. Each program is defined by the number of its first and last step.

A program can be selected from the keypad, digital input or serial line. The program can be controlled from the keys, digital inputs (START/STOP, RESET, end program), serial line, or events (output of Function Block).

5.13.2. Programmer functions

Depending on the model, the controller can combine the two functions of controller and single-loop programmer. Base time accuracy is 4 seconds every 10 hours

Programmer stop and restart modes
The programmer can be started or stopped from:
• digital input;
• key (START), (STOP) and (RESET) in the absence of other enablings;
• different restart modes after a Power-off; (Power Off);
• optimal search for setpoint forward/back in time;
• wait for Start.
Changes possible in stop state
When the programmer is stopped, you can set or change:
- active setpoint;
- current step time;
- program number;
- step number;
- phase or segment (ramp or hold).

Consents
You can assign up to 4 consents to each step. Therefore, the start of a step can depend on a defined state of consents. If the state does not agree with the programmed state, the time base stops.

If the state agrees with the programmed state, execution proceeds with restart of the time base. Each digital input can be assigned to one consent.

Events
You can assign up to 4 events to each step. At the start of the ramp and at the start of the hold of each step, the events are changed as programmed. Each digital output can be assigned to one event.

Other functions
- End program signal, with or without forcing of control outputs.
- Setting of a tolerance band relative to the setpoint. If the variable is outside the band, the time base is stopped (HBB alarm, Hold Back Band).
- Setpoint slaved with the same time base to manage a slaved controller via analog retransmission output A1.
- Total modularity of functions and parameters, with easy exclusion of ones not required.

5.13.3. Programmer behavior
The change in local setpoint, which occurs during a program stop phase, causes the restart of the step in execution, with conservation of the set ramp time.

If the controller is switched off and then on again, program execution can continue, or restart from the first step, or search for the step with the setpoint closest to process variable PV.

Behavior at restart is defined by the value of the parameter Strt on the PR.OPT submenu.

STOP/START switching at end of program resets the program and restarts the program.

The Autoreset function implies that programmer reset is active in the stop phase, with consequent acquisition of PV value as active setpoint and resetting of the time base.

With the controller in manual, or with remote absolute setpoint, the programmer time base is stopped.

When switching from remote to local setpoint, the setpoint assumes the value of the remote setpoint at the time of switching if the parameter LO.rE = BUMPL.

5.13.4. Program examples

5.13.4.1. ONE STEP program
Project conditions:
- ramp time = 0;
- hold;
- HBB enabling;
- switch-off

5.13.4.2. ONE STEP program
Project conditions:
- ramp time = 0;
- hold;
- HBB enabling;
- hold at end of program.

5.13.4.3. Program with assigned events
Project conditions:
- Evnt.1 On during STEP1;
- Evnt.2 On during hold of STEP1;
- Evnt.3 On during ramp of STEP2;
- Evnt.4 not used.

STEP1 - setting events at start of step:
- EVN.r.1 = On
- EVN.r.2 = OFF
- EVN.r.3 = OFF
- EVN.r.4 = nonE

STEP1 - setting events at start of hold:
- EVN.h.1 = nonE
- EVN.h.2 = On
- EVN.h.3 = nonE
- EVN.h.4 = nonE
5. Examples and applicative notes

Using GF_eXpress software for the configuration, the displayed pages would be:

**Program diagram**
5. Examples and applicative notes

5.13.4.4. Cyclical program with 3 setpoints and 3 steps

- **CICLE 1**
  - Step 5: \( \text{tr}_5, \text{tp}_5 \)
  - Step 6: \( \text{tr}_6, \text{tp}_6 \)
  - Step 7: \( \text{tr}_7, \text{tp}_7 \)

- **CICLE 2**
  - Step 5: \( \text{tr}_5, \text{tp}_5 \)
  - Step 6: \( \text{tr}_6, \text{tp}_6 \)
  - Step 7: \( \text{tr}_7, \text{tp}_7 \)

When the programmer state is not displayed, the key ( ) maintains the function selected with the parameter but1.

5.13.4.5. Program with HBB (hold back band) function

During functioning in fast simulation, the HBB alarm is inhibited and the control output assumes the FAULT value on the PID submenu.

All other enabled functions (restart, start/stop, reset, manual/automatic, end cycle or continuous cycle, event outputs, consent from digital inputs, second channel setpoint, etc.) are active.

5.13.5. Fast simulation of program

You can easily check a selected program by launching it in fast simulation mode. Enable it by setting the parameter LIMIT = On on the PR.OPT submenu.

The program will run with ramp time limited to 20 seconds and with hold time limited to 10 seconds. If the set values are smaller they are used. In this way the maximum duration of a step is 30 seconds.

During functioning in fast simulation, the HBB alarm is inhibited and the control output assumes the FAULT value on the PID submenu.

All other enabled functions (restart, start/stop, reset, manual/automatic, end cycle or continuous cycle, event outputs, consent from digital inputs, second channel setpoint, etc.) are active.

5.13.6. Controlling the program from the keypad

- \( \uparrow \) pressed with program stopped = START;
- \( \downarrow \) pressed with program running = STOP;
- \( \uparrow + \downarrow \) pressed for 2 seconds = RESET (condition maintained with key pressed);

5.13.7. Programmer Reset mode

By setting RST.SP = ON provides that with active reset command the setpoint assumes the value of process variable PV and power is forced to zero.

Setting RST.SP = OFF maintains the active setpoint (prior to reset) and power control.

This function is valid in case of reset from digital inputs or enabled keys, as well as in case of reset following a program change (possible only in STOP) or STOP/START switching at end of program.

5.13.8. Restart with step search

If configured, in case of restart the programmer can try to restart nor from the first program step but from the point of the program that corresponds, or is closest to, the value of the active process variable PV.

This function mode is called “restart with step search.”

At start, if Strt = RSCH was set on the PR.OPT submenu, the program searches for the setpoint with value equal to variable PV.

The search is conducted by shifting the current time forward or back and skipping phases or steps.

The following diagram shows a typical 5-step program profile and explains how restart with step search works.