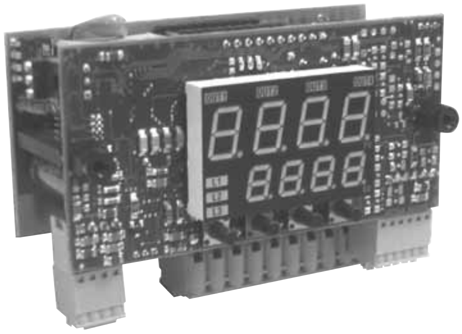
GEFRAN

600 OF

CONTROLLER



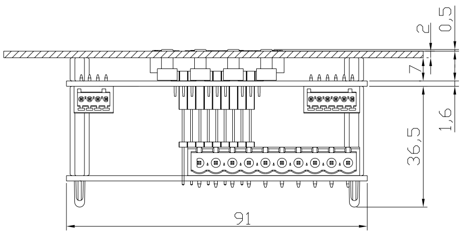
INSTALLATION AND OPERATION MANUAL

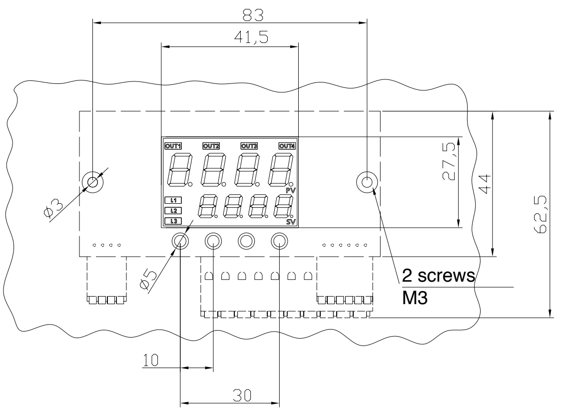
SOFTWARE VERSION **1.0X**
code **80364B** / Edition **03** - **02/2011** **ENG**

CE

1 • INSTALLATION

• Dimensions and cut-out; panel mounting





⚠ For correct and safe installation, follow the instructions and observe the warnings contained in this manual.

Panel mounting:
To fix the unit, insert the brackets provided into the seats on either side of the case.
To mount two or more units side by side, respect the cut-out dimensions shown in the drawing.

CE MARKING: The instrument conforms to the European Directives 2004/108/CE and 2006/95/CE with reference to the generic standards: **EN 61000-6-2** (immunity in industrial environment) **EN 61000-6-3** (emission in residential environment) **EN 61010-1** (safety).

MAINTENANCE: Repairs must be done only by trained and specialized personnel. Cut power to the device before accessing internal parts.
Do not clean the case with hydrocarbon-based solvents (Petrol, Trichlorethylene, etc.).
Use of these solvents can reduce the mechanical reliability of the device.
Use a cloth dampened in ethyl alcohol or water to clean the external plastic case.

SERVICE: GEFRAN has a service department. The warranty excludes defects caused by any use not conforming to these instructions.

2 • TECHNICAL SPECIFICATIONS

Display	2 x 4 digits, green, height 10 and 7mm
Keys	4 mechanical keys (Man/Aut, INC, DEC, F)
Accuracy	0.2% full scale ± 1 digit at 25°C room temperature
Main input (settable digital filter)	TC, RTD, PTC, NTC 60mV,1V Ri≥1MΩ; 5V,10V Ri≥10KΩ; 20mA Ri=50Ω Sampling time 120 msec.
Type TC Thermocouples (ITS90)	Type TC Thermocouples : J,K,R,S,T (IEC 584-1, CEI EN 60584-1, 60584-2) ; custom linearization is available / types B,E,N,L GOST,U,G,D,C are available by using the custom linearization.
Cold junction error	0,1° / °C
RTD type (scale configurable within indicated range, with or without decimal point) (ITS90) *Max line resistance for RTD*	DIN 43760 (Pt100), JPT100 20Ω
PTC type / NTC Type	990Ω, 25°C / 1KΩ, 25°C
Safety	detection of short-circuit or opening of probes, LBA alarm
°C / °F selection	configurable from keypad
Linear scale ranges	-1999...9999 with configurable decimal point position
Controls	Pid, Autotune, on-off
pb - dt - it	0,0...999,9 % - 0,00...99,99 min - 0,00...99,99 min
Action	Heat / Cool
Control outputs	on / off
Maximum power limit heat / cool	0,0...100,0 %
Cycle time	1...200 sec relay, 0,1...20.0 sec logic
Main output type	relay, logic
Softstart	0,0...500,0 min
Fault power setting	-100,0...100,0 %
Automatic blanking	Displays PV value, optional exclusion
Configurable alarms	Up to 3 alarm functions assignable to an output, configurable as: maximum, minimum, symmetrical, absolute/deviation, LBA
Alarm masking	- exclusion during warm up - latching reset from faceplate or external contact
Type of relay contact	NO (NC), 5A, 250V/30Vdc cosφ=1
Logic output for static relays	15V ±10% (12V min at 30mA)
RTC	3V Battery, 280mA/h, replaceable. Insertion by Jumper; 1200hour autonomy without power supply
Transmitter power supply	±15Vdc, max 20mA short-circuit protection
Logic inputs	(24V, 4mA) or no-voltage contact. NPN
Serial interface (optional)	RS485 , isolated
Baud rate	1200, 2400, 4800, 9600, 19200
Protocol	MODBUS
Power supply (switching type)	(standard) 100...240Vac ±10% 50/60Hz, 8VA max.
Working / Storage temperature range	0...50°C / -20...70°C
Relative humidity	20...85% RH non-condensing
Environmental conditions of use	for internal use only, altitude up to 2000m
Installation	Panel
Weight	160 g for the complete version

EMC conformity has been tested with the following connections

FUNCTION	CABLE TYPE	LENGTH
Power supply cable	1 mm²	1 mt
Relay output cable	1 mm²	3,5 mt
Digital communication wire	0,35 mm²	3,5 mt
C.T. connection cable	1,5 mm²	3,5 mt
TC input	0,8 mm² compensated	5 mt
"PT100" input	1 mm²	3 mt

3 • DESCRIPTION OF FACEPLATE

Function indicators
Indicates modes of operation

L1	MAN/AUTO	=	OFF (automatic control) ON (manual control)
L2	SETPONT1/2	=	OFF (IN1 = OFF - local Setpoint 1) ON (IN1 = ON - local Setpoint 2)
L3	SELFTUNING	=	ON (enabled Self) OFF (disabled Self)

M/ A key:
after function but, or START (immediate)/STOP (if pressed >3 sec) programmer: Active only when PV display visualises the process variable

"Inc" and "Dec" key
Press to increment (decrement) any numerical parameter •• Increment (decrement) speed is proportional to time key stays pressed •• The operation is not cyclic: once the maximum (minimum) value of a field is reached, the value will not change even if the key remains pressed.

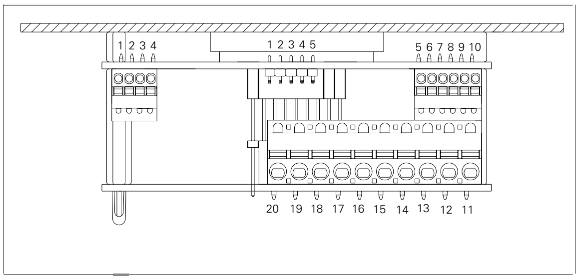
Indication of output states
OUT 1 (AL1); OUT 2 (Main); OUT 3; OUT 4

PV Display: Indication of process variable
Error Indication: LO, HI, Sbr, Err
LO= the value of process variable is < LO_S
HI= the value of process variable is > HI_S
Sbr= faulty sensor or input values higher than max. limits
Err= PT100 third wire opened for PT100, PTC or input values lower than min. limits (i.e.: TC wrong connection)

SV display: Indication of setpoint
Blinking if PV is outside the "Hold Back Band" (if enabled)

Function key
Gives access to the various configuration phases •• Confirms change of set parameters and browses next or previous parameter (if Auto/Man key is pressed)

4 • CONNECTIONS



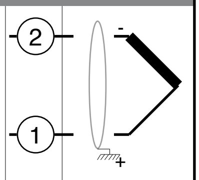
External Keypad (Optional)

1	GND
2	M/A key
3	INC key
4	DEC key
5	F key

• Inputs

• TC Input

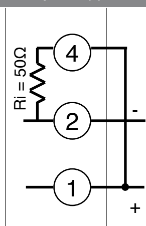
Available thermocouples:
J, K, R, S, T
(B, E, N, L, U, G, D, C custom linearization is available)
- Observe polarities
- For extensions, use the correct compensating cable for the type of TC used



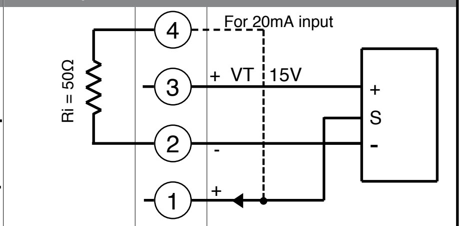
• Linear input (I)

Linear input in dc current

20mA,
Ri = 50Ω

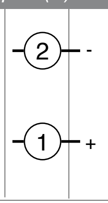


• Input 1 linear with transmitter 3 wires

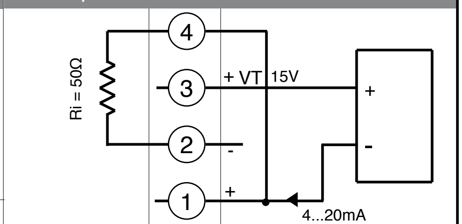


• Linear input (V)

Linear input in dc voltage
60mV, 1V
Ri > 1MΩ
5V, 10V
Ri > 10KΩ

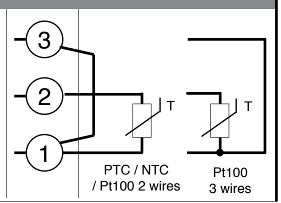


• Input 1 linear with transmitter 2 wires

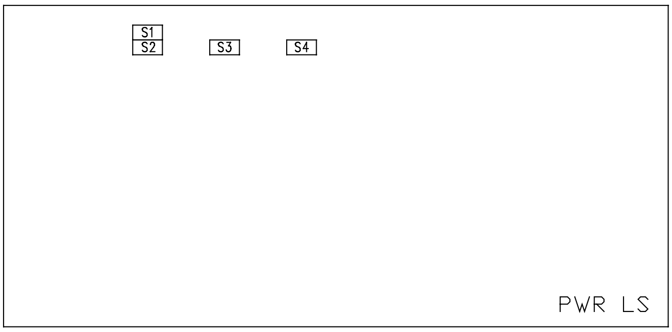


• Pt100 / PTC / NTC

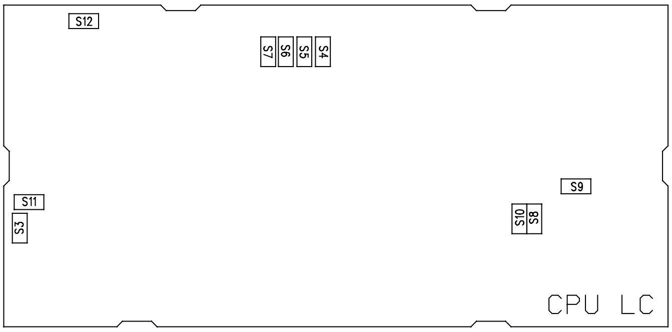
Use wires of adequate diameter (min. 1mm²)
PT100, JPT100, PTC, NTC



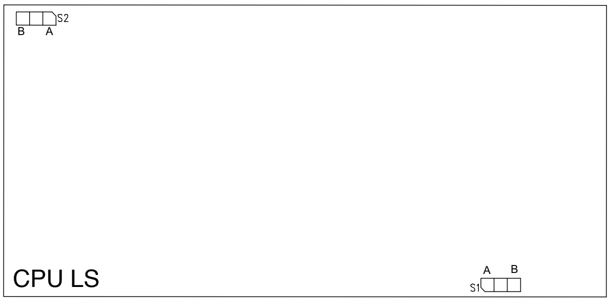
PIN	Description
20 - 19	Supply 100...240 ±10%
18 - 17	Relay output 5A 250Vac/30Vdc (OUT 4)
16 - 15	Relay output 5A 250Vac/30Vdc (OUT 3)
14 - 13	Relay output 5A 250Vac/30Vdc (OUT 2)
12 - 11	**A** Relay output 5A 250Vac/30Vdc (OUT 1) -- **B** Logic output (15V with no load, 12V at 30mA of load) (pin 12 "-" pin 11 "+") (OUT1)
Logic output 10 - 9 - 8	**A** Output ± 15Vdc 20mA, pin 8 (GND), pin 9 (-15V), pin 10 (+15V) -- (15V with no load, 12Vdc a 30mA of load) (pin 9 "+" pin 8 "gnd") (OUT6) **B** **+** Logic input 24Vdc 4mA / No-voltage contac input (NPN type) (pin 10 "+"pin 8 "gnd") -- **C** Isolated logic input 24Vdc 4mA (PNP type) (pin 10 "+" pin 8 "gnd")
7 - 6 - 5	RS485 2 wires (pin 7 "gnd" pin 6 "B-" pin 5 "A+"



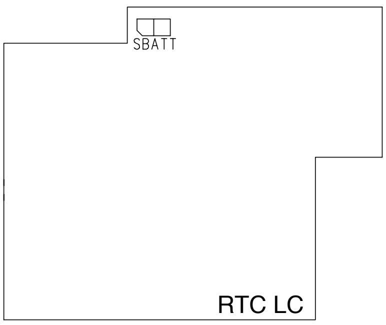
Solder link	Function description	CLOSED	OPEN
S1	Inversion OUT1	Normally closed	Normally open (Default)
S2	Inversion OUT2	Normally closed	Normally open (Default)
S3	Inversion OUT3	Normally closed	Normally open (Default)
S4	Inversion OUT4	Normally closed	Normally open (Default)



Solder link	Function description	CLOSED	OPEN
S3	Not used		
S4	enable CFG	disable (Default)	
S5	Factory config recall		Disable (Default)
S6	Calibration enable		Disable (Default)
S7	Not used		
S8	Polarization A+		Disable (Default)
S9	Polarization B-		Disable (Default)
S10	Termination A and B (220Ω)		Disable (Default)
S11 S12	Not used		



Jumper	Description	CLOSED	OPEN
S1A	Transmitter supply +15V		Disable (Default)
S1B	Pt100	Enable (Default)	
S2A	NPN type no-voltage contact	Enable (Default)	
S2B	+24V 4mA PNP type		Disable (Default)



Jumper	Description	CLOSED	OPEN
SBATT	Enable Battery	Enable	Disable (Default)

5 • "EASY" PROGRAMMING and CONFIGURATION

THE EASY CONFIGURATION IS SUITABLE FOR VERSIONS WITH TWO OUTPUTS (OUT1, OUT2). TO ACCESS THE OTHER PARAMETERS, ADD 128 TO THE **Pro** VALUE.

LEVEL 1 MENU

P.V. / S.V.	P.V. / S.V. Process variable (PV display) Work Setpoint (SV display) or control output value with controller in manual
AL. 1	Alarm point 1 (scale points)

S4 Jumper (CPU) ON

CFG	CFG menu
InP	Input settings
Out	Output settings
PAS	Password
PAS = 99	
Pro	Protection code

• CFG

h.Pb	Proportional band for heating or hysteresis in regulation ON/OFF	0 ... 999.9% f.s.	
h. It	Integral time for heating	0.00 ... 99.99 min	
h.dt	Derivative time for heating	0.00 ... 99.99 min	
h.P.H	Maximum power limit for heating	0.0 ... 100.0%	
HY. 1	Alarm 1 hysteresis	±999 scale points	0...999 sec. If +32 in A1.t 0...999 min. If +64 in A1.t

• InP

tYP.	Probe type, signal, enable custom linearization, and main input scale (**See type table, page 8**)	
dP.S	Decimal point position for main input scale	see table below
Lo.S	Minimum limit of main input scale	min...max input range selected in tyP
H i.S	Maximum limit of main input scale	min...max input range selected in tyP
Lo.L	Lower limit for local setpoint and absolute alarms	Lo.S ... Hi.S
H i.L	Upper limit for local setpoint and absolute alarms	Lo.S ... Hi.S

dP_S	Format
0	xxxx
1	xxx.x
2	xx.xx
3	x.xxx

• Out

A 1.t — Alarm type 1

AL.1.t, AL.2.t, AL.3.t

AL.x.t	Direct (high limit) Inverse (low limit)	Absolute or relative to active setpoint	Normal Symmetrical (window)
0	direct	absolute	normal
1	inverse	absolute	normal
2	direct	relative	normal
3	inverse	relative	normal
4	direct	absolute	symmetrical
5	inverse	absolute	symmetrical
6	direct	relative	symmetrical
7	inverse	relative	symmetrical

+ 8 to disable at power-on until first alarm
+ 16 to enable alarm memory
+ 32 Hys becomes delay time when alarm trips (0...999 sec.)
(excluding symmetrical absolute)
+ 64 Hys becomes delay time when alarm trips (0...999 min.)
(excluding symmetrical absolute)

Ct.2	Cycle time for Out2 (Heat or Cool)	1...200 sec.

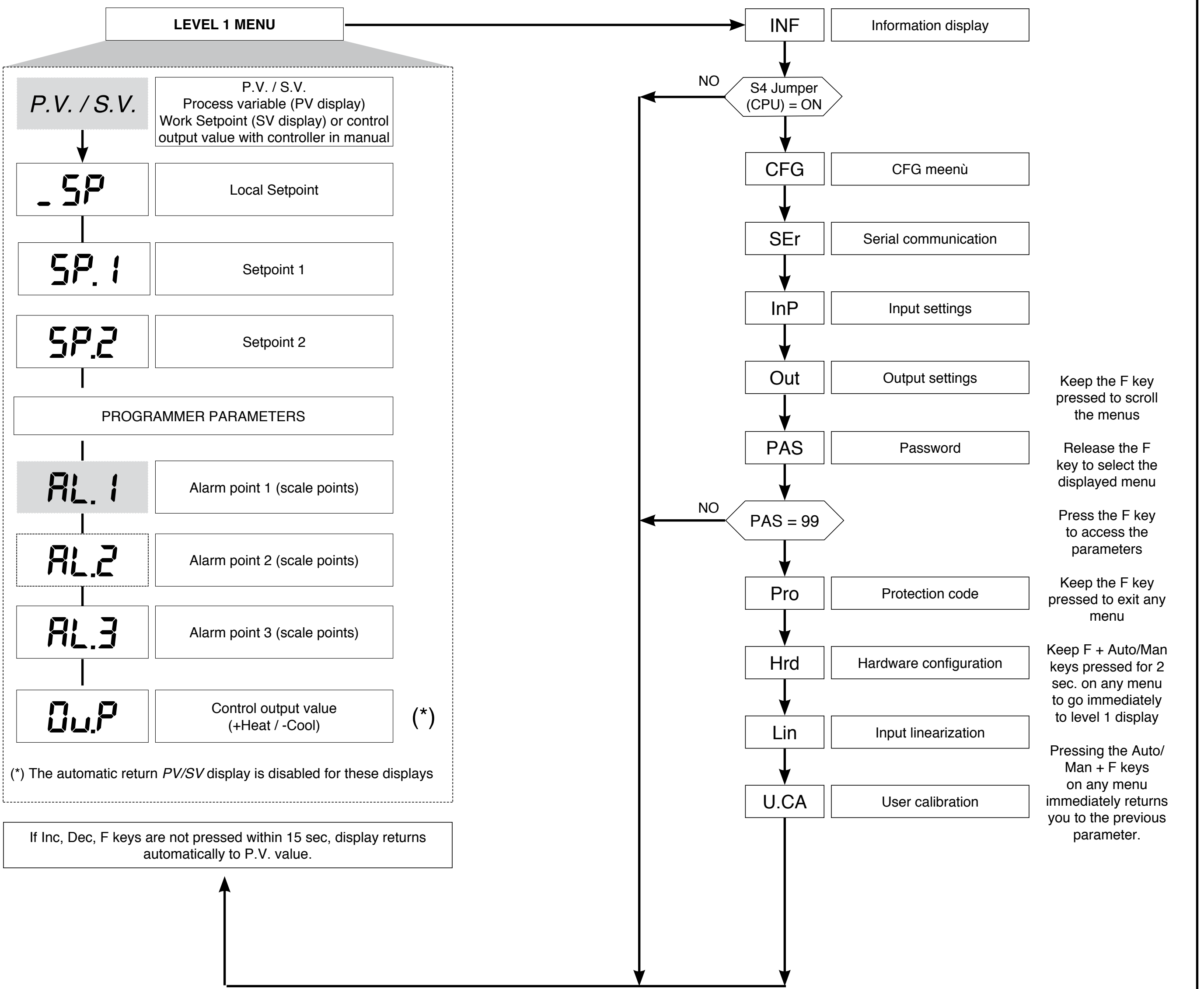
• Prot

Pro — Protection code

Prot	Display	Modification
0	SP, alarms	SP, alarms
1	SP, alarms	SP
2	SP	

+ 4 to disable InP, Out
+ 8 to disable CFG
+128 enables full configuration

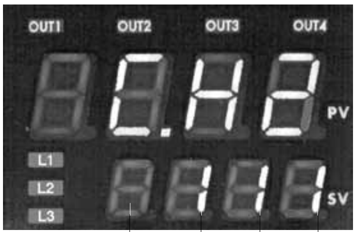
6 • PROGRAMMING and CONFIGURATION



N.B.: Once a particular configuration is entered, all unnecessary parameters are no longer displayed

• InFo Display

OUTPUT 1	OUTPUT 2	OUTPUT 3	OUTPUT 4
1 = Direct	1 = Direct	1 = Direct	1 = Direct
2 = Inverse	2 = Inverse	2 = Inverse	2 = Inverse



OUTPUT 5 (BUZZER)	OUTPUT 6 (OUTDIG)	SERIAL	DIGITAL INPUT
0 = None	0 = None	0 = None	0 = None
1 = Present	1 = Present	1 = Present	1 = Present

Parameter	Description
INF	Information display
UPd	Software version
Cod	Instrument code
Err	Self diagnostic error code
CHd	Configuration hrd 1
CH2	Configuration hrd 2

Err	
0	No Error
1	Lo
2	Hi
3	ERR
4	SBR

• PROG PROGRAMMER Parameters and Added CONFIGURATION

Parameter	Description	Range
LEn	Number of program steps *	1...2
P.ty	Program type and restart modes	
S.P.0	Step 0 set point	Lo_L ... Hi_L
h.t.0	Step 0 hold time (set time refers to the selected time basis [HH.MM or MM.SS])	00.00 ... 99.59 (99.59 = infinite time)
S.P.1	Selection of step 1	Lo_L ... Hi_L
r.t.1	Step 1 ramp time (set time refers to the selected time basis [HH. MM. or MM.SS])	00.00 ... 99.59
h.t.1	Step 1 hold time (set time refers to the selected time basis [HH.MM or MM.SS])	00.00 ... 99.59 (99.59 = infinite time)
Fn.1	Enable fan output step 1	Fan output: no (0) Off; yes (1) On
S.P.2	Selection of step 2	Lo_L ... Hi_L
r.t.2	Step 2 ramp time (set time refers to the selected time basis [HH. MM or MM.SS])	00.00 ... 99.59
h.t.2	Step 3 hold time (set time refers to the selected time basis [HH.MM or MM.SS])	00.00 ... 99.59 (99.59 = infinite time)
Fn.2	Enable fan output step 2	Fan output: no (0) Off; yes (1) On
H.b.b	Hold Back setpoint. Considered symmetrical to active set point. Available if engaged (see parameter P.ty)	0 ... 999 Scale points
bu2	Enable buzzer output (only if APP = 3 or 4)	Buzzer output: no (0) Off force “rL5 = 5”; yes (1) On force “rL5 = 18”
FAn	Enable fan output (only if APP = 6)	Fan output: no (0) Disabled; yes (1) Enabled
HE.2	Enable aux. heat output (only if APP = 6)	Aux. heat output: no (0) Off force “rL2 = 5”; yes (1) On force “rL2 = 2”

(*) excluding step 0 (always on)

Program type and restart modes

0	Restart of first program step with set point assigned PV value
1	Restart from stop conditions

+8 Wait STOP/START switching at cycle start
+16 Continuous loop, at end of cycle program resumes from first step
+32 To enable Hold Back Band
+128 Time basis MM:SS

• CFG

Parameter	Description	Range
CFG	Control parameters	
S.tu	Enabling self-tuning, autotuning, softstart	see table

S.tun	Continuous autotuning	Sel-ftuning	Softstart
0	NO	NO	NO
1	YES	NO	NO
2	NO	YES	NO
3	YES	YES	NO
4	NO	NO	YES
5	YES	NO	YES
6	-	-	-
7	-	-	-
S.tun	**Autotuning one shot**	**Selftuning**	**Softstart**
8*	WAIT	NO	NO
9	GO	NO	NO
10*	WAIT	YES	NO
11	GO	YES	NO
12*	WAIT	NO	YES
13	GO	NO	YES

(*) +16 in case autotunning running, “stored PID parameters” reload when PV < [(SSP-Lo.S)/ 2 + Lo.S]

Parameter	Description	Range
h.Pb	Proportional band for heating or hysteresis in regulation ON/OFF	0 ... 999.9% f.s.
h. It	Integral time for heating	0.00 ... 99.99 min
h.dt	Derivative time for heating	0.00 ... 99.99 min
h.P.H	Maximum power limit for heating	0.0 ... 100.0%
h.P.L	Minimum power limit for heating (not available for double heat/ cool action)	0.0 ... 100.0%
C.ME	Cooling medium	0 ... 2

C.MEd		Relative gain (Rg) (see applicable note)
0	Air	1
1	Oil	0,8
2	Water	0,4

Parameter	Description	Range
c.SP	Setpoint for cooling relative to heating setpoint	±25.0% f.s.
c.Pb	Proportional band for cooling or hysteresis in regulation ON/OFF	0 ... 999.9% f.s.
c. It	Integral time for cooling	0.00 ... 99.99 min
c.dt	Derivative time for cooling	0.00 ... 99.99 min
c.P.H	Maximum power limit for cooling	0.0 ... 100.0%
c.P.L	Minimum power limit for cooling (not available for heating/cooling double action)	0.0 ... 100.0%
rSt	Manual reset	-999 ... 999 punti scala
P.rS	Reset power	-100.0 ... 100.0%
A.rS	Antireset	0 ... 9999 punti scala
FFd	Feedforward	-100.0 ... 100.0%
SoF	Softstart time	0.0 ... 500.0 min
HY. 1	Alarm 1 hysteresis	±999 scale points; 0…999 sec If +32 in A1.t; 0…999 min If +64 in A1.t
HY.2	Alarm 2 hysteresis	±999 scale points; 0…999 sec If +32 in A2.t; 0…999 min If +64 in A2.t
HY.3	Alarm 3 hysteresis	±999 scale points; 0…999 sec If +32 in A3.t; 0…999 min If +64 in A3.t
Lb.t	Waiting time for LBA alarm intervention (Set to “0” to disable LBA alarm)	0.0 ... 500.0 min (*)
Lb.P	Power limit for LBA alarm condition	-100.0 ... 100.0% (*)
FA.P	Power output in fault condition (when probe is faulty)	-100.0 ... 100.0% ON / OFF
G.SP	Set gradient (see applicable note)	0.0 ... 999.9 digit / min. (digit / sec see SP.r)

(*) LBA alarm may be reset by simultaneously pressing $\Delta + \nabla$ keys when OutP is displayed or by switching to Manual.

Note:
C_Pb, c_it, c_dt parameters are “read only” if the option “relative gain heat/cool control” (Ctrl = 14) has been selected.

• Ser

Parameter	Description	Range
Ser	Serial setting	
Cod	Unit identification code	0 ... 247
Sr.P	Serial interface protocol	see table

SER.P	Serial protocol
1	MODBUS RTU

Parameter	Description
bAu	Select Baudrate

bAud	Baudrate
0	1200
1	2400
2	4800
3	9600
4	19200

Parameter	Description
PAr	Parity selection

PAr	Parity
0	No parity
1	odd
2	even

S.In

Virtual instrument inputs

0 ... 31

Inputs	IN	P.V.	AL3	AL2	AL1
Bit	4	3	2	1	0
Ex:	1	1	0	0	0

Set code 24 in S.in. to manage serial line AN and IN

S.Ou

Virtual instrument outputs

0 ... 127

Outputs	OUT6	OUT5		OUT4	OUT3	OUT2	OUT1
Bit	6	5	4	3	2	1	0

Ex: 1 0 0 1 1

set code 19 in S.Ou. to manage serial line OUT1, OUT2 and OUTW.

S.U.I

Virtual instrument user interface

0 ... 255

Interf.	LED 1/2/3	KEYB	DISL	DISH	LED OUT4	LED OUT3	LED OUT2	LED OUT1
Bit	7	6	5	4	3	2	1	0
Ex:	1	0	1	0	0	0		

If you want to manage KEYB and DISH from serial line, set code 80 in S.U.I.

• InP

InP

Input settings

SP.r

Def. remote setpoint

Val.	Type of remote setpoint	Absolute Relative
0	Digital (from serial line)	Absolute
1	Digital (from serial line)	Reletive to local setpoint

+2 set gradient in digit / sec

tYP.

Probe type, signal, enable custom linearization, and main input scale

Type	Tipo sonda Sensore:	Senza punto dec. TC	Con punto dec.
0	TC J °C	0/1000	0.0/999.9
1	TC J °F	32/1832	32.0/999.9
2	TC K °C	0/1300	0.0/999.9
3	TC K °F	32/2372	32.0/999.9
4	TC R °C	0/1750	0.0/999.9
5	TC R °F	32/3182	32.0/999.9
6	TC S °C	0/1750	0.0/999.9
7	TC S ° F	32/3182	32.0/999.9
8	TC T °C	-200/400	-199.9/400.0
9	TC T °F	-328/752	-199.9/752.0
28	TC	CUSTOM	CUSTOM
29	TC	CUSTOM	CUSTOM
30	PT100 °C	-200/850	-199.9/850.0
31	PT100 °F	-328/156 2	-199.9/999.9
32	JPT100 °C	-200/600	-199.9/600.0
33	JPT100 °F	-328/1112	-199.9/999.9
34	PTC °C	-55/120	-55.0/120.0
35	PTC °F	-67/248	-67.0/248.0
36	NTC °C	-10/70	-10.0/70.0
37	NTC °F	14/158	14.0/158.0
38	0...60 mV	-1999/9999	-199.9/999.9
39	0...60 mV	linear custom	linear custom
40	12...60 mV	-1999/9999	-199.9/999.9
41	12...60 mV	linear custom	linear custom
42	0...20 mA	-1999/9999	-199.9/999.9
43	0...20 mA	linear custom	linear custom
44	4...20 mA	-1999/9999	-199.9/999.9
45	4...20 mA	linear custom	linear custom
46	0...10 V	-1999/9999	-199.9/999.9
47	0...10 V	linear custom	linear custom
48	2...10 V	-1999/9999	-199.9/999.9
49	2...10 V	linear custom	linear custom
50	0...5 V	-1999/9999	-199.9/999.9
51	0...5 V	linear custom	linear custom
52	1...5 V	-1999/9999	-199.9/999.9
53	1...5 V	linear custom	linear custom
54	0...1 V	-1999/9999	-199.9/999.9
55	0...1 V	linear custom	linear custom
56	200mv..1V	-1999/9999	-199.9/999.9
57	200mv..1V	linear custom	linear custom
58	Cust 10V-20mA	-1999/9999	-199.9/999.9
59	Cust 10V-20mA	linear custom	linear custom
60	Cust 60mV	-1999/9999	-199.9/999.9
61	Cust 60mV	linear custom	linear custom
62	PT100-JPT	CUSTOM	CUSTOM
63	PTC	CUSTOM	CUSTOM
64	NTC	CUSTOM	CUSTOM

For custom linearization:
- LO signal is generated with variable below Lo.S or at minimum calibration value
- HI signal is generated with variable above Lo.S or at maximum calibration value

Max. non-linearity error for thermocouples (TC), resistors (PT100) and thermistors (PTC, NTC). The error is calculated as deviation from theoretical value and is expressed as percentage of full scale (in °C).	**S, R** range 0...1750°C; error < 0.2% f.s. (t > 300°C) / for other range; error < 0.5% f.s. **T** error < 0.2% f.s. (t > -150°C) **B** range 44...1800°C; error < 0.5% f.s. (t > 300°C) / range 44,0...999,9; error < 1% f.s. (t > 300°C) **U** range -99,9...99,9 and -99...99°C; error < 0.5% f.s. / for other range; error < 0.2% f.s. (t > -150°C) **G** error < 0.2% f.s. (t > 300°C) **D** error < 0.2% f.s. (t > 200°C) **C** range 0...2300; error < 0.2% f.s. / for other range; error < 0.5% f.s. **NTC** error < 0.5% f.s. Tc: **J, K, E, N, L** error < 0,2% f.s. **JPT100** and **PTC** error < 0,2% f.s. **PT100** scale -200...850°C Precision better than 0,2% f.s. at 25°C In range 0...50°C: • Precision better than 0,2% f.s. in range -200...400°C • Precision better than 0,4% f.s. in range +400...850°C (where f.s. refers to range -200... +850°C)

FiLt

Digital filter on input (if = 0 excludes averaging filter on sample value)

0.0 ... 20.0 sec

FiLd

Digital filter on input display

0.0 ... 25.5 sec

dP.S

Decimal point position for input scale

dP_S	Format
0	xxxx
1	xxx.x
2	xx.xx (*)
3	x.xxx (*)

(*) not available for TC, RTD, PTC and NTC scales

Lo.S

Minimum limit of main input scale

min...max input range selected in tyP

Hi.S

Maximum limit of main input scale

min...max input range selected in tyP

oFS.

Offset correction of main input

-999 ... 999 scale points

Lo.L

Lower limit for setting SP and absolute alarms

Lo.S ... Hi.S

Hi.L

Upper limit for setting SP and absolute alarms

Lo.S ... Hi.S

• Out

Out — Output settings

A1.r — Select reference signal for alarm 1

A2.r — Select reference signal for alarm 2

A3.r — Select reference signal for alarm 3

AL.1.r, AL.2.r, AL.3.r

AL.x.r	Variable to be compared	Refernce setpoint
0	PV (process variable)	AL
1	SSP (active setpoint)	AL (only absolute)
2	PV (process variable)	AL [only relative and referred to SP1 (with multiset function)]
4	PV (process variable)	AL [only relative and referred to SP2 (with multiset function)]
6	Display PV	AL

A1.t — Alarm type 1

A2.t — Alarm type 2

A3.t — Alarm type 3

AL.1.t, AL.2.t, AL.3.t

AL.x.t	Direct (high limit) Inverse (low limit)	Absolute or relative to active setpoint	Normal Symmetrical (window)
0	direct	absolute	normal
1	inverse	absolute	normal
2	direct	relative	normal
3	inverse	relative	normal
4	direct	absolute	symmetrical
5	inverse	absolute	symmetrical
6	direct	relative	symmetrical
7	inverse	relative	symmetrical

+8 to disable on power up until first interception
+16 to latch alarm
+ 32 Hys becomes delay time when alarm trips (0...999 sec.) (excluding symmetrical absolute)
+ 64 Hys becomes delay time when alarm trips (0...999 min.) (excluding symmetrical absolute)

rL.1 — Out 1 Allocation of reference signa

rL.2 — Out 2 Allocation of reference signa

rL.3 — Out 3 Allocation of reference signa

rL.4 — Out 4 Allocation of reference signa

rL.o.1, rL.o.2, rL.o.3, rL.o.4

Val	Function
0	HEAT (control output for heating)
1	COOL (control output for cooling)
2	AL1 - alarm 1
3	AL2 - alarm 2
4	AL3 - alarm 3
5	-
6	LBA - alarm LBA
7	IN1 - repetition of logic input
8	Repeat but key (if but = 8)
9	AL1 or AL2
10	AL1 or AL2 or AL3
11	AL1 and AL2
12	AL1 and AL2 and AL3
13	-
14	-
15	-
16	-
17	-
18	End Cycle
19	Fan output
20 *	Output duty cycle constant (if APP = 6)

+ 32 for denied logic level at output, except codes 0…1

64	rL.1 HEAT heat control output with fast cycle time 0.1...20.0 sec.
65	rL.1 COOL cool control output with fast cycle time 0.1...20.0 sec.

(*) only for rL.4

BUZZER OUTPUT — **rL.5** — Out 5 Allocation of reference signa

OUTDIG OUTPUT — **rL.6** — Out 6 Allocation of reference signa

rL.o.5, rL.o.6

Val	Function
2	AL1 - alarm 1
3	AL2 - alarm 2
4	AL3 - alarm 3
5	-
6	LBA - alarm LBA
7	IN1 - repetition of logic input
8	Repeat but key (if but = 8)
9	AL1 or AL2
10	AL1 or AL2 or AL3
11	AL1 and AL2
12	AL1 and AL2 and AL3
13	-
14	-
15	-
16	-
17	-
18	End Cycle
19	Fan output
20	-

+ 32 for denied logic level at output

Parameter	Description	Range
Ct. 1	Cycle time for OUT1 (Heat or Cool)	0.1...20.0 sec.
Ct.2	Cycle time for OUT2 (Heat or Cool)	1...200 sec.
Ct.3	Cycle time for OUT3 (Heat or Cool)	1...200 sec.
Ct.4	Cycle time for OUT4 (Heat or Cool)	1...200 sec.
AH.b	Out4 cycle time with constant duty cycle (if APP = 6)	0...999 sec
Hb.t	Out4 ON time with constant duty cycle (if APP = 6)	0...999 sec
rEL	Fault action (sets state in case of probe fault) Err, Sbr	see table below

_rEL.	Alarm 1	Alarm 2	Alarm 3
0	OFF	OFF	OFF
1	ON	OFF	OFF
2	OFF	ON	OFF
3	ON	ON	OFF
4	OFF	OFF	ON
5	ON	OFF	ON
6	OFF	ON	ON
7	ON	ON	ON

• Prot

Pro — Protection code

Prot	Display	Modification
0	SP, alarms, OuP, INF, PROG	SP, alarms, PROG
1	SP, alarms, OuP, INF, PROG	SP, PROG
2	SP, OuP, INF, PROG	PROG

+ 4 to disable InP, Out
+ 8 to disable CFG, Ser,
+ 16 to disable SW “power-up - power down”
+ 32 disable manual power latching
+ 64 to disable manual power modification
+128 enables full configuration

N.B: - OuP and INF displayed only with full configuration enabled
- Alarm thresholds displayed in “level1” only with full configuration enabled

Hrd — Hardware configuration

hd.1 — Enable multiset instrument control by serial

Val	Multiset (2 SP)	Reversed LED state	Instrument control by serial
0			
1	x		
2		x	
3	x	x	
4			x
5	x		x
6		x	x
7	x	x	x

Ctr — Control type

Val	Control type
0	P heat
1	P cool
2	P heat / cool
3	PI heat
4	PI cool
5	PI heat / cool
6	PID heat
7	PID cool
8	PID heat / cool
9	ON-OFF heat
10	ON-OFF cool
11	ON-OFF heat / cool
12	PID heat + ON-OFF cool
13	ON-OFF heat + PID cool
14	PID heat + cool with relative gain (see C.MEd parameter)

Selection of derivative action sampling time:
+ 0 sample 1 sec.
+ 16 sample 4 sec.
+ 32 sample 8 sec.
+ 64 sample 240 msec.

Note: LbA alarm is not enabled with ON/OFF type control

AL.n — Select number of enabled alarms

AL.nr	Alarm 1	Alarm 2	Alarm 3
0	disabled	disabled	disabled
1	enabled	disabled	disabled
2	disabled	enabled	disabled
3	enabled	enabled	disabled
4	disabled	disabled	enabled
5	enabled	disabled	enabled
6	disabled	enabled	enabled
7	enabled	enabled	enabled

+ 16 to enable LBA alarm

but. — Function of M/A keys

butt	
0	No function (key disenabled)
1	MAN / AUTO controller
2	LOC / REM
3	HOLD
4	Alarms memory reset
5	SP1 / SP2 Selection
6	Start / Stop selftuning
7	Start / Stop autotuning
8	Set / Reset outputs Out 1... Out 4

+ 16 disables the “back menu” function (Auto/Man + F keys) in the configuration menus

Note: if APP = 2,3,4,6 the STOP-RESET/START function is set.
In the programmer, if “but” is pressed for 3 seconds, the Stop function is performed.
In the STOP/START function, when STOP is performed, also the initial reset is provided, and the SETPOINT is setted equal to the PV.

diG. — Function of digital input

dig.	
0	No function (key disenabled)
1	MAN / AUTO controller
2	LOC / REM
3	HOLD
4	Alarms memory reset
5	SP1/SP2 Selection
6	Software on/off
7	F key block
8	START/STOP Selftuning
9	START/STOP Autotuning
10	START/STOP Programmatore
11	RESET Programmer

	in diG = NPN state “ON” (closed) in diG = PNP	state “ON” (+24V)
1	AUTO	MAN
2	LOC	REM
3	NO HOLD	HOLD
4	NO Alarms Reset	Alarms Reset
5	SP1	SP2
6	NO Sw OFF	Sw OFF
7	NO STOP “F”	STOP “F”
8	NO Selftuning	Selftuning
9	NO Autotuning	Autotuning
10	STOP	NO STOP
11	RESET	NO RESET

+ 16 for input in denied logic (NPN)
+ 32 to force logic state 0 (OFF)
+ 48 to force logic state 1 (ON)

dSP

Defining SV display function

diSP	Lower display (SV) function
0	SSP - setpoint enabled
1	InP.2 - aux input
2	Control output value
3	Deviation (SSP - PV)

Ld.1

Ld.2

Ld.3

Function of LEDs

Val.	Function
0	none
1	MAN/AUTO controller
2	LOC / REM
3	HOLD
4	Selftuning enabled
5	Autotuning enabled
6	IN1 repetition
7	Enable serial dialogue
8	Error present
9	Softstart running
10	SP1...SP2 Indication
11	Set point gradient running
12	-
13	Output 5
14	Output 6

+ 16 LED flashes if active

APP

Application

	APP
0	Standard controller
1	Standard controller (open jumper S4 CPU and close jumper S2 PWR)
2	Programmer on (1 or 2 steps, hold only)
3	Programmer on (1 or 2 steps, ramp + hold, fan and buzzer control)
4	Programmer on (1 step, ramp + hold, fan and buzzer control)
5	Comparator (change setpoint when OUT1 and OUT2 are off)
6	Controller (change setpoint when AL1 is off only at power-up, fan and output control at constant duty cycle)

• Lin

Lin — Custom linearization for main input

S.00 — Step 0 beginning of scale value — Display limits (-1999...9999)

......

the n step value corresponds to input:
mV beginning scale + n*ΔmV
ΔmV = (mV full scale - mV beginning scale) / 32

S.32 — Step 32 full of scale value — Display limits (-1999...9999)

S.33 — Step 33 — mV beginning scale

S.34 — Step 34 — mV full scale

S.35 — Step 35 — mV at 50°C

Only for TYP = Tc custom

• U.CAL

U.CA	User calibration

Val	Function
1	Analogue output
2	Input 1 – custom 10V / 20mA
3	Input 1 - custom 60mV
4	Custom PT100 / J PT100
5	Custom PTC
6	Custom NTC
7	-

• Application notes

MODE 1
Mode 1 is activated with parameter APP = 1.
Mode is standard temperature control.
Open jumper S4 on the CPU board to protect the configuration menus.
To reverse a relay output, close the corresponding jumper on the POWER board.

MODE 2
Mode 2 is activated with parameter APP = 2.
Mode is programmer with 1 or 2 hold steps only (the first hold step is always present).
A hold time setting of 99.59 indicates infinite time.
The M/A key function is cycle START/STOP. STOP is engaged when the key is pressed for about 3s which also causes cycle RESET.
The step being run can be saved with parameter P.ty = 1.
Hold Back Band lets you block the counts until the variable re-enters the symmetrical band around the active setpoint.
The SV display shows the setpoint to be reached and, alternately, the message WAIT with the remaining count value in case of hold.

MODE 3
Mode 3 is activated with parameter APP = 3.
Mode is programmer with 1 or 2 ramp and hold steps (the first hold step is always present).
A hold time setting of 99.59 indicates infinite time.
The M/A key function is cycle START/STOP. STOP is engaged when the key is pressed for about 3s which also causes cycle RESET.
The step being run can be saved with parameter P.ty = 1.
Hold Back Band lets you block the counts until the variable re-enters the symmetrical band around the active setpoint.
The SV display shows the setpoint to be reached and, alternately, the message WAIT with the remaining count value in case of hold.
You can switch on/off the buzzer at the end of the programmer cycle with the parameter displaying level 1 buz = yES/no, which forces parameter rL.5 = 18 or 5.
You can switch on/off the fan output for each step with the parameter displaying level 1 Fn.x = yES/no.

MODE 4
Mode 4 is activated with parameter APP = 4.
Mode is programmer with 1 ramp step (the first hold step is always present).
A hold time setting of 99.59 indicates infinite time.
The M/A key function is cycle START/STOP. STOP is engaged when the key is pressed for about 3s which also causes cycle RESET.
The step being run can be saved with parameter P.ty = 1.
Hold Back Band lets you block the counts until the variable re-enters the symmetrical band around the active setpoint.
The SV display shows the setpoint to be reached and, alternately, the message WAIT with the remaining count value in case of hold.
You can switch on/off the buzzer at the end of the programmer cycle with the parameter displaying level 1 buz = yES/no, which forces parameter rL.5 = 18 or 5.
You can switch on/off the fan output for each step with the parameter displaying level 1 Fn.x = yES/no.

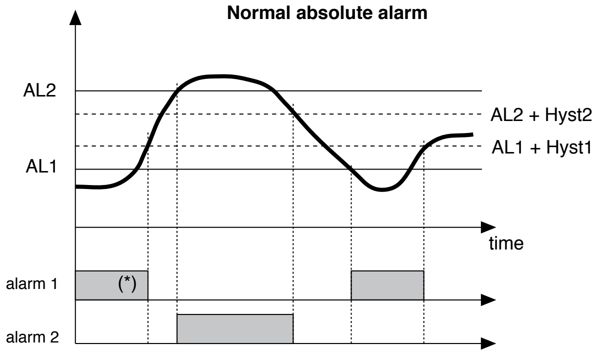
MODE 5
Mode 5 is activated with parameter APP = 5.
Mode is multiset comparator (SP1 and SP2) with setpoint change(from SP1 to SP2) when outputs out1 and out2 are inactive.

MODE 6
Mode 6 is activated with parameter APP = 6.
Mode is multiset comparator (SP1 and SP2) with setpoint change(from SP1 to SP2) when alarm AL1 is inactive.
The M/A key function is cycle START.
You can switch on/off the fan output with the parameter displaying level 1 FAn = yES/no.
You can switch on/off the aux. heating output to reach SP1 with the parameter displaying level 1 HE.2 = yES/no, which forces parameter rL.2 = 2 or 5.
When SP2 is reached, you can activate the constant duty cycle output, which has a cycle time settable in seconds in parameter AH.b and an On time settable in parameter Hb.t.

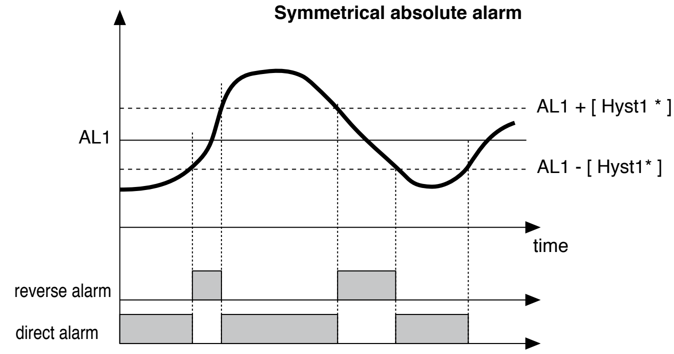
• HOLD function

The input value and alarms are frozen while the logic input is closed.
With logic input closed, a reset turns OFF both the relay outputs and the alarms latch.

7 • ALARMS

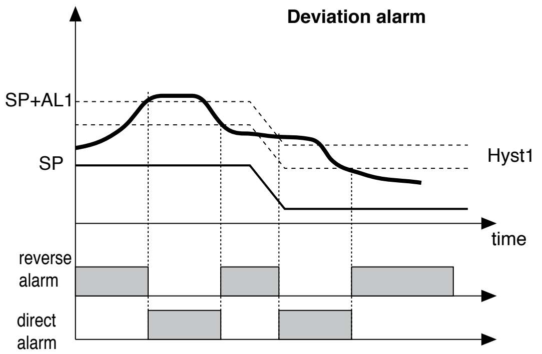


For AL1 = reverse absolute alarm (low) with positive Hyst1, AL1 t = 1
(*) = OFF if disabled on power-up
For AL2 = direct absolute alarm (high) with negative Hyst2, AL2 t = 0

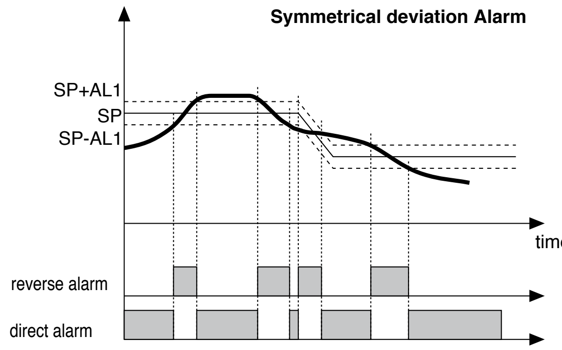


For AL1 = symmetrical Lo absolute alarm with Hyst1, AL1 t = 5
For AL1 = symmetrical Hi absolute alarm with Hyst1, AL1 t = 4

* Minimum hysteresis = 2 scale points



For AL1 = Lo deviation alarm with negative Hyst 1, AL1 t = 3
For AL1 = Hi deviation alarm with negative Hyst 1, AL1 t = 2



For AL1 = Symmetrical Lo deviation alarm with Hyst 1, AL1 t = 7
For AL1 = Symmetrical Hi deviation alarm with Hyst 1, AL1 t = 6

8 • CONTROL ACTIONS

Proportional Action:
action in which contribution to output is proportional to deviation at input (deviation = difference between controlled variable and setpoint).
Derivative Action:
action in which contribution to output is proportional to rate of variation input deviation.
Integral Action:
action in which contribution to output is proportional to integral of time of input deviation.

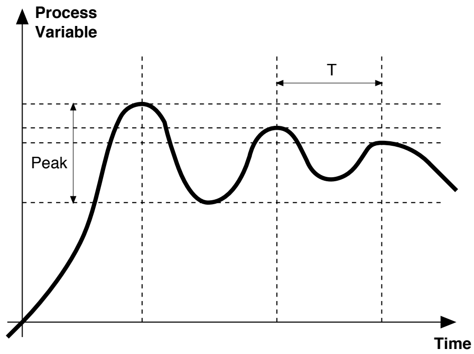
Influence of Proportional, Derivative and Integral actions on response of process under control

* An increase in P.B. reduces oscillations but increases deviation.
* A reduction in P.B. reduces the deviation but provokes oscillations of the controlled variable (the system tends to be unstable if P.B. value is too low).
* An increase in Derivative Action corresponds to an increase in Derivative Time, reduces deviation and prevents oscillation up to a critical value of Derivative Time, beyond which deviation increases and prolonged oscillations occur.
* An increase in Integral Action corresponds to a reduction in Integral Time, and tends to eliminate deviation between the controlled variable and the setpoint when the system is running at rated speed.

If the Integral Time value is too long (Weak integral action), deviation between the controlled variable and the setpoint may persist.
Contact GEFRAN for more information on control actions.

9 • MANUAL TUNING

A) Enter the setpoint at its working value.
B) Set the proportional band at 0.1% (with on-off type setting).
C) Switch to automatic and observe the behavior of the variable. It will be similar to that in the figure:

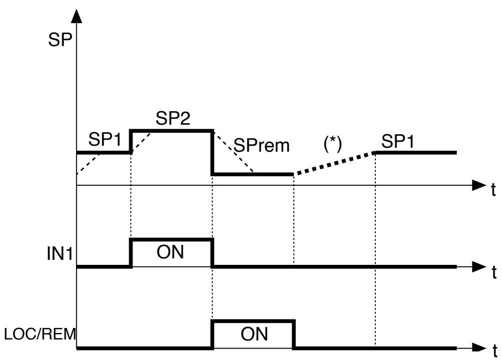


D) The PID parameters are calculated s follows: Proportional band

$$P.B. = \frac{\text{Peak}}{(\text{V max - V min})} \times 100$$

(V max - V min) is the scale range.
Integral time: It = 1.5 x T
Derivative time: dt = It/4
E) Switch the unit to manual, set the calculated parameters. Return to PID action by setting the appropriate relay output cycle time, and switch back to Automatic.
F) If possible, to optimize parameters, change the setpoint and check temporary response. If an oscillation persists, increase the proportional band. If the response is too slow, reduce it.

10 • MULTISET FUNCTION, SET GRADIENT



(*) if the set gradient is set

The multiset function is enabled in hd.1.
The gradient function is always enabled.
You can select between setpoint 1 and setpoint 2 with the faceplate key or with digital input.
You can display the setpoint 1-2 selection by means of LED.
SET GRADIENT: if set to ≠0, the setpoint is assumed equal to PV at power-on and auto/man switchover. With gradient set, it reaches the local setpoint or the one selected.
Every variation in setpoint is subject to a gradient.
The set gradient is inhibited at power-on when self-tuning is engaged.
If the set gradient is set to ≠0, it is active even with variations of the local setpoint, settable only on the relative SP menu.
The control setpoint reaches the set value at the speed defined by the gradient.

11 • SOFTWARE ON / OFF SWITCHING FUNCTION

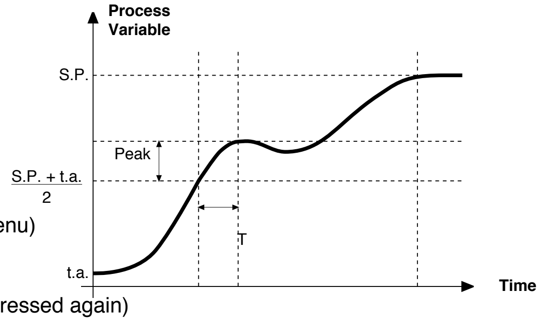
How to switch the unit OFF: hold down the “F” and “Raise” keys simultaneously for 5 seconds to deactivate the unit, which will go to the OFF state while keeping the line supply connected and keeping the process value displayed. The SV display is OFF.
All outputs (alarms and controls) are OFF (logic level 0, relays de-energized) and all unit functions are disabled except the switch-on function and digital communication.
How to switch the unit ON: hold down the “F” key for 5 seconds and the unit will switch OFF to ON. If there is a power failure during the OFF state, the unit will remain in OFF state at the next power-up (ON/OFF state is memorized).
The function is normally enabled, but can be disabled by setting the parameter Prot = Prot +16. This function can be assigned to a digital input (d.i.G) and excludes deactivation from the keyboard.

12 • SELF-TUNING

The function works for single output systems (heating or cooling). The self-tuning action calculates optimum control parameter values during process startup. The variable (for example, temperature) must be that assumed at zero power (room temperature).
The controller supplies maximum power until an intermediate value between starting value and setpoint is reached, after which it zeros power. PID parameters are calculated by measuring overshoot and the time needed to reach peak. When calculations are finished, the system disables automatically and the control proceeds until the setpoint is reached.

How to activate self-tuning:
A. Activation at power-on
1. Set the setpoint to the required value
2. Enable selftuning by setting the Stun parameter to 2 (CFG menu)
3. Turn off the instrument
4. Make sure the temperature is near room temperature
5. Turn on the instrument again

B. Activation from keyboard
1. Make sure that key M/A is enabled for Start/Stop selftuning (code but = 6 Hrd menu)
2. Bring the temperature near room temperature
3. Set the setpoint to the required value
4. Press key M/A to activate selftuning (Attention: selftuning interrupts if the key is pressed again)

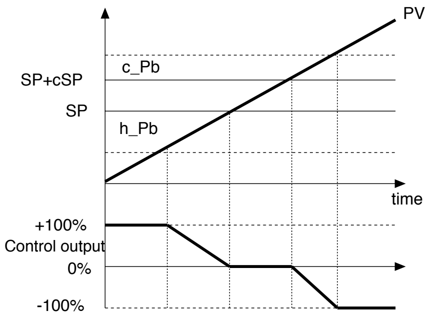


The procedure runs automatically until finished, when the new PID parameters are stored: proportional band, integral and derivative times calculated for the active action (heating or cooling). In case of double action (heating or cooling), parameters for the opposite action are calculated by maintaining the initial ratio between parameters (ex.: CPb = HPb * K; where K = CPb / HPb when self-tuning starts). When finished, the Stun code is automatically cancelled.
Notes :
-The procedure does not start if the temperature is higher than the setpoint (heating control mode) or if the temperature is lower than the setpoint (cooling control mode). In this case , the Stu code is not cancelled.
-It is advisable to eneable one of the configurable LEDs to signal selftuning status.By setting one of parameters
LED1, LED2, LED3=4 or 20 on the Hrd menu, the respective LED will be on or flashing when selftuning is active.

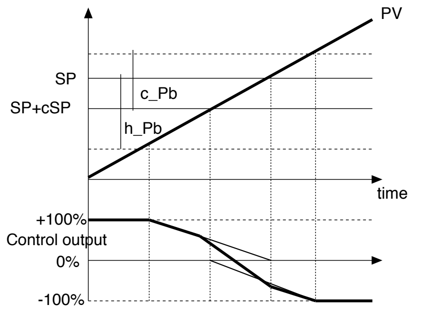
13 • AUTO-TUNING

Enabling the auto-tuning function blocks the PID parameter settings. It can be one of two types: permanent (continuous) or single-action (one-shot).
* Continuous auto-tuning is activated via the Stu parameter (values 1, 3, 5). It continuously reads system oscillations, immediately seeking the PID parameter values that reduce the current oscillation. It does not engage if the oscillations drop below 1.0% of the proportional band. It is interrupted if the set-point is changed, and automatically resumes with a constant set-point. The calculated parameters are not saved if the instrument is switched off, if the instrument is switched to manual, or if the configuration code is disabled. The controller resumes with the parameters programmed before auto-tuning was enabled. The calculated parameters are saved when the function is enabled from the digital input or from the A/M (start/stop) key if the procedure is interrupted.
* One-shot auto-tuning can be enabled manually or automatically. It is activated via the Stu parameter (as can be seen on the table, the values to be set depend on whether Self-tuning or Soft-start is enabled.). It is useful for calculation of PID parameters when the system is around the set-point. It produces a variation on the control output at a maximum of ± 100% of the current control power limited by h.PH - h.PL (hot), c.PH - c.PL (cold), and assesses the effects in timed overshoot. The calculated parameters are saved. Manual activation (Stu code = 8, 10, 12) via direct setting of the parameter or via digital input or via key. Automatic activation (Stu code = 24, 26, 28 with error band of 0.5%) when the PV-SP error exceeds the preset band (programmable to 0.5%, 1%, 2%, 4% of full scale).
NB: at power-up, or after a change of set-point, automatic activation is inhibited for a time equal to five times the integral time, with a minimum of 5 minutes. The same time has to run after one-shot.

14 • CONTROLS



Control output with proportional action only if proportional heating band overlaps proportional cooling band.



Control output with proportional action only if proportional heating band overlaps proportional cooling band.

PV = Process Value
SP+cSP = cooling setpoint
c_Pb = Proportional cooling band
SP = Heating Setpoint
h_Pb = proportional heating band

Heating/Cooling control with relative gain

In this control mode (enabled with Ctr = 14 parameter) the type of cooling has to be specified.
Cooling PID parameters are therefore calculated based on heating parameters according to the specified ratio.
(for example: C.ME = 1 (oil), H_Pb = 10, H_dt = 1, H_It = 4 implies: C_Pb = 12,5, C_dt = 1, C_It = 4)
We advise you to apply the following values when setting output cycle times:

Air	T Cool Cycle = 10 sec.
Oil	T Cool Cycle = 4 sec.
Water	T Cool Cycle = 2 sec.

NB.: Cooling parameters **cannot be modified** in this mode.

15 • PROGRAMMER CONFIGURATION

The instrument combines the functions of a controller and a single loop controller-programmer. The programmer function (parameter APP in Hrd = 2 / 3 / 4) lets you run a program as a set of steps.
Each step has two segments: a ramp and a hold. On the “PROG” menu, some parameters regard all of the steps (generic) and others are specific to single steps.

Generic parameters

“**Len**”	defines the number of programmer steps (2 or 3)
“**P.t.Y**”	configures mode and the type of restart after a stop, and includes enabling of the “Hold back band” and the selection of the time basis for the steps (hours/min or min/sec).
“**H.b.b**”	Hold back setpoint

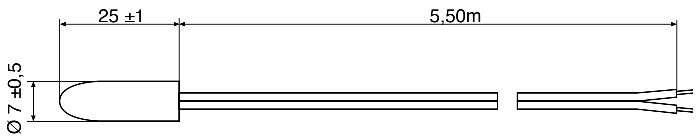
Parameters regarding single steps

Each step x is characterized by:

“S.P.x”	set point value
“r.t.x”	ramp time (excluding step 0, starting temperature)
“h.t.x”	hold time
“F.n.x”	enable fan output (can be assigned to only one output in steps 1 and 2)
“bu2”	enable buzzer (only for parameter APP = 3 / 4)

16 • ACCESSORIES

• PTC



• ORDER CODE

PTC 7 x 25   5m

TECHNICAL DATA

Mod. probe:	Ambient probe
Cap material:	Plastic (Ø 7 x 25mm)
Temperature range:	-20...80°C
PTC:	R 25°C = 1KΩ ±1% (KTY 81-110)
Response time:	20sec (in still air)
Isolation:	100MΩ, 500Vd.c. between cap and terminals
Wire material:	Unipolar in PVC (12/0,18)
Wire length:	5,50m

• RS232 / TTL interface for GEFRAN instrument configuration

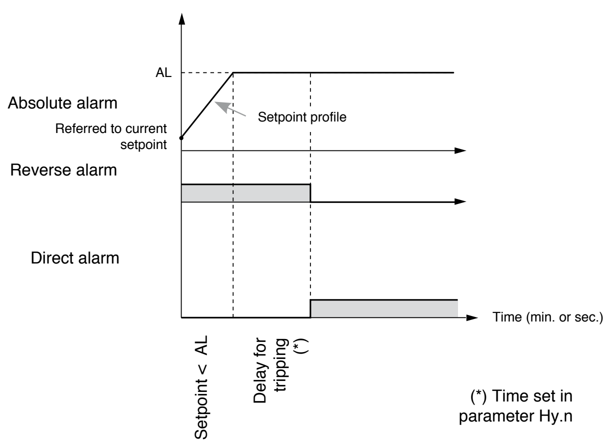
N.B. RS232 interface for PC configuration is supplied with the WINSTRUM programming software. Make connection with instrument powered but with inputs and outputs disconnected.

• ORDER CODE

WSK-0-0-0	Cable interface + CD Winstrum

17 • APPLICATIONS

• Twin setpoint application (ramp + hold + time expiration alarm)



ORDER CODE

F032998
600OF Model A
Description of variants
Output 1: relay
Ouput 2-3-4: relay
Aux Ouput: +15V, -15V
External keyboard

F032999
600 OF Model B
Description of variants
Output 1: logic
Output 2-3-4: relay
Aux Ouput: +15V, -15V
External keyboard

F033000
600 OF Model C
Description of variants
Output 1: logic
Output 2-3-4: relay
Aux Ouput: +15V, -15V
Serial RS485
Buzzer
External keyboard

F033001
600 OF Model D
Description of variants
Output 1: logic
Output 2-3-4: none
External keyboard

F033002
600 OF Model E
Description of variants
Output 1: logic
Output 2-3-4: relay
Digital input NPN (PNP)
External keyboard

F033003
600 OF Model F
Description of variants
Output 1: logic
Output 2-3-4: relay
Digital input NPN (PNP)
Serial RS485
RTC
External keyboard

F034009
600 OF Model G
Description of variants
Output 1: relay
Output 2-3-4: relay
Output 6: logic
External keyboard

F037470
600 OF Model H
Description of variants
Output 1: logic
Output 2: relay
Aux Output : +15V, -15V
External keyboard

• WARNINGS

⚠ WARNING: this symbol indicates danger. It is placed near the power supply circuit and near high-voltage relay contacts.

Read the following warnings before installing, connecting or using the device:
• follow instructions precisely when connecting the device.
• always use cables that are suitable for the voltage and current levels indicated in the technical specifications.
• the device has no ON/OFF switch: it switches on immediately when power is turned on. For safety reasons, devices permanently connected to the power supply require a two-phase disconnecting switch with proper marking. Such switch must be located near the device and must be easily reachable by the user. A single switch can control several units.
• if the device is connected to electrically NON-ISOLATED equipment (e.g. thermocouples), a grounding wire must be applied to assure that this connection is not made directly through the machine structure.
• if the device is used in applications where there is risk of injury to persons and/or damage to machines or materials, it MUST be used with auxiliary alarm units. You should be able to check the correct operation of such units during normal operation of the device.
• before using the device, the user must check that all device parameters are correctly set in order to avoid injury to persons and/or damage to property.
• the device must NOT be used in infiammable or explosive environments. It may be connected to units operating in such environments only by means of suitable interfaces in conformity to local safety regulations.
• the device contains components that are sensitive to static electrical discharges. Therefore, take appropriate precautions when handling electronic circuit boards in order to prevent permanent damage to these components.
***Installation*:** installation category II, pollution level 2, double isolation
• only for low power supply: supply from Class 2 or low voltage limited energy source
• power supply lines must be separated from device input and output lines; always check that the supply voltage matches the voltage indicated on the device label.
• install the instrumentation separately from the relays and power switching devices
• do not install high-power remote switches, contactors, relays, thyristor power units (particularly if “phase angle” type), motors, etc... in the same cabinet.
• avoid dust, humidity, corrosive gases and heat sources.
• do not close the ventilation holes; working temperature must be in the range of 0...50°C.
• surrounding air: 50°C
• use 60/75°C copper (Cu) conductor only, wire size range 2x No 22 - 14AWG, Solid/Stranded
• use terminal tightening torque 0.5N m
If the device has faston terminals, they must be protected and isolated; if the device has screw terminals, wires should be attached at least in pairs.
• *Power*: supplied from a disconnecting switch with fuse for the device section; path of wires from switch to devices should be as straight as possible; the same supply should not be used to power relays, contactors, solenoid valves, etc.; if the voltage waveform is strongly distorted by thyristor switching units or by electric motors, it is recommended that an isolation transformer be used only for the devices, connecting the screen to ground; it is important for the electrical system to have a good ground connection; voltage between neutral and ground must not exceed 1V and resistance must be less than 6Ohm; if the supply voltage is highly variable, use a voltage stabilizer for the device; use line filters in the vicinity of high frequency generators or arc welders; power supply lines must be separated from device input and output lines; always check that the supply voltage matches the voltage indicated on the device label.
• *Input and output connections*: external connected circuits must have double insulation; to connect analog inputs (TC, RTD) you have to: physically separate input wiring from power supply wiring, from output wiring, and from power connections; use twisted and screened cables, with screen connected to ground at only one point; to connect adjustment and alarm outputs (contactors, solenoid valves, motors, fans, etc.), install RC groups (resistor and capacitor in series) in parallel with inductive loads that work in AC *(Note: all capacitors must conform to VDE standards (class x2) and support at least 220 VAC. Resistors must be at least 2W)*; fit a 1N4007 diode in parallel with the coil of inductive loads that operate in DC.
GEFRAN spa will not be held liable for any injury to persons and/or damage to property deriving from tampering, from any incorrect or erroneous use, or from any use not conforming to the device specifications.