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.

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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:

F 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.

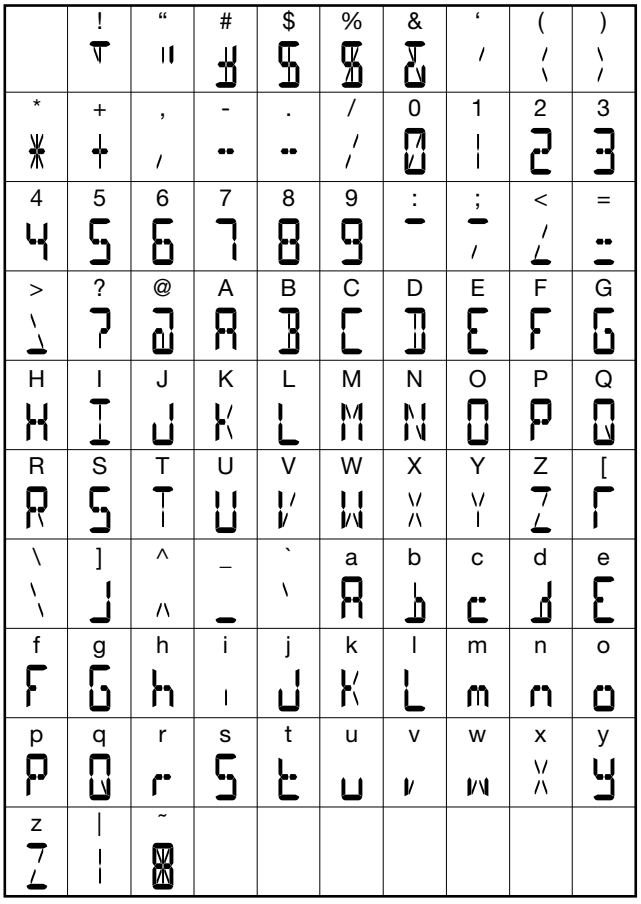

Figure 15 - 14-segment font

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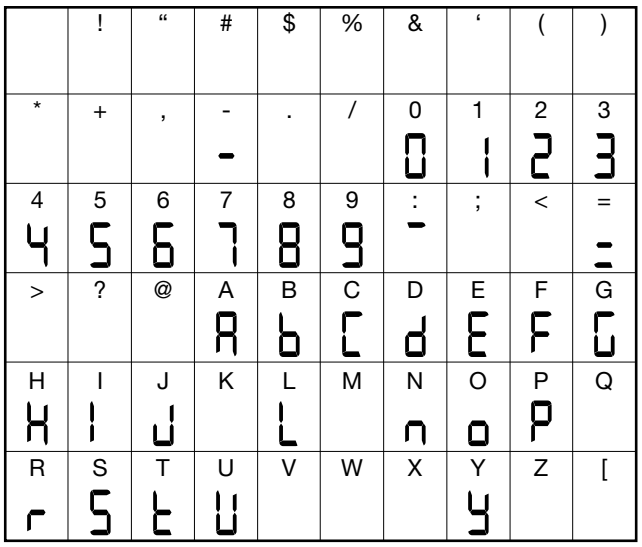


Figure 16 - 7-segment font

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:

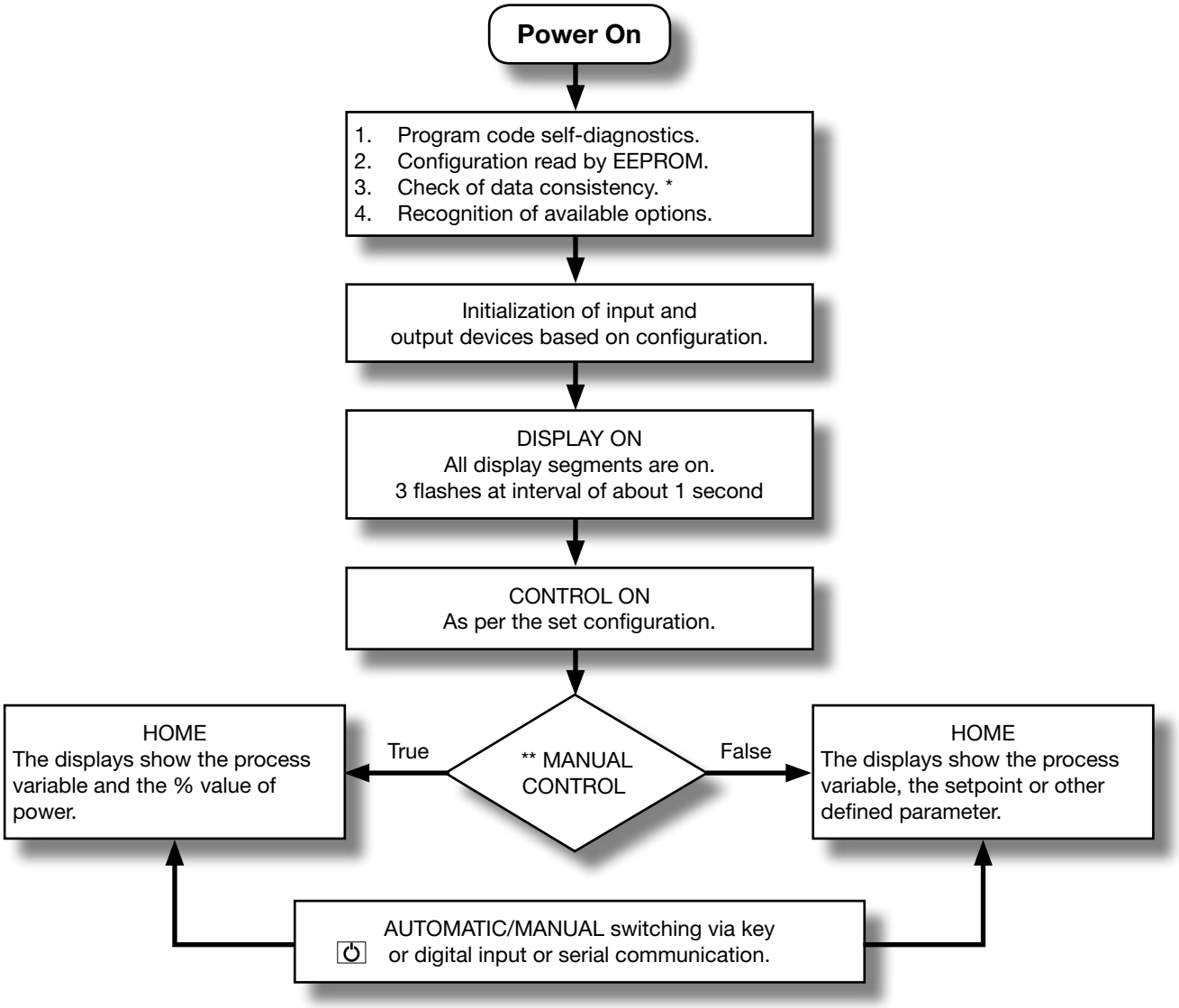
- during configuration, describing the active parameter;
- during functioning, after the tripping of alarms, digital inputs and logic function outputs, if the relative messages were enabled

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.



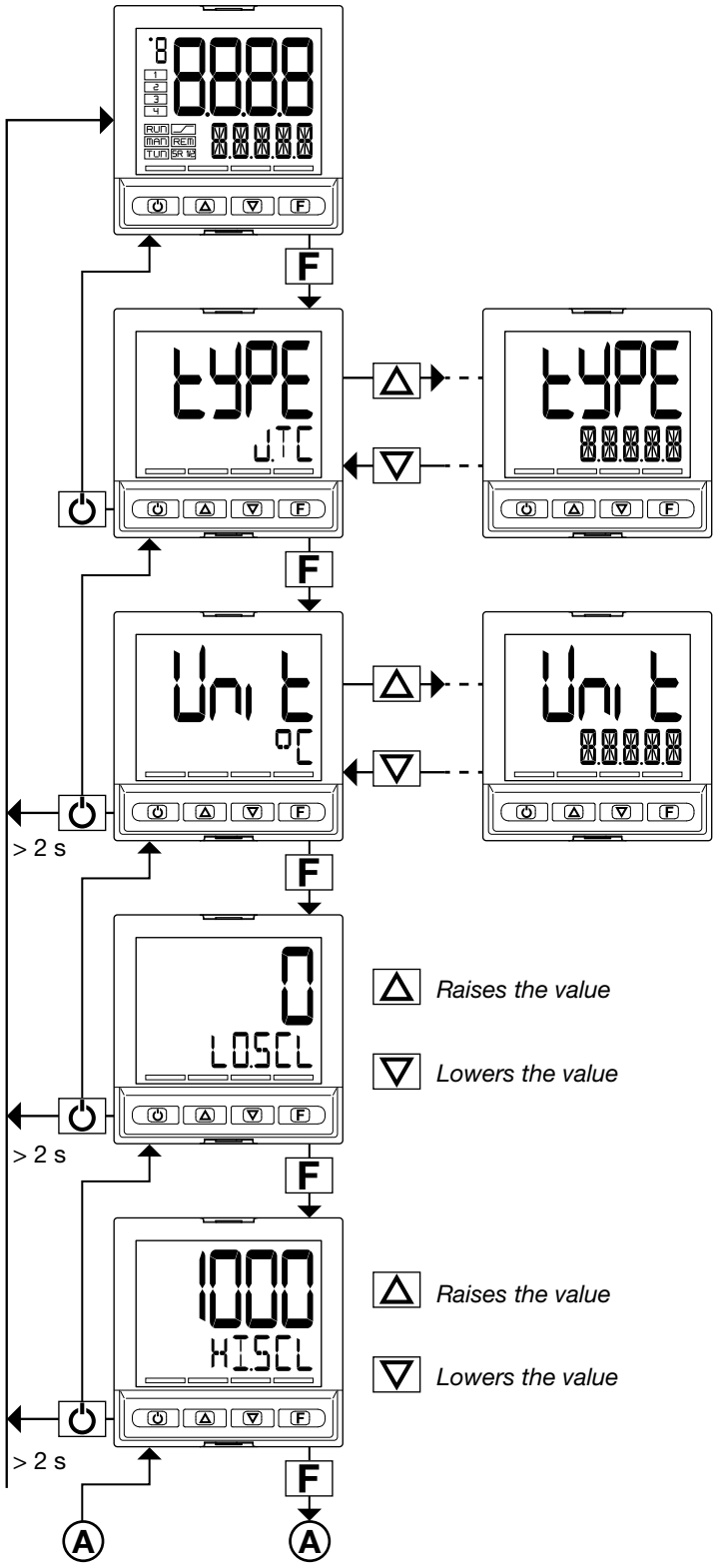
*) Any error is signaled by the message EEPROM CHECKSUM ERROR.
**) Only if MANUAL mode was used before the controller was powered off.

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

Selecting unit of measurement
The unit of measurement can be
°C or °F only if a TC or Rtd sensor is selected.

Raises the value

Lowers the value

Minimum scale limit

Only if the selected sensor is in mV or V, the scale limits LO.SCL, HI.SCL and the settable limits of the LO.SP, HI.SP setpoint for TC or RTD sensors are automatically set according to sensor type and unit of measurement.

Raises the value

Lowers the value

Maximum scale limit

Only if the selected sensor is in mV or V.

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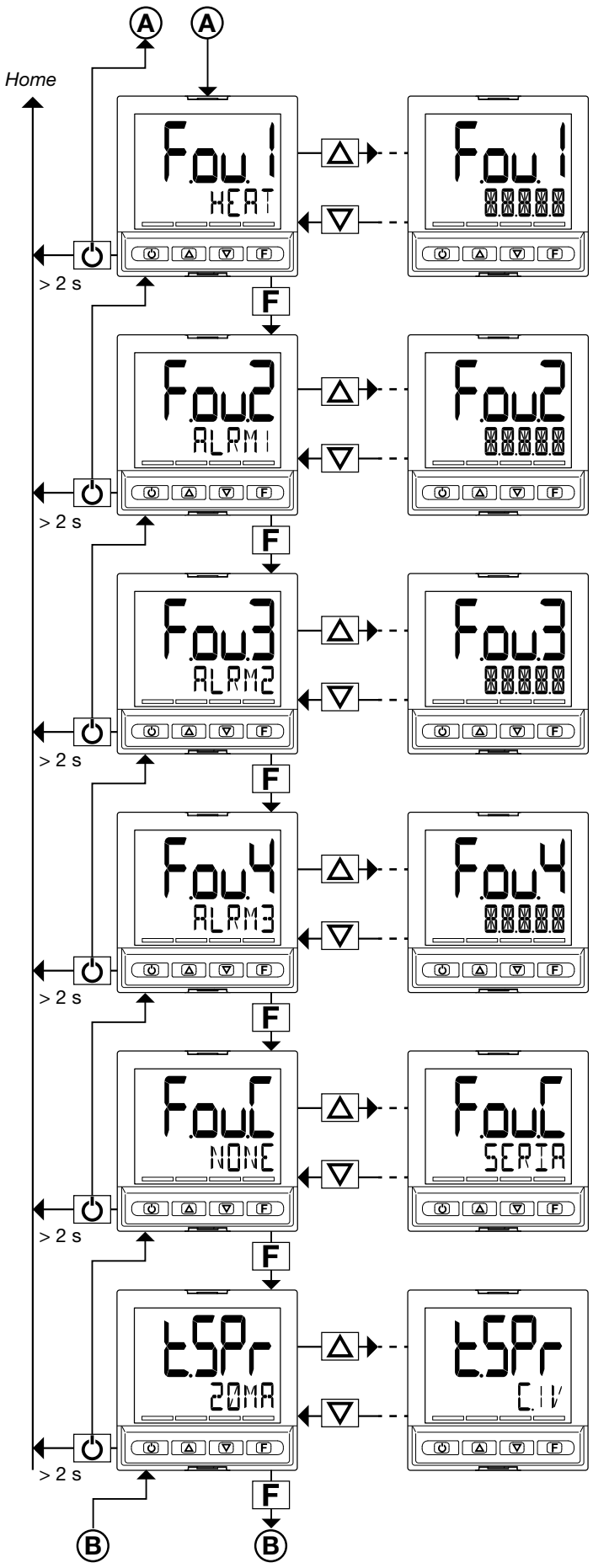

Selecting output 1 function
The proposed functions depend on output type (relay, logic).

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 availableis 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.

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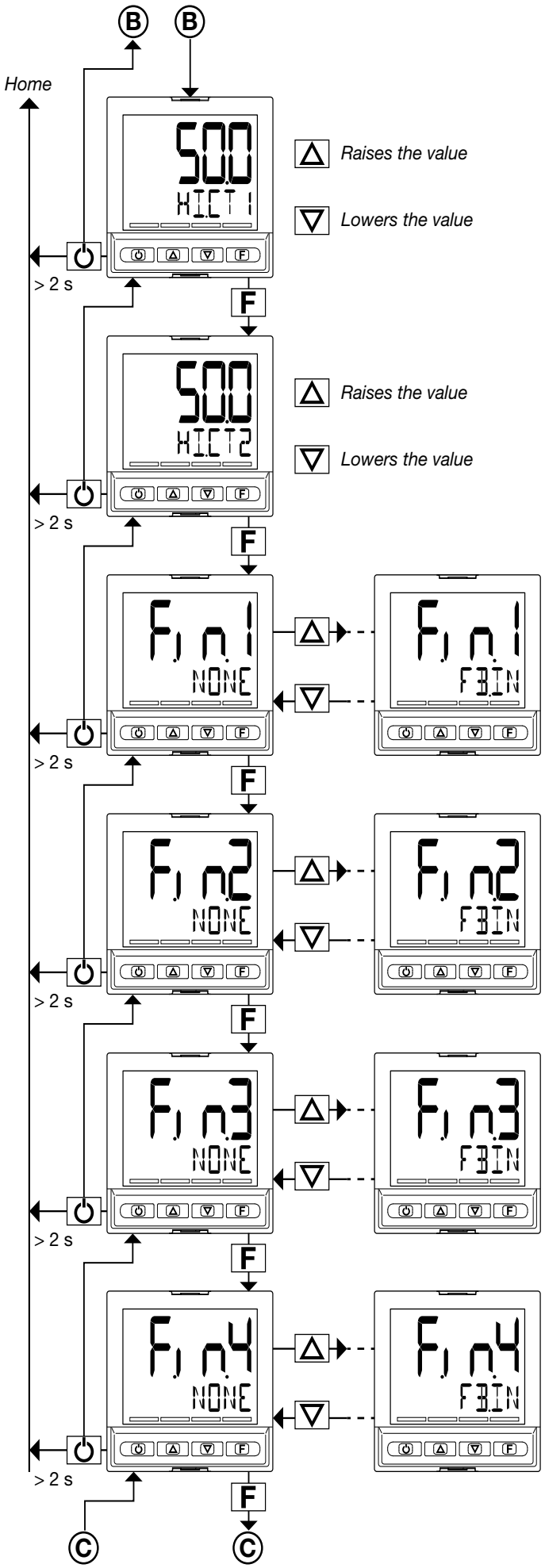

Full-scale value of current transformer CT1

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).

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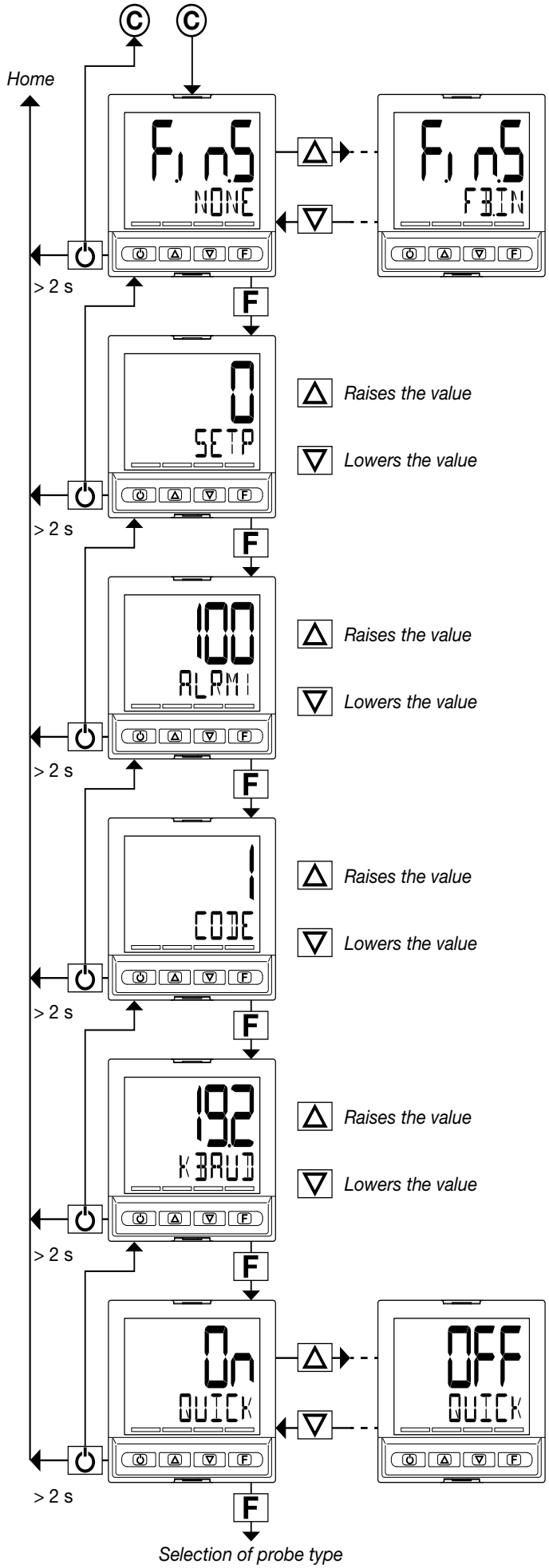


Selecting digital input 5 function
The menu item appears only if the optional input is available (for models 1250 and 1350 only).

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

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.

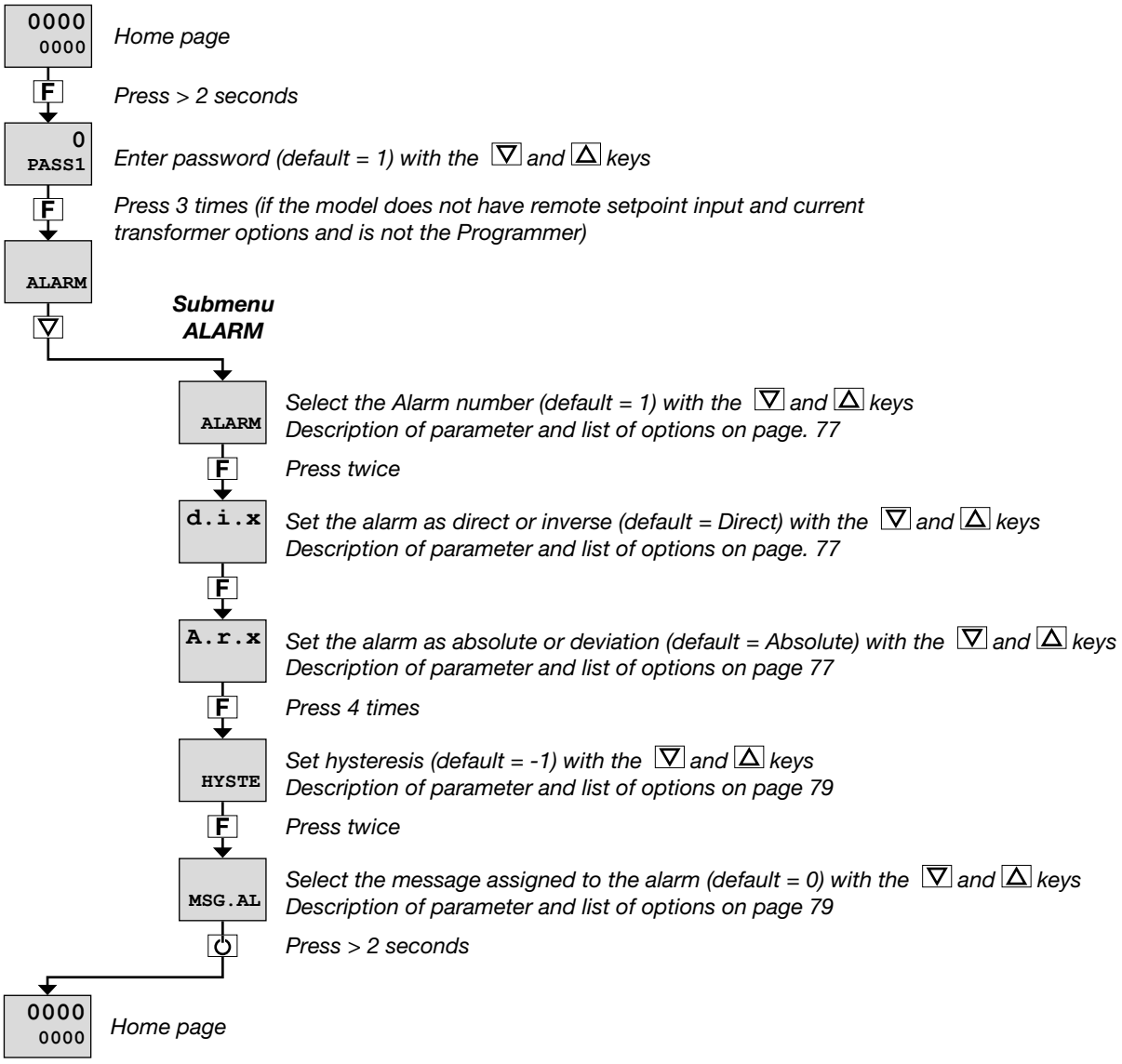
With this configuration, the controller can satisfy the majority of operating requirements.

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.



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).

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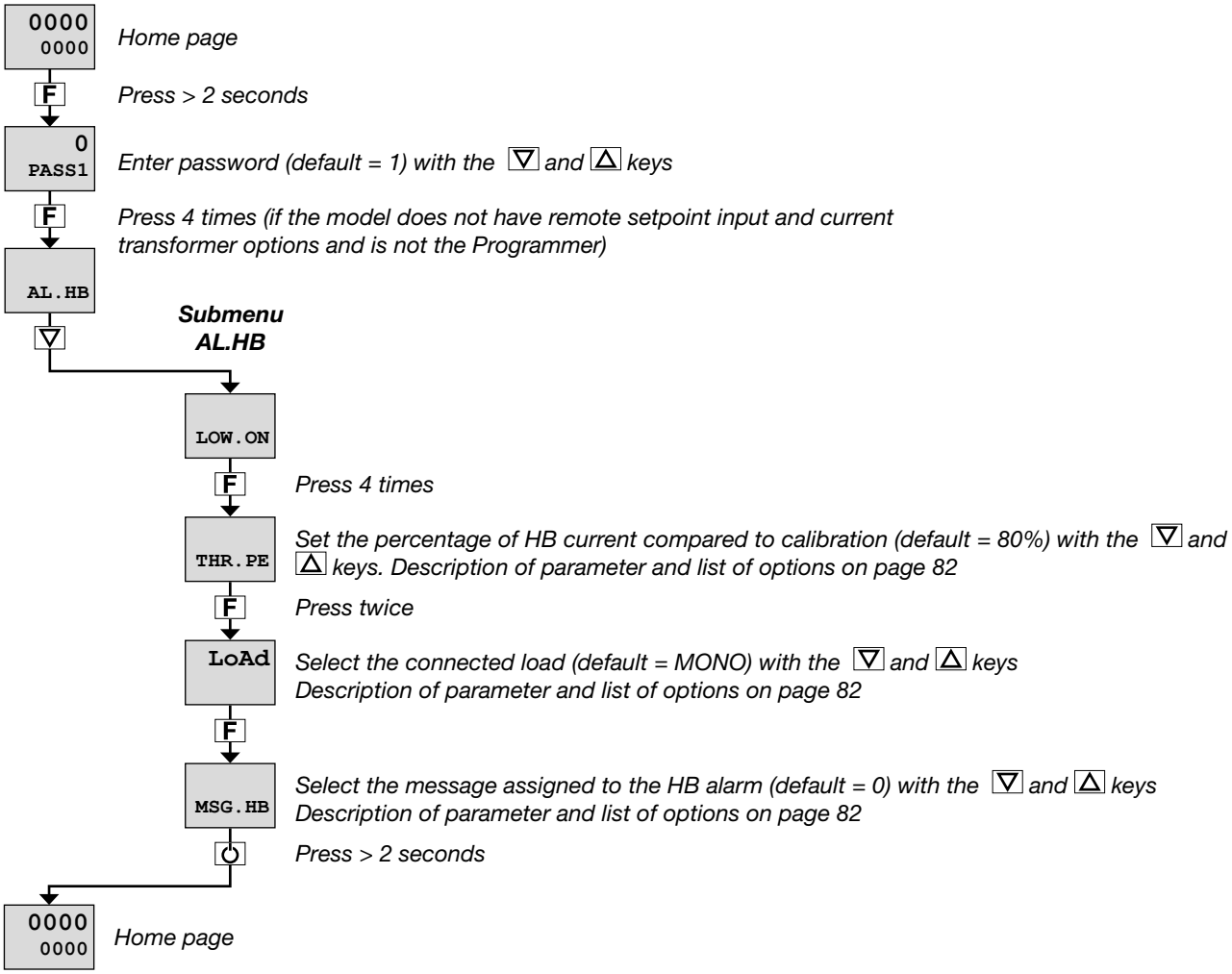
3.4.2. Setting up the Heater Break Alarm

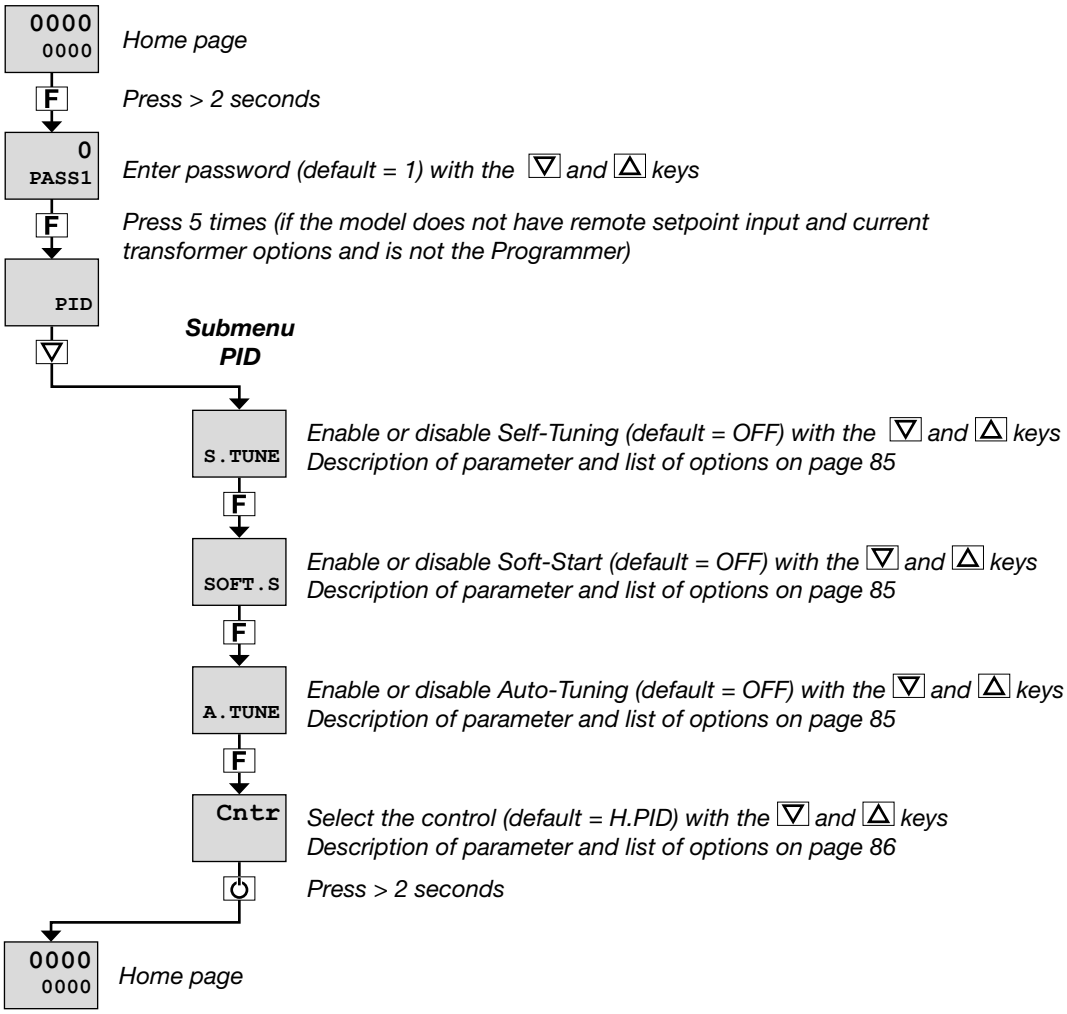
If at least one output was configured as Heater Break Alarm in the fast configuration.



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 DERV.S, default = *1*);
- 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.P.HI, default = *100.0*);
- set the minimum heating power limit (parameter H.P.LO, 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.P.HI, default = *100.0*);
- set the minimum cooling power limit (parameter C.P.LO, default = *0.0*);
- set the Manual Reset value (parameter RESET, default = *0*);
- set the Reset Power value (parameter P.RST, default = *0.0*);
- set the Antireset value (parameter A.RST, default = *0*);
- set the Feedforward Power value (parameter, default = *0.0*);
- set the deadband (parameter DEAD.B, default = *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, dafault = *0.0*);

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- 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.

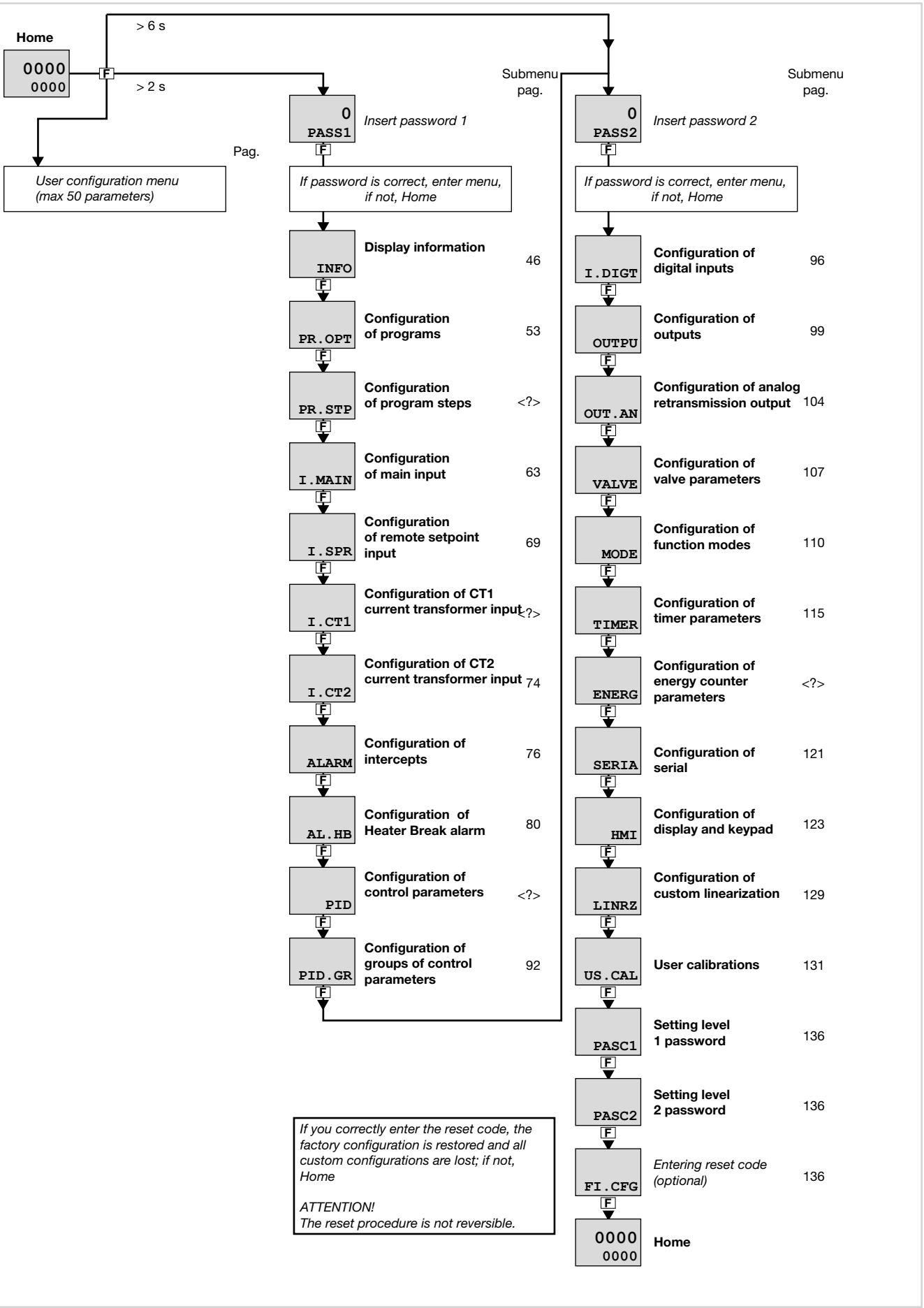
The second section, accessed with password 2, groups the submenus and parameters used to configure HW resources

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

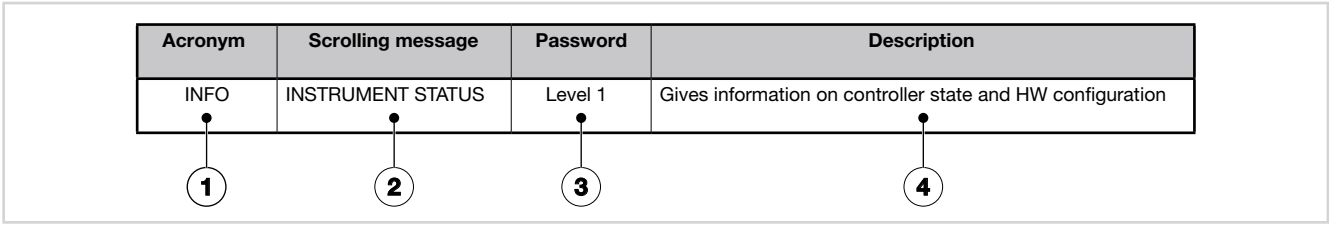
4.2. Main menu



4.3. Legend for submenus and parameters

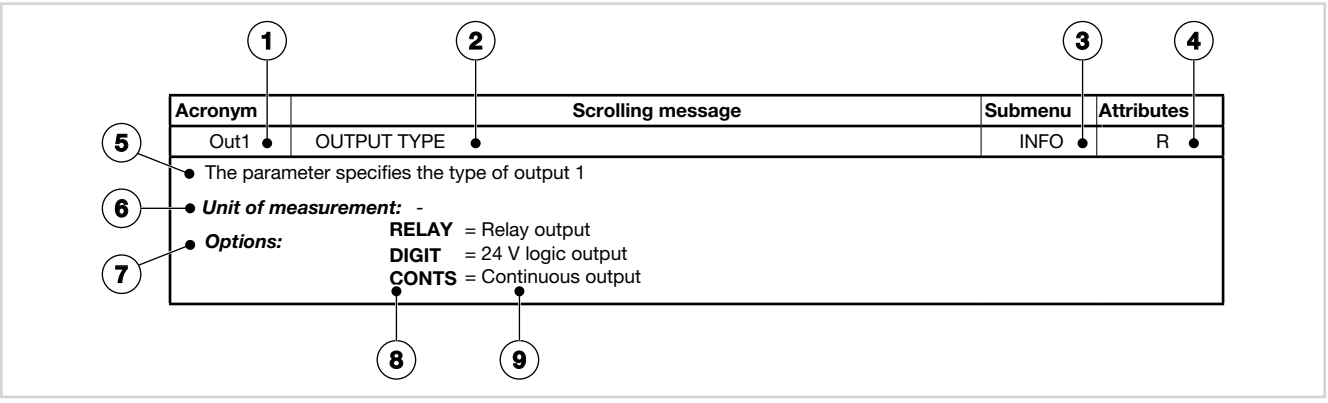
The purposes and characteristics of submenus and parameters are described and summarized in the following tables.

4.3.1. Submenu



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

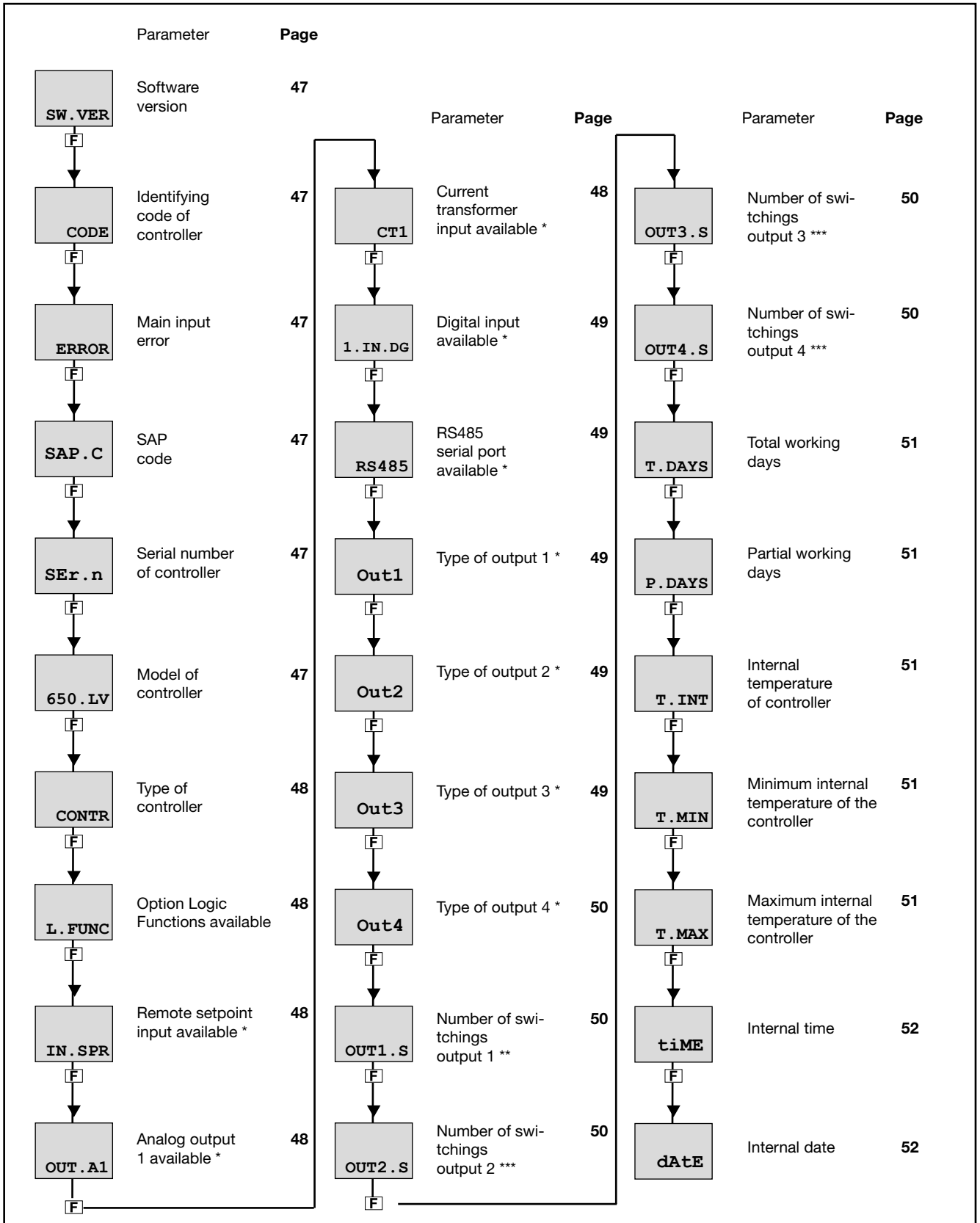


1. Acronym of parameter as it appears on controller display.
2. Text of scrolling message as it appears on controller display.
3. Submenu to which parameter belongs.
4. Attributes of parameter: R = readable, W = writable. If only R, the operator or technician can read the parameter value but cannot change 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. CONFIGURATION

4.4. INFO Submenu - information display

Acronym	Scrolling message	Password	Description
INFO	INSTRUMENT STATUS	Level 1	Gives information on controller state and HW configuration.



* *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

Acronym	Scrolling message	Password	Description
SW.VER	SOFTWARE VERSION	INFO	R

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

Unit of measurement: -

Options: -

4.4.2. CODE - Identifying code of controller

Acronym	Scrolling message	Password	Description
CODE	INSTRUMENT ID CODE FOR SERIAL COMM	INFO	R

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

Unit of measurement: -

Options: 0...247

4.4.3. ERROR - Main input error

Acronym	Scrolling message	Password	Description
ERROR	MAIN INPUT ERROR	INFO	R

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

Acronym	Scrolling message	Password	Description
SAP.C	SAP ORDER CODE	INFO	R

The parameter shows the product number (Fxxxxxx).

Unit of measurement: -

Options: -

4.4.5. SEr.n - Serial number of controller

Acronym	Scrolling message	Password	Description
SEr.n	SERIAL NUMBER	INFO	R

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. CONFIGURATION

4.4.6. xxxxx - Model of controller

Acronym	Scrolling message	Submenu	Attributes
xxxxx	MODEL	INFO	R

The parameter shows the model of the controller.
xxxxx 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. xxxxx - Type of controller

Acronym	Scrolling message	Submenu	Attributes
xxxxx	MODEL OPTION	INFO	R

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

Acronym	Scrolling message	Submenu	Attributes
L.FUNC	LOGIC FUNCTION AVAILABLE	INFO	R

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

Acronym	Scrolling message	Submenu	Attributes
IN.SPR	REMOTE SETPOINT AVAILABLE	INFO	R

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

Acronym	Scrolling message	Submenu	Attributes
OUT.A1	ANALOG OUTPUT AVAILABLE	INFO	R

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

Acronym	Scrolling message	Submenu	Attributes
CTx	CURRENT TRASFORMER AVAILABLE	INFO	R

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

Acronym	Scrolling message	Submenu	Attributes
x.IN.DG	DIGITAL INPUT AVAILABLE	INFO	R

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

Acronym	Scrolling message	Submenu	Attributes
RS485	FIELDBUS AVAILABLE	INFO	R

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

Acronym	Scrolling message	Submenu	Attributes
Out1	OUTPUT TYPE	INFO	R

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

Acronym	Scrolling message	Submenu	Attributes
Out2	OUTPUT TYPE	INFO	R

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. CONFIGURATION

4.4.16. Out3 - Type of output 3

Acronym	Scrolling message	Submenu	Attributes
Out3	OUTPUT TYPE	INFO	R

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

Acronym	Scrolling message	Submenu	Attributes
Out4	OUTPUT TYPE	INFO	R

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

Acronym	Scrolling message	Submenu	Attributes
OUT1.S	NUMBER X 1000 RELAY CYCLES	INFO	R

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

Acronym	Scrolling message	Submenu	Attributes
OUT2.S	NUMBER X 1000 RELAY CYCLES	INFO	R

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

Acronym	Scrolling message	Submenu	Attributes
OUT3.S	NUMBER X 1000 RELAY CYCLES	INFO	R

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

Acronym	Scrolling message	Submenu	Attributes
OUT4.S	NUMBER X 1000 RELAY CYCLES	INFO	R

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

Acronym	Scrolling message	Submenu	Attributes
T.DAYS	TOTAL DAYS OF OPERATION	INFO	R

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

Acronym	Scrolling message	Submenu	Attributes
P.DAYS	PARTIAL DAYS OF OPERATION	INFO	R

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

Acronym	Scrolling message	Submenu	Attributes
T.INT	INTERNAL TEMPERATURE	INFO	R

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

Acronym	Scrolling message	Submenu	Attributes
T.MIN	MIN INTERNAL TEMPERATURE	INFO	R

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

Unit of measurement: °C

Options: -

4. CONFIGURATION

4.4.26. T.MAX - Maximum internal temperature of the controller

Acronym	Scrolling message	Submenu	Attributes
T.MAX	MAX INTERNAL TEMPERATURE	INFO	R

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

Unit of measurement: °C

Options: -

4.4.27. tiME - Internal time

Acronym	Scrolling message	Submenu	Attributes
tiME	INTERNAL TIME	INFO	R

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

Acronym	Scrolling message	Submenu	Attributes
dAtE	INTERNAL DATE	INFO	R

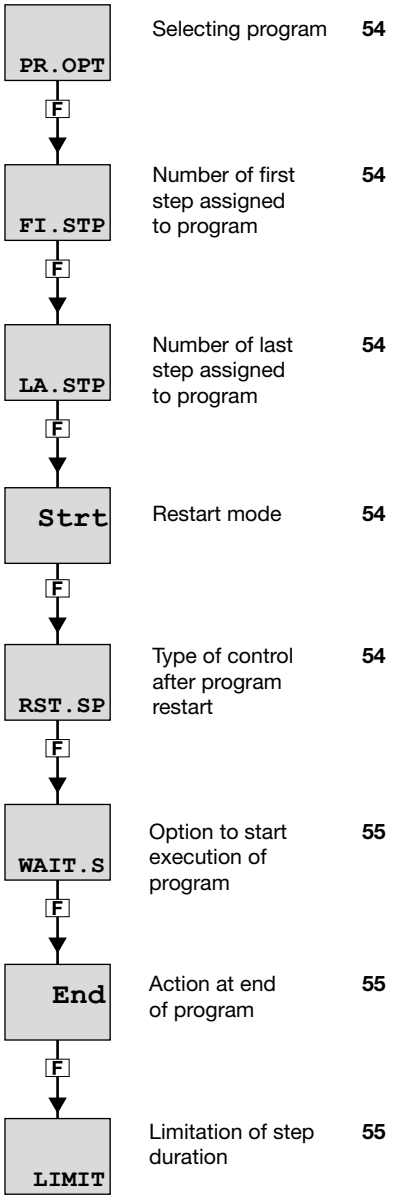
The parameter shows the complete internal date of the controller: month, day, year, day of week, with scrolling text.

Unit of measurement: MM / DD / YYYY

Options: -

4.5. PR.OPT Submenu - Configuring programs

Acronym	Scrolling message	Password	Description
PR.OPT	PROGRAMMER CONFIGURATION	Levelo	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.



4. CONFIGURATION

4.5.1. PR.OPT - Selecting program

Acronym	Scrolling message	Submenu	Attributes
PR.OPT	PROGRAM NUMBER	PR.OPT	R W

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

Acronym	Scrolling message	Submenu	Attributes
FI.STP	FIRST STEP OF PROGRAM	PR.OPT	R W

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

Acronym	Scrolling message	Submenu	Attributes
LA.STP	LAST STEP OF PROGRAM	PR.OPT	R W

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

Acronym	Scrolling message	Submenu	Attributes
Strt	RESTART TYPE AFTER POWER-ON	PR.OPT	R W

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

Acronym	Scrolling message	Submenu	Attributes
RST.SP	CONTROL TYPE AFTER RESET	PR.OPT	R W

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

Acronym	Scrolling message	Submenu	Attributes
WAIT.S	DEF OF START EXEC PROGRAM	PR.OPT	R W

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

Acronym	Scrolling message	Submenu	Attributes
End	CONDITION AT END OF CYCLE	PR.OPT	R W

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

Acronym	Scrolling message	Submenu	Attributes
LIMIT	DEF OF STEP TIMING LIMITATION	PR.OPT	R W

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 forzate al valore di FAULT.

Unit of measurement: -

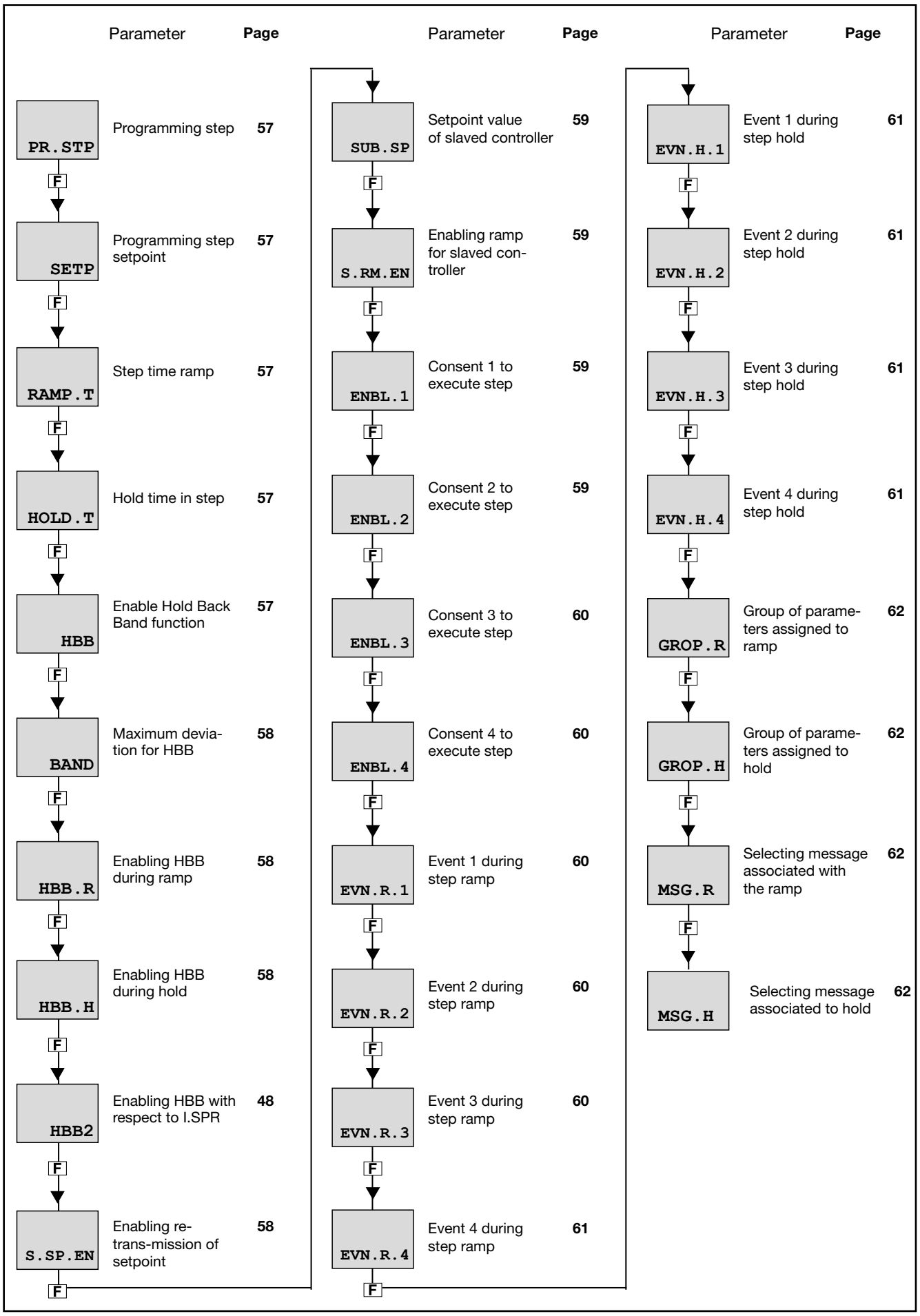
Options:
OFF = Disables limitation of step duration
On = Enables limitation of step duration: limits ramp times to 20 seconds and hold times to 10 seconds, in order to have a step time that never exceeds 30 seconds.

4.6. PR.STP Submenu - Configuration of program steps

Acronym	Scrolling message	Password	Description
PR.STP	STEP DEFINITION	Level 1	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.

4. CONFIGURATION

Submenu PR.STP - *Configuration of program steps*



4.6.1. PR.STP - Programming step

Acronym	Scrolling message	Submenu	Attributes
PR.STP	PROGRAMMER ACTUAL STEP	PR.SPT	R W

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

Acronym	Scrolling message	Submenu	Attributes
SETP	STEP SETPOINT	PR.SPT	R W

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

Acronym	Scrolling message	Submenu	Attributes
RAMP.T	STEP RAMP TIME	PR.SPT	R W

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

Acronym	Scrolling message	Submenu	Attributes
HOLD.T	STEP HOLD TIME	PR.SPT	R W

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

Acronym	Scrolling message	Submenu	Attributes
HBB	HOLD BACK BAND FUNCTION	PR.SPT	R W

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. CONFIGURATION

4.6.6. BAND - Maximum deviation for HBB

Acronym	Scrolling message	Submenu	Attributes
BAND	HOLD BACK BAND VALUE	PR.SPT	R W

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

Acronym	Scrolling message	Submenu	Attributes
HBB.R	ENABLE HOLD BACK BAND DURING STEP RAMP	PR.SPT	R W

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

Acronym	Scrolling message	Submenu	Attributes
HBB.H	ENABLE HOLD BACK BAND DURING STEP HOLD	PR.SPT	R W

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

Acronym	Scrolling message	Submenu	Attributes
HBB2	HOLD BACK BAND FUNCTION REFERRED TO I.SPR INPUT	PR.SPT	R W

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

Acronym	Scrolling message	Submenu	Attributes
S.SP.EN	SUBDUED SETPOINT RETRANSMITTED ENABLE	PR.SPT	R W

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

Acronym	Scrolling message	Submenu	Attributes
SUB.SP	SUBDUED SETPOINT ASSOCIATED TO STEP	PR.SPT	R W

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

Acronym	Scrolling message	Submenu	Attributes
S.RM.EN	SUBDUED SETPOINT RAMP ENABLE	PR.SPT	R W

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

Acronym	Scrolling message	Submenu	Attributes
ENBL.1	STEP ENABLE FOR STEP START	PR.SPT	R W

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

Acronym	Scrolling message	Submenu	Attributes
ENBL.2	STEP ENABLE FOR STEP START	PR.SPT	R W

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

See ENBL.1 for details.

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4.6.15. ENBL.3 - Consent 3 to execute step

Acronym	Scrolling message	Submenu	Attributes
ENBL.3	STEP ENABLE FOR STEP START	PR.SPT	R W

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

Acronym	Scrolling message	Submenu	Attributes
ENBL.4	STEP ENABLE FOR STEP START	PR.SPT	R W

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

Acronym	Scrolling message	Submenu	Attributes
EVN.R.1	EVENT DURING STEP RAMP	PR.SPT	R W

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

Acronym	Scrolling message	Submenu	Attributes
EVN.R.2	EVENT DURING STEP RAMP	PR.SPT	R W

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

Acronym	Scrolling message	Submenu	Attributes
EVN.R.3	EVENT DURING STEP RAMP	PR.SPT	R W

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

Acronym	Scrolling message	Submenu	Attributes
EVN.R.4	EVENT DURING STEP RAMP	PR.SPT	R W

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

Acronym	Scrolling message	Submenu	Attributes
EVN.H.1	EVENT DURING STEP HOLD	PR.SPT	R W

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

Acronym	Scrolling message	Submenu	Attributes
EVN.H.2	EVENT DURING STEP HOLD	PR.SPT	R W

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

Acronym	Scrolling message	Submenu	Attributes
EVN.H.3	EVENT DURING STEP HOLD	PR.SPT	R W

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

Acronym	Scrolling message	Submenu	Attributes
EVN.H.4	EVENT DURING STEP HOLD	PR.SPT	R W

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

Acronym	Scrolling message	Submenu	Attributes
GROP.R	CONTROL PARAMETER GROUP DURING STEP RAMP	PR.SPT	R W

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

Acronym	Scrolling message	Submenu	Attributes
GROP.H	CONTROL PARAMETER GROUP DURING STEP HOLD	PR.SPT	R W

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

Acronym	Scrolling message	Submenu	Attributes
MSG.R	SCROLLING MESSAGE DURING STEP RAMP	PR.SPT	R W

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

Acronym	Scrolling message	Submenu	Attributes
MSG.H	SCROLLING MESSAGE DURING STEP HOLD	PR.SPT	R W

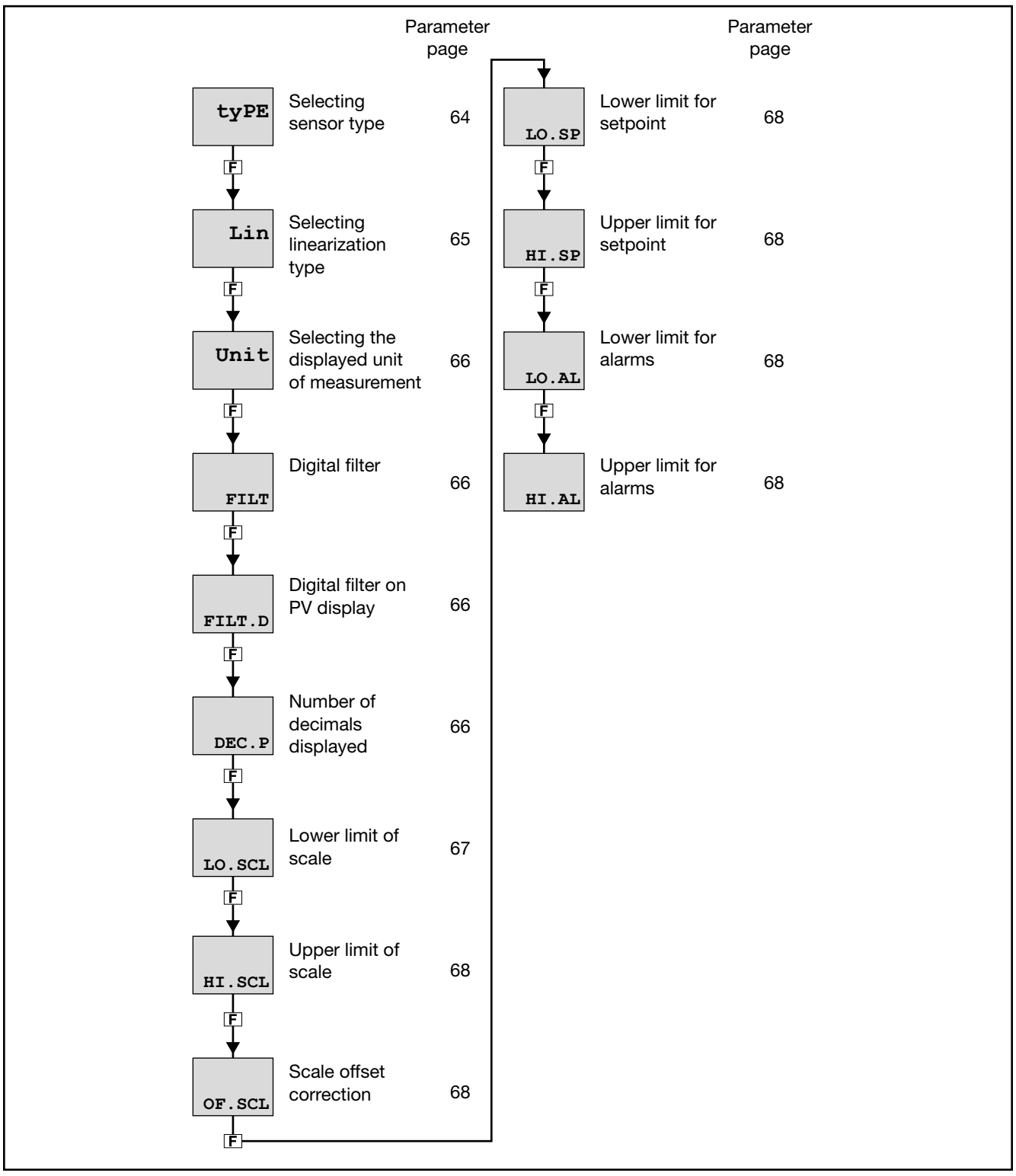
The parameter displays and sets the message number associated with the pitch during the maintenance, which is the message that will appear on the display to scroll to the step you are configuring
More information on the scrolling message can be found in the section “3.1.2.2 Scrolling messages” on page 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

Acronym	Scrolling message	Password	Description
I.MAIN	MAIN INPUT CONFIG	Level 1	Lets you configure the controller's main input.



4. CONFIGURATION

4.7.1. tyPE - Selecting sensor type

Acronym	Scrolling message	Submenu	Attributes
tyPE	MAIN INPUT TYPE OF PROBE	I.MAIN	R W

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 FAUL.T parameters is activated.

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

Sensor type	Sensor	Unit of measurement	Scale limits for DEC.P = 0	Scale limits for DEC.P = 1	Error @ 25°C
Thermocouple	J	°C	0...1000	0.0...999.9	< 1.6°C
	K	°C	0...1300	0.0...999.9	
	R	°C	0...1750	0.0...999.9	with scale 0...1750 °C: < 2°C (T > 100 °C)
	S	°C	0...1750	0.0...999.9	
	T	°C	-200...400	-199.9...400.0	< 1.6°C
	C	°C	0...2300	0.0...999.9	< 1.6°C
	D	°C	0...2300	0.0...999.9	< 1.6°C
	Pt20Rh Pt40Rh	°C	0...1880	0.0...999.9	< 5.1°C (T>1000°C)
Infrared characteristic of the Tc K model see note	1	°C	10...70	10.0...70.0	maximum error 0.5°C
	2	°C	60...120	60.0...120.0	maximum error 0.5°C
	3	°C	115...165	115.0...165.0	maximum error 0.5°C
	4	°C	140...260	140.0...260.0	maximum error 0.5°C
Resistance thermometer	PT100	°C	-200...850	-199.9...850.0	< 1°C
	PT100	°C	-50...100	-50.0...100.0	
	JPT100	°C	-200...600	-199.9...850.0	< 1°C
Voltage /Current	0...60 mV		-1999...9999	-199.9...999.9	
	0...20 mA				
	4...20 mA				
	0...10 V				
	2...10 V				
	0...5 V				
	1...5 V				
	0...1 V				
	0.2...1 V				
Custom	RTD		-1999...9999	-199.9...999.9	
	0...60 mV				
	0...20 mA				
	4...20 mA				
	0...10 V				
	2...10 V				
	0...5 V				
	1...5 V				
	0...1 V				
	0.2...1 V				

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)..

Unit of measurement: -

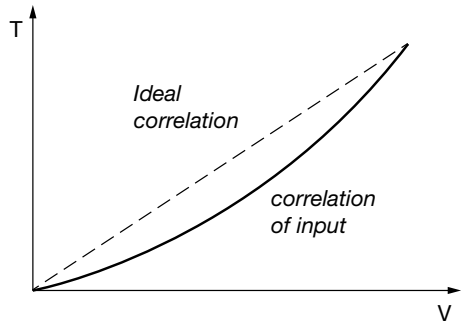
Options:

J.TC	= J thermocouple
K.TC	= K thermocouple
R TC	= R thermocouple
S TC	= S thermocouple
T.TC	= T thermocouple
C.TC	= C thermocouple
D.TC	= D thermocouple
PT2.TC	= Pt20Rh / Pt40Rh thermocouple
INFR1	= IR sensor type 1
INFR2	= IR sensor type 2
INFR3	= IR sensor type 3
INFR4	= IR sensor type 4
PT100	= Pt100 resistance thermometer
PT.LIM	= Pt 100 limitated resistance thermometer
JTP10	= JPT100 resistance thermometer
60MV	= 0...60 mV sensor
20MA	= 0...20 mA sensor
4-20M	= 4...20 mA sensor
10V	= 0...10 V sensor
2-10V	= 2...10 V sensor
5V	= 0...5 V sensor
1-5V	= 1...5 V sensor
1V	= 0...1 V sensor
0.2-1V	= 0,2...1 V sensor
C.RTD	= RTD sensor with user calibration
C.60MV	= 0...60 mV sensor with user calibration
C.20MA	= 0...20 mA sensor with user calibration
C.4-20	= 4...20 mA sensor with user calibration
C.10V	= 0...10 V sensor with user calibration
C.2-10	= 2...10 V sensor with user calibration
C.5V	= 0...5 V sensor with user calibration
C.1-5V	= 1...5 V sensor with user calibration
C.1V	= 0...1 V sensor with user calibration
C.0.2-1	= 0,2...1 V sensor with user calibration

4.7.2. Lin - Selecting linearization type

Acronym	Scrolling message	Submenu	Attributes
Lin	CUSTOM LINEARIZATION	I.MAIN	R W

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

Acronym	Scrolling message	Submenu	Attributes
Unit	UNIT OF MEASURE	I.MAIN	R W

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

Acronym	Scrolling message	Submenu	Attributes
FILT	DIGITAL FILTER	I.MAIN	R W

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

Acronym	Scrolling message	Submenu	Attributes
FILT.D	DIGITAL FILTER ON DISPLAY PV	I.MAIN	R W

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

Acronym	Scrolling message	Submenu	Attributes
DEC.P	DECIMAL POINT POSITION	I.MAIN	R W

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

Acronym	Scrolling message	Submenu	Attributes
LO.SCL	INPUT LOW LIMIT	I.MAIN	R W

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

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

	Unit = °C DEC.P = 0	Unit = °F DEC.P = 0
4-20M	-1999...9999	-1999...9999
10V	-1999...9999	-1999...9999
2-10V	-1999...9999	-1999...9999
5V	-1999...9999	-1999...9999
1-5V	-1999...9999	-1999...9999
1V	-1999...9999	-1999...9999
0.2-1V	-1999...9999	-1999...9999
C.RTD	-1999...9999	-1999...9999
C.60MV	-1999...9999	-1999...9999
C.20MA	-1999...9999	-1999...9999
C.4-20	-1999...9999	-1999...9999
C.10V	-1999...9999	-1999...9999
C.2-10	-1999...9999	-1999...9999
C.5V	-1999...9999	-1999...9999
C.1-5V	-1999...9999	-1999...9999
C.1V	-1999...9999	-1999...9999
C.0.2-1	-1999...9999	-1999...9999

4.7.8. HI.SCL - Upper limit of scale

Acronym	Scrolling message	Submenu	Attributes
HI.SCL	INPUT HIGH LIMIT	I.MAIN	R W

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.

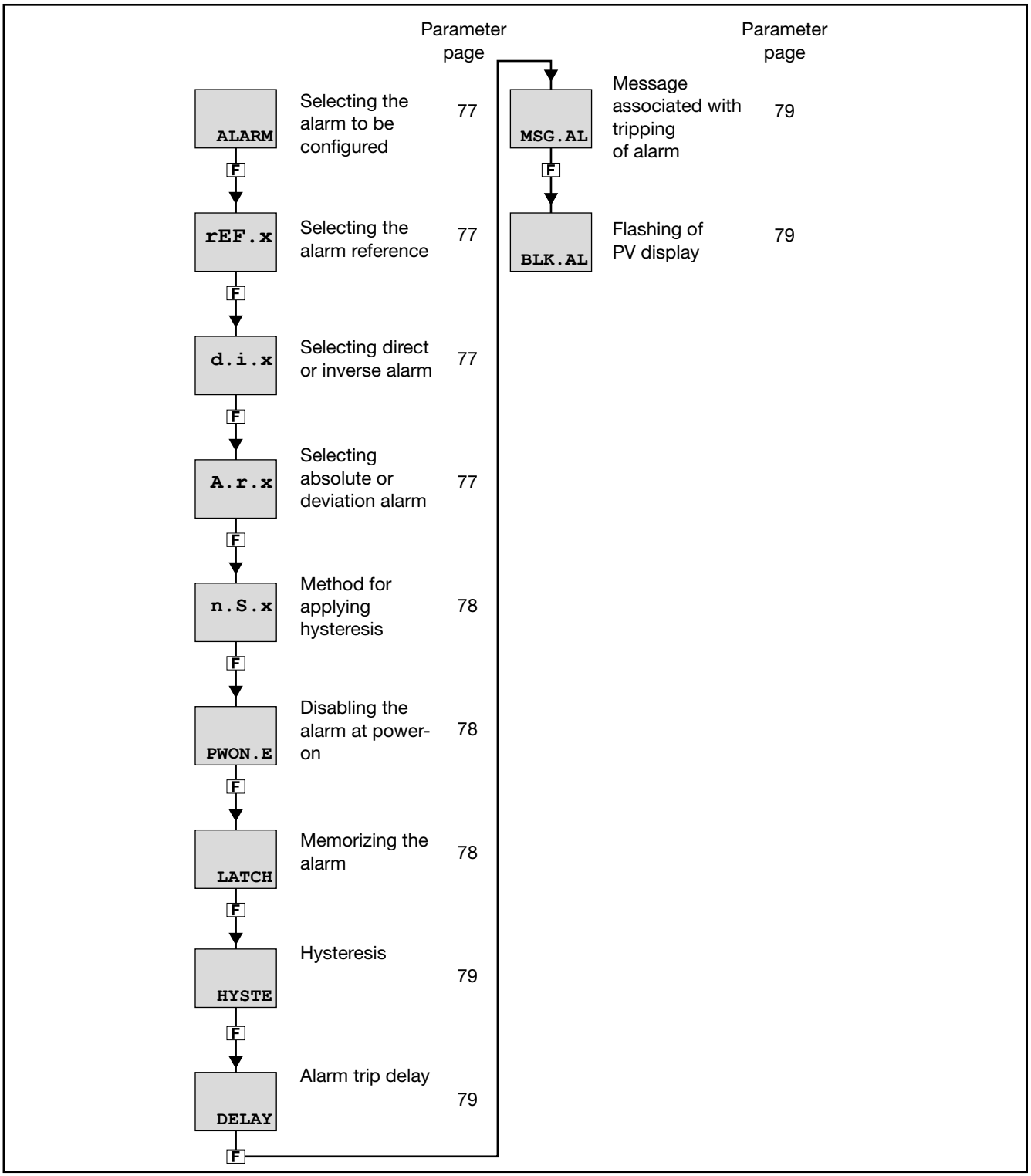
Unit of measurement: The one set with the Unit parameter

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

Acronym	Scrolling message	Password	Description
ALARM	ALARM CONFIG	Level 1	Lets you configure the generic alarms.



4.11.1. ALARM - Selecting the alarm to be configured

Acronym	Scrolling message	Submenu	Attributes
ALARM	ALARM NUMBER	ALARM	R W

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

Acronym	Scrolling message	Submenu	Attributes
rEF.x	SELECTING REFERENCE SIGNAL	ALARM	R W

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.EN = Totalizer Energy transferred to the load
T.INT = Internal temperature

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

Acronym	Scrolling message	Submenu	Attributes
d.i.x	DIRECT/INVERSE DEFINITION	ALARM	R W

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

Acronym	Scrolling message	Submenu	Attributes
A.r.x	ABSOLUTE/DEVIATION DEFINITION	ALARM	R W

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

Acronym	Scrolling message	Submenu	Attributes
n.S.x	NORMAL/SYMMETRIC DEFINITION	ALARM	R W

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

Acronym	Scrolling message	Submenu	Attributes
PWON.E	DISABLE AT SWITCH ON	ALARM	R W

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

Acronym	Scrolling message	Submenu	Attributes
LATCH	MEMORY DEFINITION	ALARM	R W

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

4.11.8. HYSTE - Hysteresis

Acronym	Scrolling message	Submenu	Attributes
HYSTE	HYSTERESIS	ALARM	R W

lThe 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

Acronym	Scrolling message	Submenu	Attributes
DELAY	DELAY OF ACTIVATION	ALARM	R W

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

Acronym	Scrolling message	Submenu	Attributes
MSG.AL	SCROLLING MESSAGE AT ALARM ACT	ALARM	R W

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

Acronym	Scrolling message	Submenu	Attributes
BLK.AL	BLINK DISPLAY PV DEF	ALARM	R W

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.

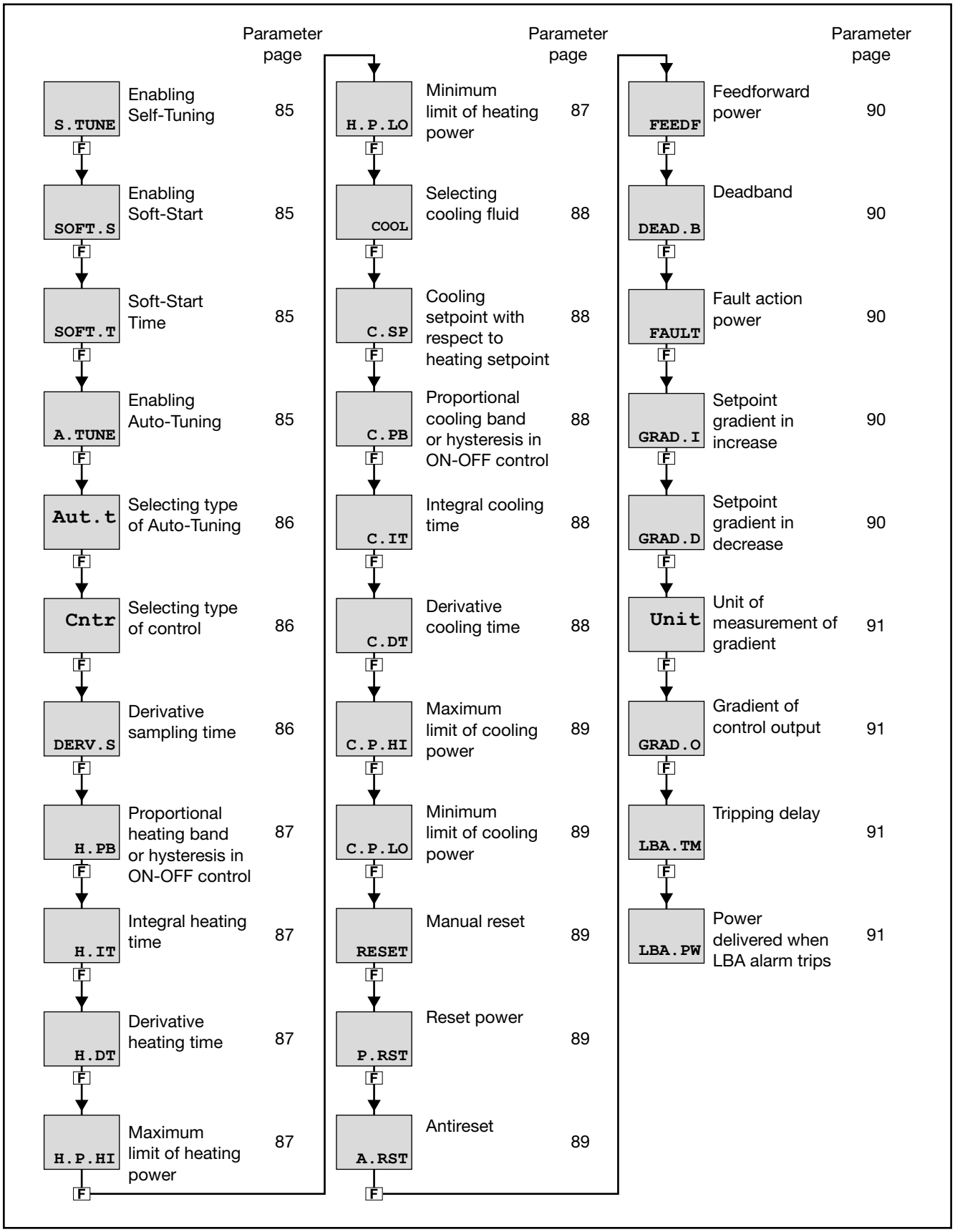
Unit of measurement: -

Options: **OFF** = PV display does not flash in case of alarm
On = PV display flashes in case of alarm

4. CONFIGURATION

4.13. PID Submenu – Configuring control parameters

Acronym	Scrolling message	Password	Description
PID	PID CONFIG	Level 1	Lets you configure the control parameters



4.13.1. S.TUNE - Enabling Self-Tuning

Acronym	Scrolling message	Submenu	Attributes
S.TUNE	SELF TUNING ENABLE	PID	R W

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

Acronym	Scrolling message	Submenu	Attributes
SOFT.S	SOFT START ENABLE	PID	R W

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

Acronym	Scrolling message	Submenu	Attributes
SOFT.T	SOFT START TIME	PID	R W

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

Acronym	Scrolling message	Submenu	Attributes
A.TUNE	AUTO TUNING ENABLE	PID	R W

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

Acronym	Scrolling message	Submenu	Attributes
Aut.t	AUTO TUNING SELECTION	PID	R W

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

Acronym	Scrolling message	Submenu	Attributes
Cntr	TYPE OF CONTROL	PID	R W

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: -

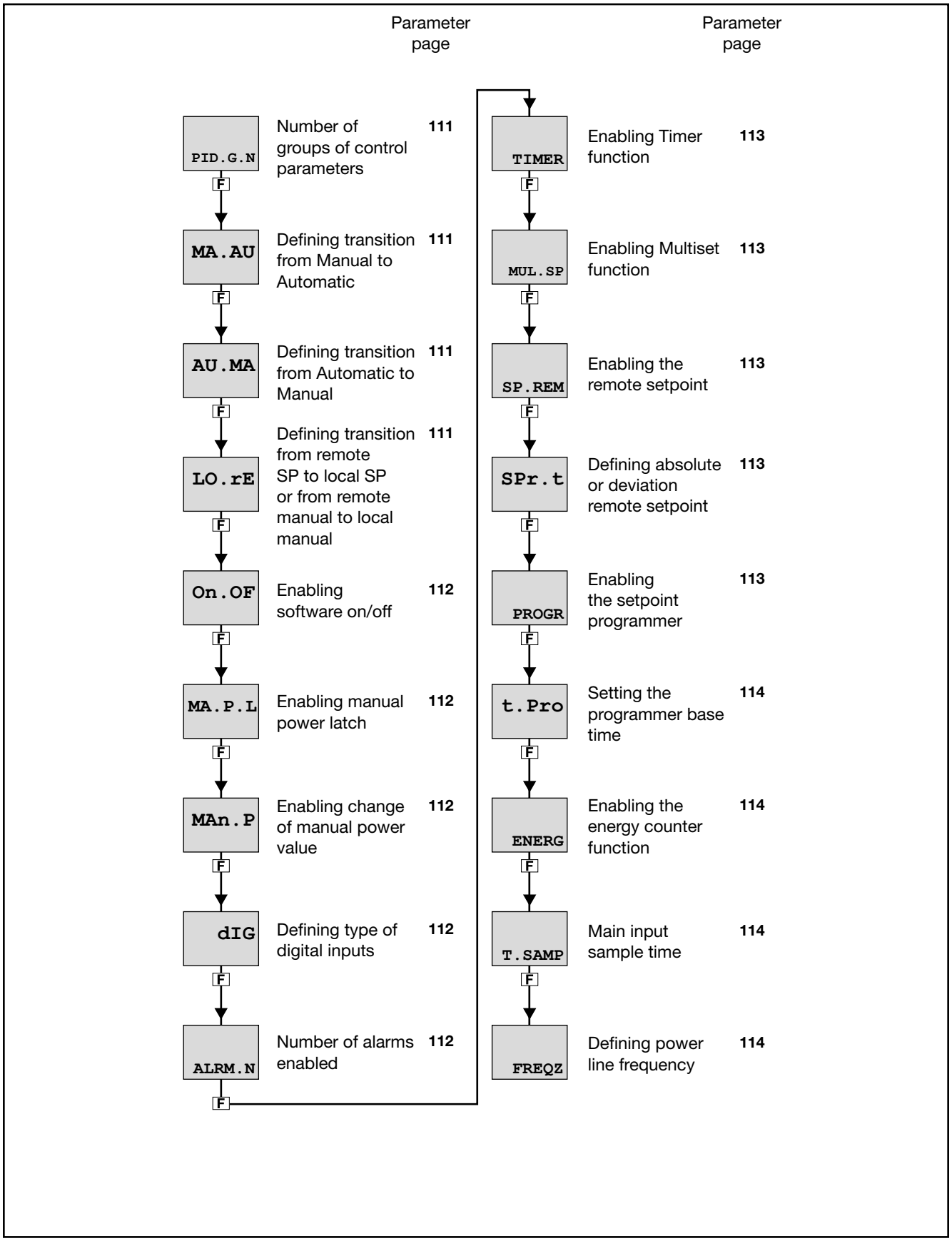
Options:

H.PROP = 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. CONFIGURATION

4.19. MODE Submenu – Configuring functioning mode

Acronym	Scrolling message	Password	Description
MODE	FUNCTION MODE MANAGER	Level 2	Lets you configure the controller's functioning mode.



4.19.1. PID.G.N - Number of groups of control parameters

Acronym	Scrolling message	Submenu	Attributes
PID.G.N	NUM OF CONTROL PARAMETERS GROUP	MODE	R W

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

Acronym	Scrolling message	Submenu	Attributes
MA.AU	MANUAL TO AUTOMATIC TRANSITION TYPE	MODE	R W

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

Acronym	Scrolling message	Submenu	Attributes
AU.MA	AUTOMATIC TO MANUAL TRANSITION TYPE	MODE	R W

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

Acronym	Scrolling message	Submenu	Attributes
LO.rE	REMOTE TO LOCAL TRANSITION TYPE	MODE	R W

The parameter shows and sets controller behavior when switching from remote to local setpoint, and is significant only with F.SPr = 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

Acronym	Scrolling message	Submenu	Attributes
On.OF	SOFTWARE ON/OFF ENABLE	MODE	R W

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

Acronym	Scrolling message	Submenu	Attributes
MA.P.L	MANUAL POWER LATCH ENABLE	MODE	R W

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

Acronym	Scrolling message	Submenu	Attributes
MAn.P	MANUAL POWER MODIFY ENABLE	MODE	R W

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

Acronym	Scrolling message	Submenu	Attributes
dIG	DIGITAL INPUT TYPE	MODE	R W

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

Acronym	Scrolling message	Submenu	Attributes
ALRM.N	NUM OF ENABLE ALARMS	MODE	R W

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

Acronym	Scrolling message	Submenu	Attributes
tMEr	TIMER ENABLE	MODE	R W

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

Acronym	Scrolling message	Submenu	Attributes
MUL.SP	MULTISET ENABLE	MODE	R W

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

Acronym	Scrolling message	Submenu	Attributes
SP.REM	REMOTE SP ENABLE	MODE	R W

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

Acronym	Scrolling message	Submenu	Attributes
SPr.t	REMOTE SP TYPE	MODE	R W

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

Acronym	Scrolling message	Submenu	Attributes
PROGR	PROGRAMMER ENABLE	MODE	R W

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

Acronym	Scrolling message	Submenu	Attributes
t.Pro	PROGRAMMER BASE TIME DEFINITION	MODE	R W

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

Acronym	Scrolling message	Submenu	Attributes
ENERG	ENERGY COUNTER ENABLE	MODE	R W

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

Acronym	Scrolling message	Submenu	Attributes
T.SAMP	MAIN INPUT SAMPLE TIME	MODE	R W

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

Acronym	Scrolling message	Submenu	Attributes
FREQZ	LINE FREQUENCY	MODE	R W

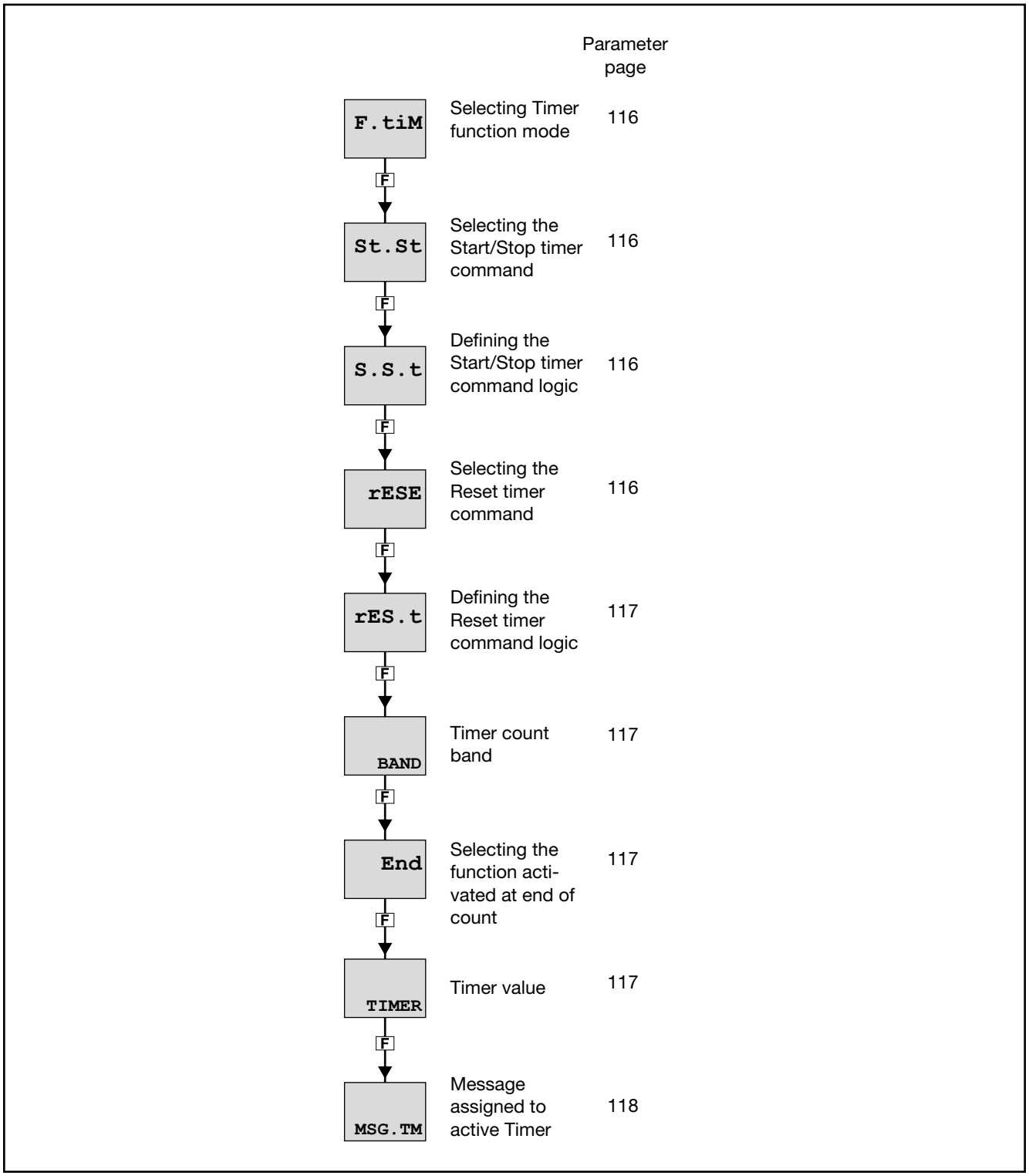
The parameter shows and sets the power line frequency

Unit of measurement: Hz

Options: **50**
60

4.20. TIMER Submenu – Configuring timer parameters

Acronym	Scrolling message	Password	Description
TIMER	TIMER MANAGER	Level 2	Lets you configure the timer parameters. The submenu appears only if the Timer function was enabled on the MODE submenu.



4. CONFIGURATION

4.20.1. F.tiM - Selecting Timer function mode

Acronym	Scrolling message	Submenu	Attributes
F.tiM	TIMER FUNCTION	TIMER	R W

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

Acronym	Scrolling message	Submenu	Attributes
St.St	TIMER START STOP	TIMER	R W

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

Acronym	Scrolling message	Submenu	Attributes
S.S.t	LOGIC TYPE OF TIMER START/STOP	TIMER	R W

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

Acronym	Scrolling message	Submenu	Attributes
rESE	TIMER RESET	TIMER	R W

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

Acronym	Scrolling message	Submenu	Attributes
rES.t	LOGIC TYPE OF TIMER RESET	TIMER	R W

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

Acronym	Scrolling message	Submenu	Attributes
BAND	SYMM SP BAND WHERE TIMER IS ACTIVE	TIMER	R W

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

Acronym	Scrolling message	Submenu	Attributes
End	FUNCTION WHERE TIMER IS OVER	TIMER	R W

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

Acronym	Scrolling message	Submenu	Attributes
TIMER	ACTUAL TIME	TIMER	R W

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

Acronym	Scrolling message	Submenu	Attributes
MSG.TM	MSG NUMBER WHEN TIMER OVER	TIMER	R W

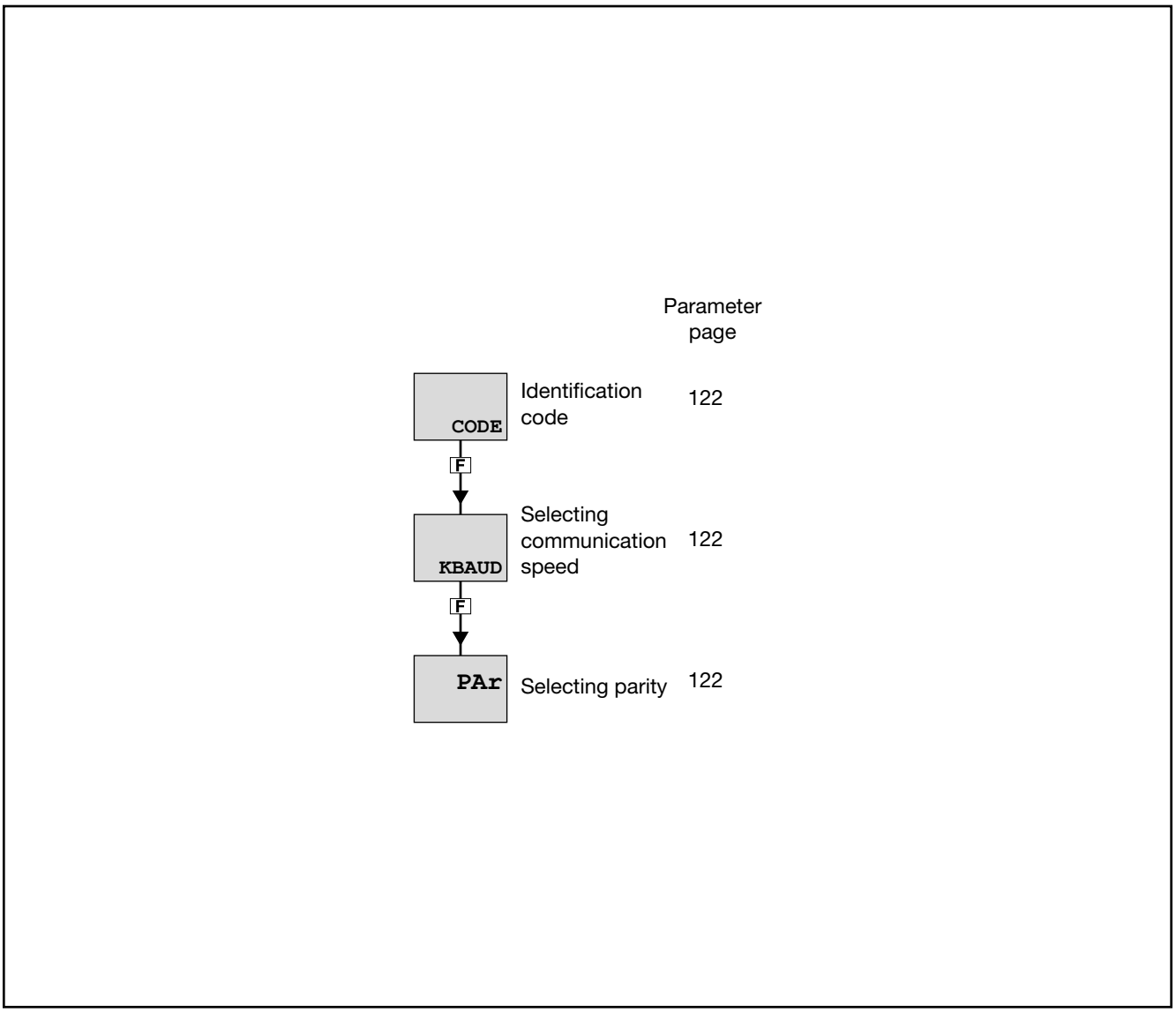
The parameter shows and sets the number of the message assigned to the active timer count, i.e., the scrolling message shown on the display.
For more information on scrolling messages, see paragraph “3.1.2.2. Scrolling messages” on page 34.
If the parameter is set to “0” no message will be displayed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

Unit of measurement: Message number

Options: **0...25**

4.22. SERIA Submenu – Configuring serial communication

Acronym	Scrolling message	Password	Description
SERIA	SERIAL COMMUNICATION CONFIG	Level 2	Lets you configure serial communication



4. CONFIGURATION

4.22.1. CODE - Identification code

Acronym	Scrolling message	Submenu	Attributes
CODE	INSTRUMENT ID CODE FOR SERIAL COMM	SERIA	R W

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

Acronym	Scrolling message	Submenu	Attributes
KBAUD	COMMUNICATION SPEED	SERIA	R W

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

Acronym	Scrolling message	Submenu	Attributes
PAr	PARITY	SERIA	R W

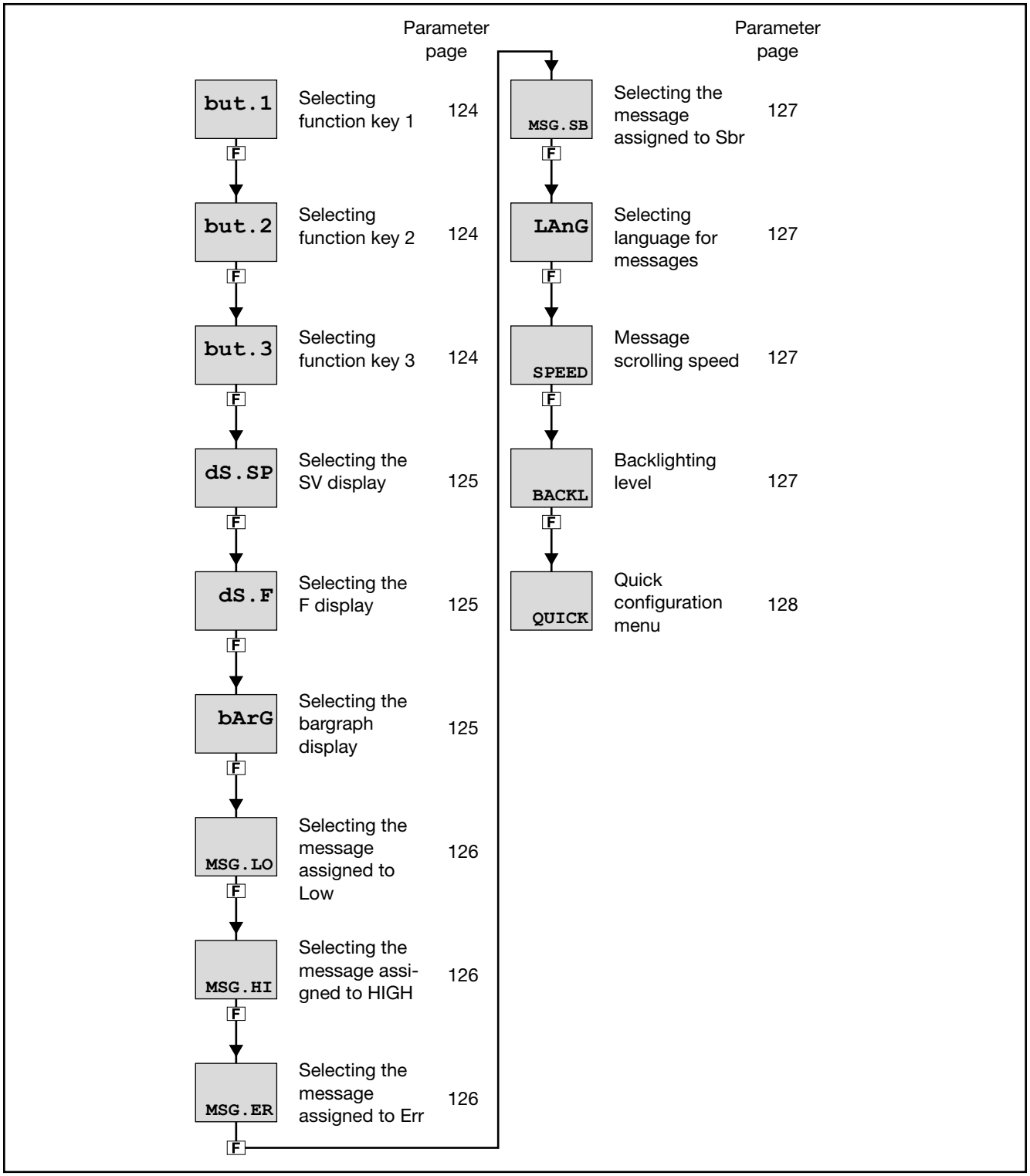
The parameter shows and sets the parity used in serial communication.

Unit of measurement: -

Options:
NONE = No parity
ODD = Odd parity
EVEN = Even parity

4.23. HMI Submenu – Configuring the display and keypad

Acronym	Scrolling message	Password	Description
HMI	DISPLAY AND KEYBOARD	Level 2	Lets you configure the controller's display and keys



4. CONFIGURATION

4.23.1. but.1 - Selecting function key 1

Acronym	Scrolling message	Submenu	Attributes
but.1	KEY FUNCTION	HMI	R W

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

Acronym	Scrolling message	Submenu	Attributes
but.2	KEY FUNCTION	HMI	R W

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

Unit of measurement: -

Options: As per **but.1**

4.23.3. but.3 - Selecting function key 3

Acronym	Scrolling message	Submenu	Attributes
but.3	KEY FUNCTION	HMI	R W

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

Unit of measurement: -

Options: As per **but.1**

4.23.4. dS.SP - Selecting the SV display

Acronym	Scrolling message	Submenu	Attributes
dS.SP	SV DISPLAY FUNCTION	HMI	R W

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

Unit of measurement: -

Options:
NONE = 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

Acronym	Scrolling message	Submenu	Attributes
dS.F	F DISPLAY FUNCTION	HMI	R W

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**
note: if dS.SP = SETP and dS.F = OUT.PW
or dS.SP = OUT.PW and dS.F = SETP in manual operation
gradient GRAD.0 = 0: OUT.PW become MAN.PW
gradient 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

Acronym	Scrolling message	Submenu	Attributes
bArG	BARGRAPH FUNCTION	HMI	R W

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**

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4.23.7. MSG.LO - Selecting the message assigned to Low

Acronym	Scrolling message	Submenu	Attributes
MSG.LO	NUM SCROLLING MSG WHEN MAIN INPUT IS LOW ERR	HMI	R W

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 Lou.

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

Acronym	Scrolling message	Submenu	Attributes
MSG.HI	NUM SCROLLING MSG WHEN MAIN INPUT IS HI ERR	HMI	R W

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

Acronym	Scrolling message	Submenu	Attributes
MSG.ER	NUM SCROLLING MSG WHEN MAIN INPUT IS ERR ERR	HMI	R W

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

Acronym	Scrolling message	Submenu	Attributes
MSG.SB	NUM SCROLLING MSG WHEN MAIN IN IS SB ERR	HMI	R W

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

Acronym	Scrolling message	Submenu	Attributes
LAnG	MESSAGE LANGUAGE	HMI	R W

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

Acronym	Scrolling message	Submenu	Attributes
SPEED	SCROLLING MESSAGE SPEED	HMI	R W

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

Acronym	Scrolling message	Submenu	Attributes
BACKL	BACKLIGHT LEVEL	HMI	R W

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. CONFIGURATION

4.23.14. QUICK - Quick configuration menu

Acronym	Scrolling message	Submenu	Attributes
QUICK	QUICK CONFIG ENABLE	HMI	R W

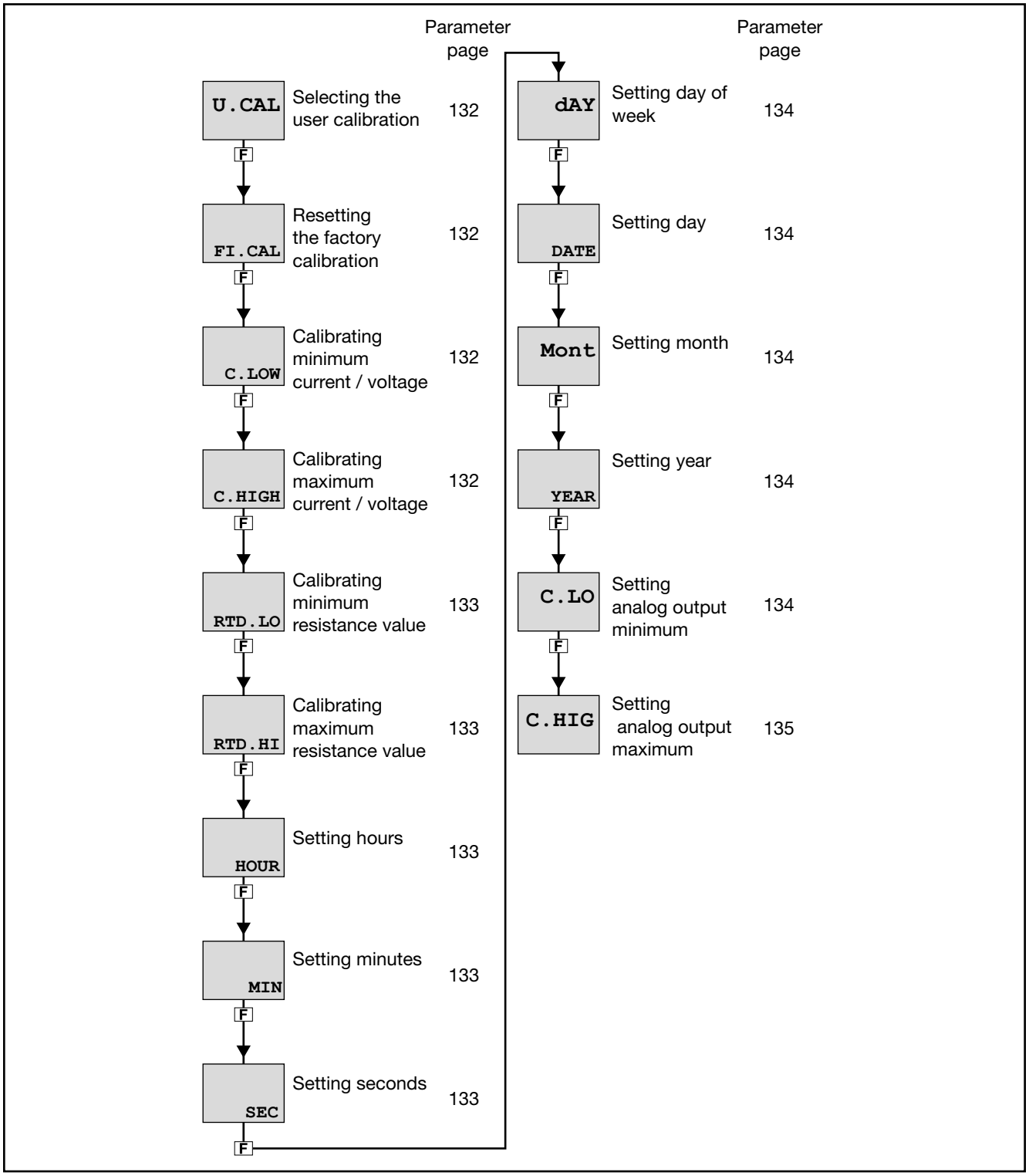
The parameter shows and sets enabling of the quick configuration menu.

Unit of measurement: -

Options: **OFF** = Quick configuration menu is not displayed
On = Quick configuration menu is displayed

4.25. US.CAL Submenu – User calibrations

Acronym	Scrolling message	Password	Description
US.CAL	USER CALIBRATION MANAGER	Level 2	Lets the user calibrate the controller with regard to Custom main input, HB alarm setpoints, energy reset, and partial day count.



4. CONFIGURATION

4.25.1. U.CAL - Selecting the user calibration

Acronym	Scrolling message	Submenu	Attributes
U.CAL	USER CALIBRATION TYPE	US.CAL	R W

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

Acronym	Scrolling message	Submenu	Attributes
FI.CAL	FACTORY CALIBRATION	US.CAL	R W

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

Acronym	Scrolling message	Submenu	Attributes
C.LOW		US.CAL	R W

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.HIGH - Calibrating maximum current / voltage

Acronym	Scrolling message	Submenu	Attributes
C.HIGH		US.CAL	R W

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

Acronym	Scrolling message	Submenu	Attributes
RTD.LO		US.CAL	R W

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

Acronym	Scrolling message	Submenu	Attributes
RTD.HI		US.CAL	R W

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

Acronym	Scrolling message	Submenu	Attributes
HOUR		US.CAL	R W

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

Acronym	Scrolling message	Submenu	Attributes
MIN		US.CAL	R W

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

Acronym	Scrolling message	Submenu	Attributes
SEC		US.CAL	R W
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

Acronym	Scrolling message	Submenu	Attributes
dAY		US.CAL	R W
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

Acronym	Scrolling message	Submenu	Attributes
DATE		US.CAL	R W
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

Acronym	Scrolling message	Submenu	Attributes
Mont		US.CAL	R W
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

Acronym	Scrolling message	Submenu	Attributes
YEAR		US.CAL	R W
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

Acronym	Scrolling message	Submenu	Attributes
C.LO		US.CAL	R W

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

Acronym	Scrolling message	Submenu	Attributes
C.HIG		US.CAL	R W

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

Acronym	Scrolling message	Submenu	Attributes
PASC1	SET PASS1	Level 2	R W

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

Acronym	Scrolling message	Submenu	Attributes
PASC2	SET PASS2	Livello 2	R W

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

Acronym	Scrolling message	Submenu	Attributes
FI.CFG	ENTER DEFAULT CONFIGURATION PASS	Livello 2	R W

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 F 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**

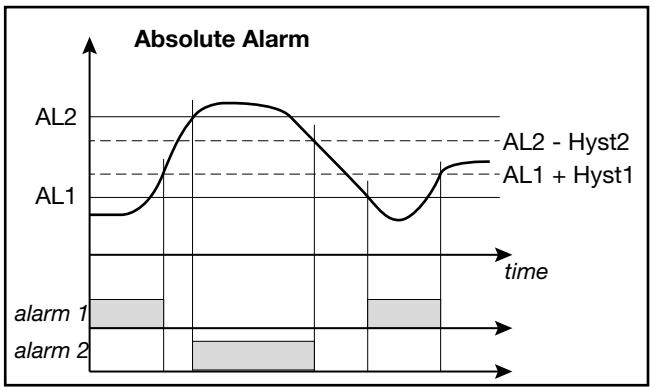
5. Examples and applicative notes

5.6. Alarms

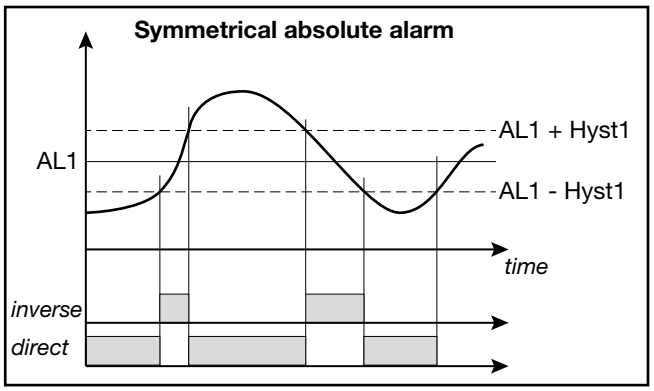
5.6.1. Generic alarms AL1...AL4

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

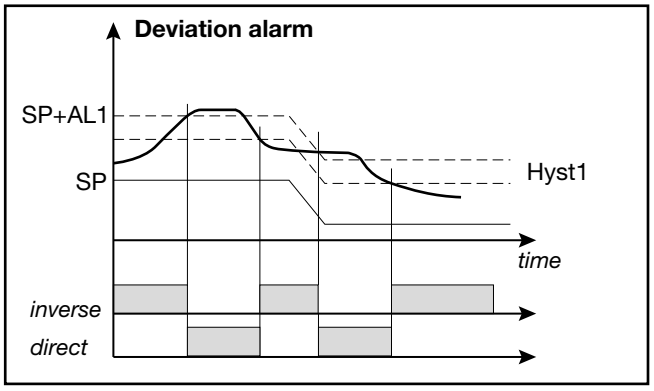
Absolute alarm
AL1 inverse and absolute, AL2 direct and absolute.
Two alarm setpoints, AL1 (lower setpoint) and AL2 (upper setpoint) are set, corresponding to two specific hysteresis values, Hyst1 (positive) and Hyst2 (negative).
The alarm trips when the measured value remains less than AL1 or greater than AL2 for the set delays.
The alarm condition ends when the measured value is greater than AL1 + Hyst 1, 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.



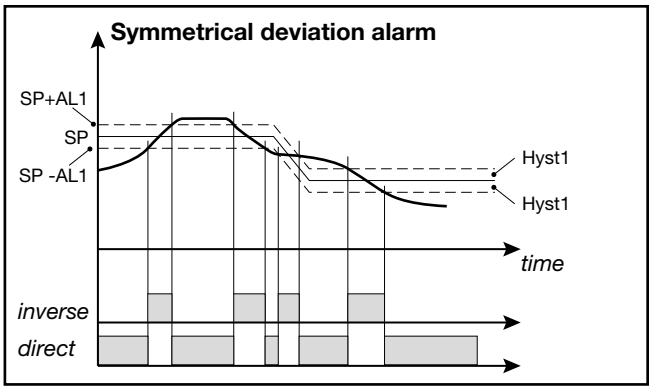
Symmetrical absolute alarm
A single alarm setpoint AL1 and a single hysteresis value Hyst1 are set.
When a direct alarm is set, the alarm trips when the measured value is less than AL1 - Hyst1 or greater than AL1 + Hyst1 for the set delay.
When a inverse alarm is set, the alarm trips when the measured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

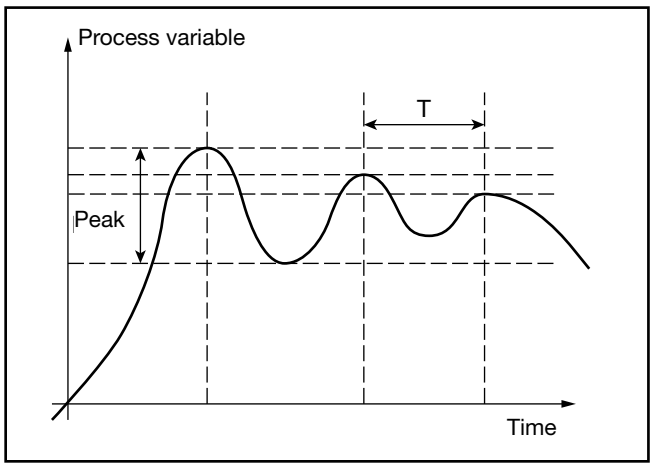
5.10.1.1. Influence of Proportional, Derivative and Integral actions on response of controlled process

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).
- 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.

5.10.2. 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

   $$P.B. = \frac{Peak}{V_{max} - V_{min}} \times 100$$

   where $V_{max} - V_{min}$ is the scale interval.
   - Integral Time value It = 1.5 x T
   - Derivative Time value dt = It / 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.

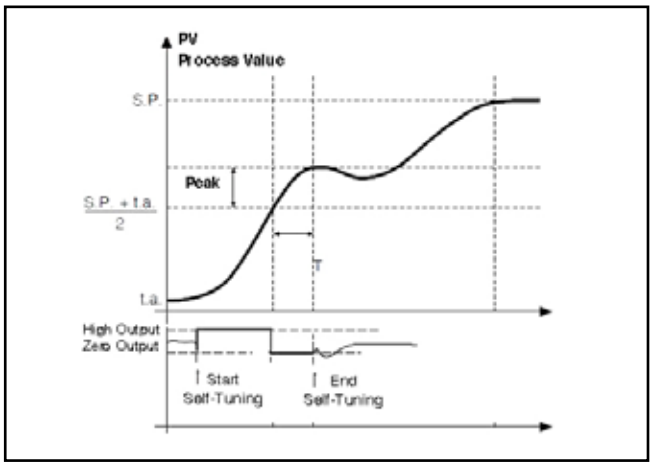
At the end of the procedure, the following new PID parameters are saved:
- proportional band,
- integral and derivative times, calculated for the current action (heat or cool).
  In case of dual action (heat + cool) the parameters are calculated automatically separately for the two actions.

Active tuning condition is signaled on the display by an LED

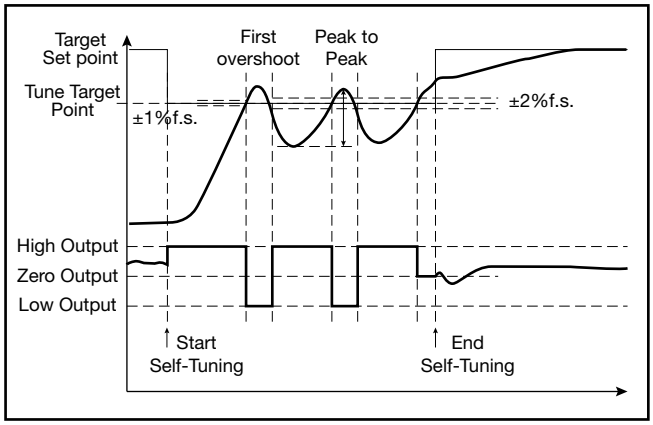
5. Examples and applicative notes

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

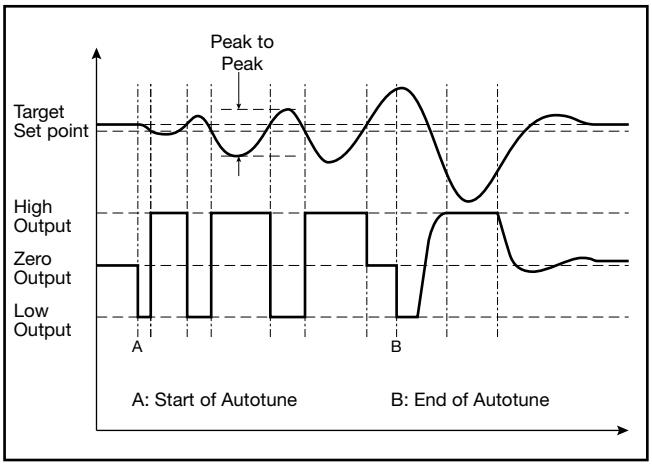
Notes
- For the programmer model, if Self-Tuning starts when the controller is powered-on, the program is in STOP.
- If SP-PV deviation is less than 0.3% f.s., Self-Tuning switches to “one shot” Auto-Tuning; otherwise it calculates a point at 75% of deviation around which to start “one shot” Auto-Tuning,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



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. Examples and applicative notes

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.

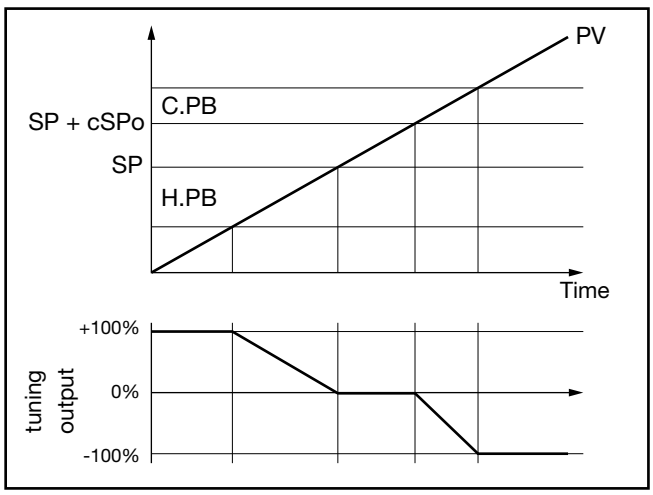
Continuous Auto-Tuning constantly measures system oscillations, immediately searching for PID parameter values that reduce the current oscillation. It does not act if the oscillations drop to values below 1.0% of the Proportional Band.
It is interrupted if the setpoint changes and automatically resumes 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.
The calculated parameters are latched when the function, enabled from digital input or key ⏻ , is disabled.
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.

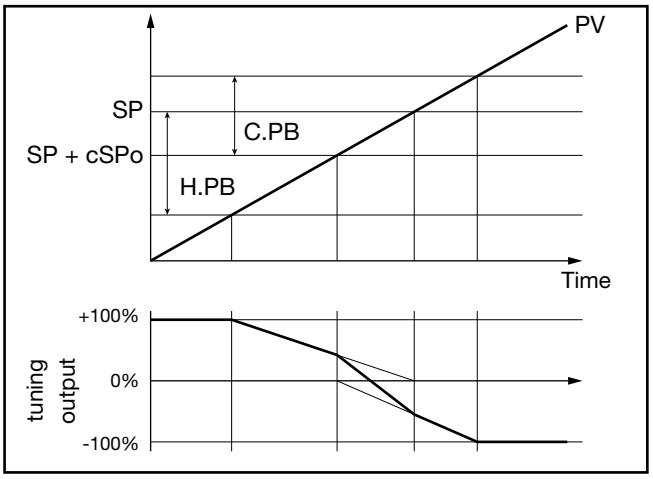
5.10.5. Examples of tuning

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



Tuning output only with proportional action in case of proportional heating band separate from cooling band.



Tuning output only with proportional action in case of proportional heating band superimposed on cooling 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 thei [△] , [▽] keys as follows:
- [△] pressed with timer stopped = START
- [▽] pressed with timer running = STOP
- [△] + [▽] 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.

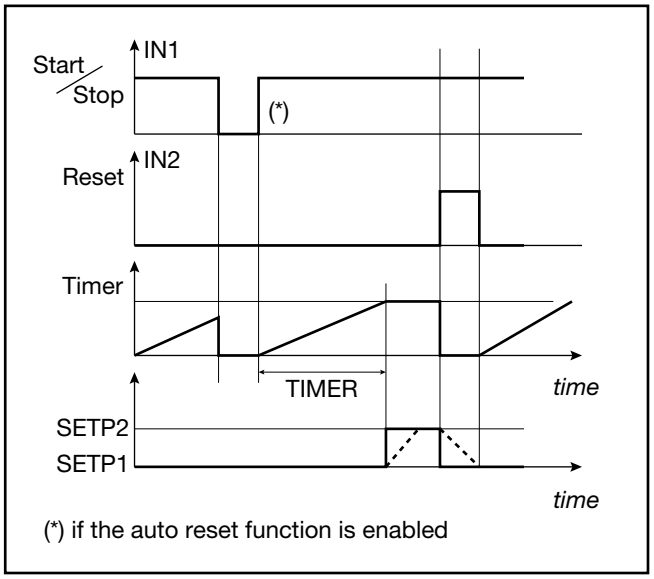
You can select the true POSIT state or false NEGAT state for the reset command.

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 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**.

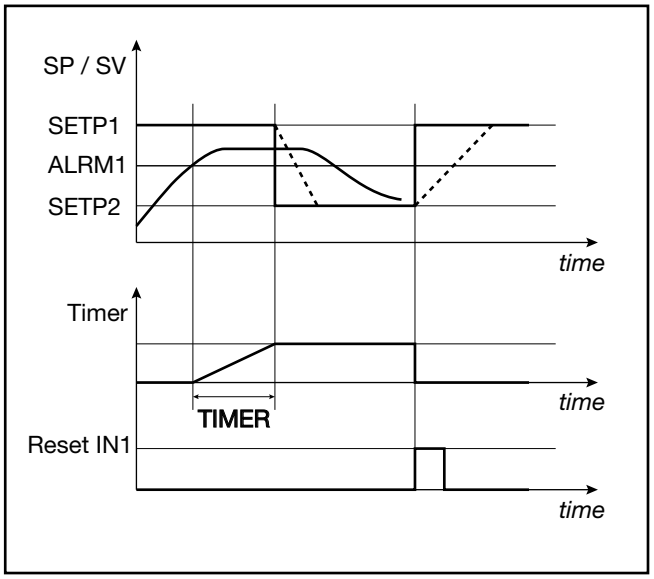
The following diagrams show timer behavior when enabling from digital input and from alarm are used.
Switching between SETP1 and SETP2 is based on the value of the up gradient GRAD.I (if SETP2 > SETP1) or down gradient GRAD.D (if SETP2 < SETP1).
Switching is immediate if the gradient is set to 0 (zero).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

Enabling from digital input



(*) if the auto reset function is enabled

Enabling from alarm



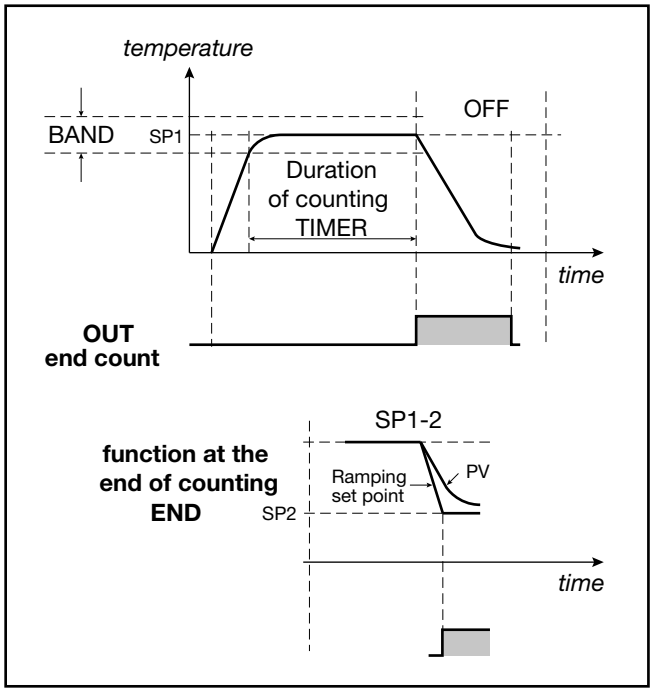
5. Examples and applicative notes

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.

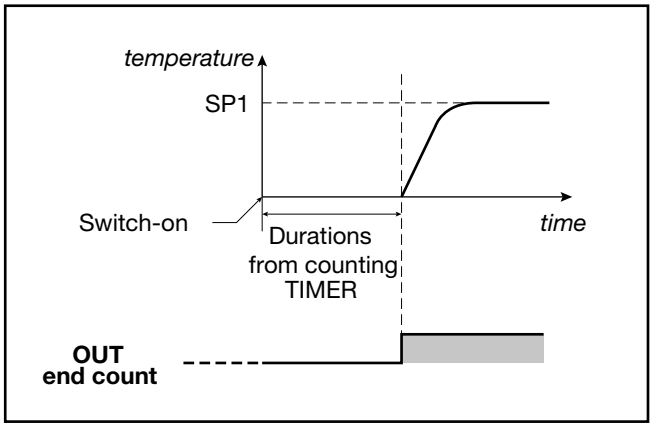
When the function at end of count is End = SP1-2, the end count state activates when the setpoint reaches value SETP2 based on the value of the up gradient GRAD.I (if SETP2 > SETP1) or down gradient GRAD.D (if SETP2 < SETP1).
Switching is immediate if the gradient is set to 0 (zero).

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.



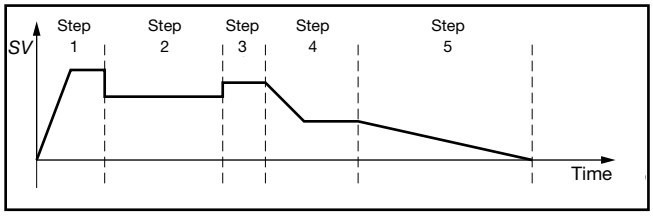
5.11.4. Variables available for the user configuration menu

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;
- alarm state (ON = START);
- different restart modes after a Power-off; (Power Off);
- setpoint preceding a Power-off;
- process variable value at time of Power-on;
- 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.

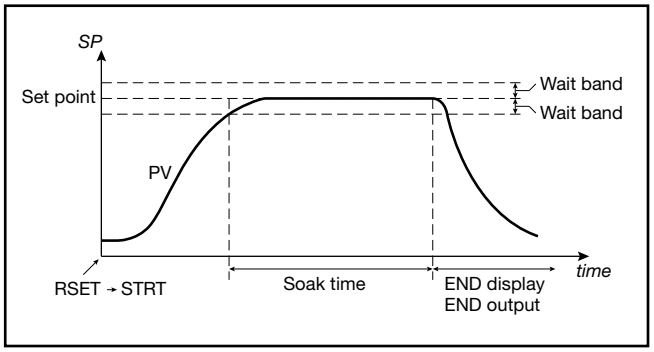
With the controller in manual, or with remote absolute setpoint, the programmer time base is stopped.

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

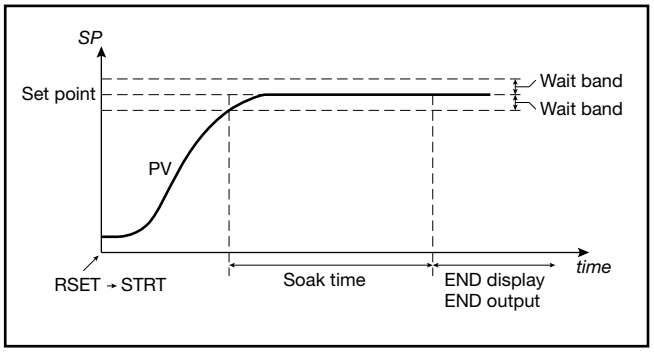
5.13.4.1. ONE STEP program

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.

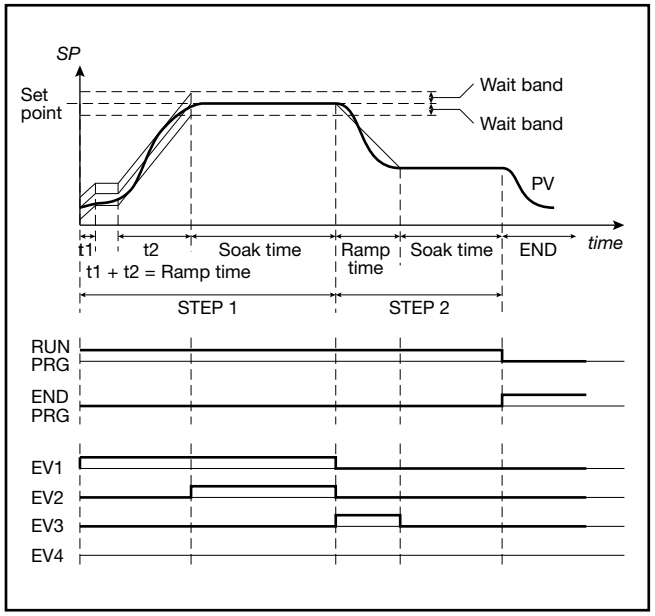
STEP1 - setting events at start of step:
- EVN.r.1 = On
- EVN.r.2 = OFF
- EVN.r.3 = OFF
- EVN.r.4 = nonE

STEP1 - setting events at start of hold:
- EVN.h.1 = nonE
- EVN.h.2 = On
- EVN.h.3 = nonE
- EVN.h.4 = nonE

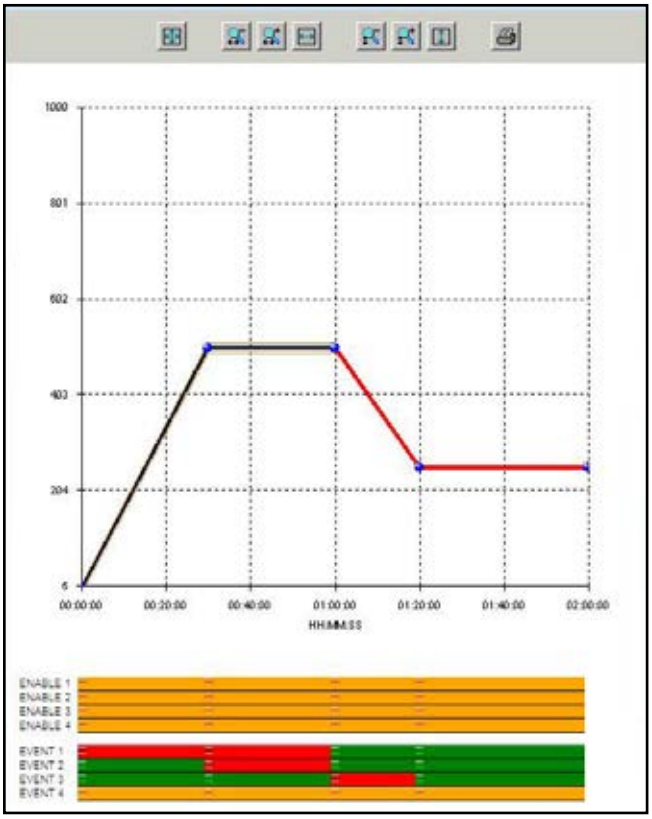
5. Examples and applicative notes

STEP2 - setting events at start of step:
- EVN.r.1 = OFF
- EVN.r.2 = OFF
- EVN.r.3 = On
- EVN.r.4 = nonE

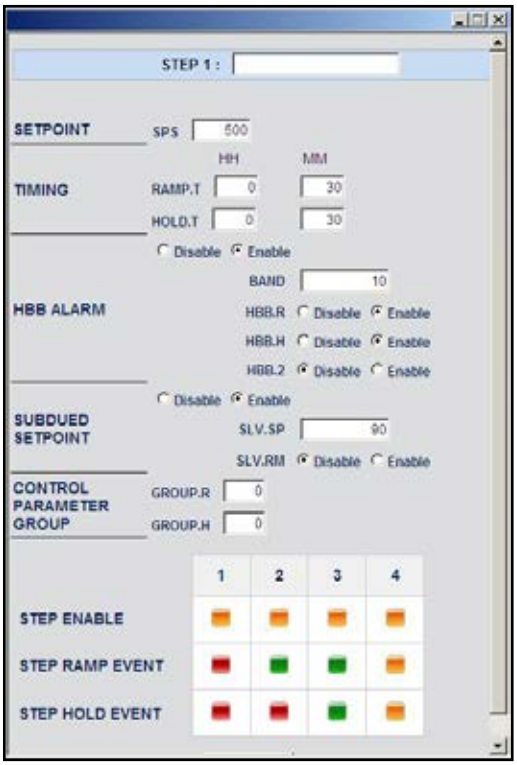
STEP2 - setting events at start of hold:
- EVN.h.1 = nonE
- EVN.h.2 = nonE
- EVN.h.3 = OFF
- EVN.h.4 = nonE



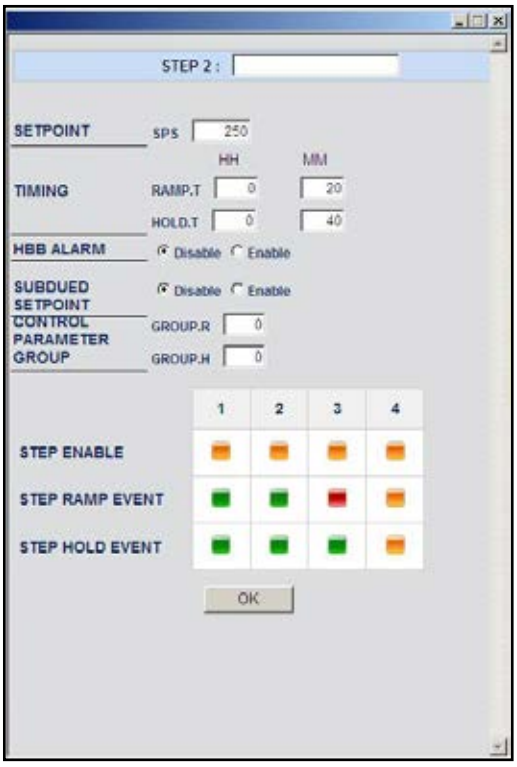
Using GF_eXpress software for the configuration, the displayed pages would be:



Program diagram



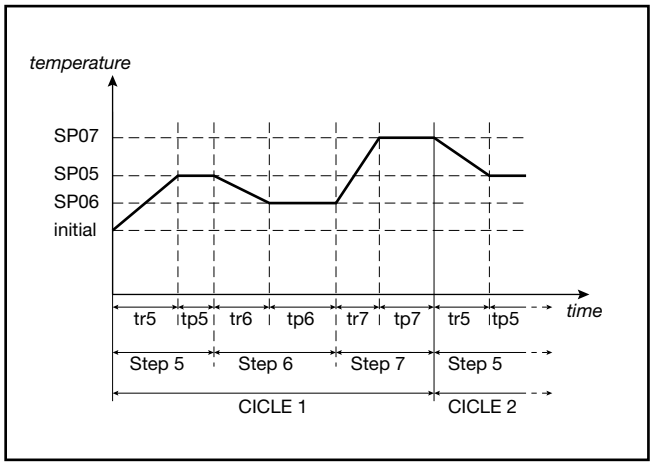
Configuration of STEP 1



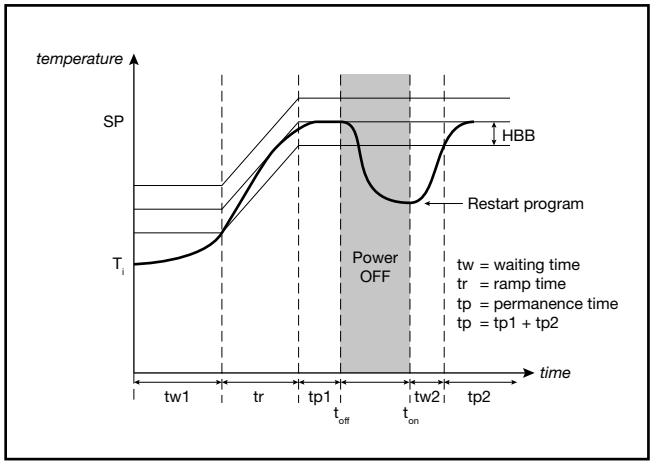
Configuration of STEP 2

5. Examples and applicative notes

5.13.4.4. Cyclical program with 3 setpoints and 3 steps



5.13.4.5. Program with HBB (hold back band) function



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

In the absence of enablings from digital inputs , the program is controlled when programmer state is displayed using the [△], [▽] keys, with the following modes:

- [△] pressed with program stopped = START;
- [▽] pressed with program running = STOP;
- [▽] + [△] pressed for 2 seconds = RESET (condition maintained with key pressed);

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

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.

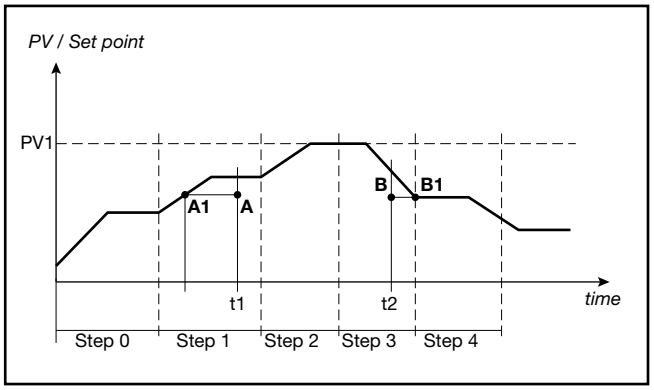
This function is valid in case of reset from digital inputs or enabled keys, as well as in case of reset following a program change (possible only in STOP) or STOP/START switching at end of program.

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



If the variable has values lower than the ones requested during a setpoint raise phase (point A, t1), restart is conducted by lowering the active time base until the setpoint profile (point A1) is intercepted.

If the variable has values lower than the ones requested during a setpoint lower phase (point B, t2), restart is conducted by raising the active time base until the setpoint profile (point B1) is intercepted.

If interception is impossible, as in the case of variable at value PV1, the program is restarted from the active setpoint and time.

If the HBB control is on, programmer base times remain in effect until the variable re-enters the set tolerance band, symmetrical to the setpoint value.