cod. 9IS44199-1
rel. 06/12 -EN-

EW 4800

UNIVERSAL CONTROLLERS
Temperature regulators and process controllers



Keys

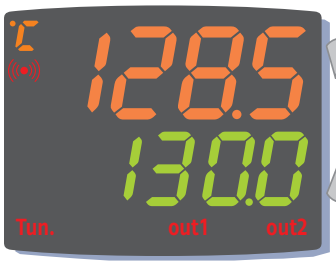
UP
Scrolls through menu items
Increases values
Programmable by parameter
(see par. H31)

DOWN
Scrolls through menu items
Decreases values
Programmable by parameter
(see par. H32)

fnc
Opens QuickStart menu
ESC (exit) function

set
Accesses the Setpoint
Opens the Programming Menu
Activates functions
Confirms commands

Display and Leds



Process value (PV):
Used to display the process value, and the labels of parameters, alarms and functions.

Set value (SV):
Used to display the setpoints, parameter values, function statuses, other statuses.

Tun Flashes when Autotuning is active; otherwise OFF; ON if "Autotuning at start-up" will not be activated the next time the device is switched on (see PID Regulator/ Autotuning); otherwise OFF;

S.Str ON if the Soft Start function is active; OFF in all other cases;

out1 - out2 ON when output active; otherwise OFF;
Flashes if there is a delay, a protection, or activation is blocked

aux ON for output active; otherwise OFF

Alarm ON if there is an alarm; otherwise OFF; flashes if an alarm is switched off;

°C/°F Indicates whether the temperature display is in °C or °F;
OFF for other units of measure

Setting the Setpoint

The following procedure is to be followed in order to set the 2 setpoint values in the device: SEt1 and SEt2



① When the initial display is present, press and release the Set key.

② The PV display shows label SEt1, and the SV display shows the current Setpoint value. Press the Set key again to display the Setpoint 2 in the same way.

③ The UP and DOWN keys can be used to change the Setpoint value shown on the SV display.

④ When the Set or "fnc" key is pressed, or the timeout has elapsed (15 sec), the new value appears and the initial display returns

Programming menu

The programming menu contains all the parameters needed for setting the device functions, and is divided into two levels user level and installer level:



• When the Set is pressed on the main display for 3 seconds, the user can access the Parameter Programming menu;
the USEr label appears, to indicate user level of the menu.

User level access:



• Indicated by label USEr press and release the Set key to open the folders containing the user level parameters

Installer level access (InSt):



• Indicated by label UsEr the UP and DOWN keys can be used to display the InSt label, which indicates the access point of the folders containing the installer level parameters. When InStis displayed, press and release the Set key

How to change the parameter values (in both levels):



• Press the UP and DOWN keys to scroll through all the user level folders and, on the desired folder, press the Set key to access the parameters in the folder (for example, the ALAr folder).



• When the Set key is pressed on the ALAr folder, the first parameter in the folder is displayed, as follows:
- PV display: parameter label (PAO)
- SV display: current parameter value (0)
The Set key can be used to scroll through all the parameters in the folder.



• To change the value of a displayed parameter, use the UP and DOWN keys. When the parameter has been set to the desired value, press "fnc", or allow the 15 second timeout to elapse, to save the new parameter setting.

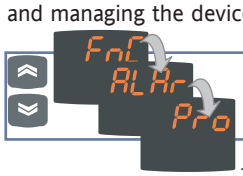


• Now press and release the "fnc" key to return to the previous display levels.

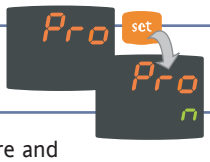
At any level of any of the menus, press the "fnc" key, or allow the 15 second timeout to elapse, in order to return to the previous menu level. The last value shown on the display will then be stored in memory.

QuickStart Menu

In the main menu, the “fnc” key can be pressed to open the QuickStart menu and access the special functions, which are useful for setting and managing the device, for example the Functions Folder and the Alarms Folder (if at least one alarm is present).



After pressing the “fnc” key, the UP and DOWN keys can be used to scroll through the folders in the menu



When a label is selected, the Set key can be pressed to access the corresponding folder.

The following is a description of the menu structure and the functions in the individual folders:

Functions Folder

On the FnC label, the Set key can be pressed to access the functions.



The label will be displayed, with the current status of the function.
To scroll through the available functions, use the Set key.



To change the status of a function, use the UP and DOWN keys.

Function	Label function	Status of default	Key	Indication function active
Soft Start	SStr	ON	1	LED S.Str ON
Stand-by	Stnb	OFF	5	/
Autotuning*	Auto	OFF	7	LED Tun flashing
Start work cycles/sequences**	StEP	OFF	8	/
Reset work cycles/sequences***	rStS	OFF	-	/
Reset PID*	rStP	OFF	-	/

Notes
* function visible if H01=2-3-7-8-9-10-11
** If pressed during a work cycle, the device goes into STOP status. In this status, the cycle time must stop and be re-started by a START command.
*** Visible only if work cycles have been enabled. When pressed, the cycle is reset and the device is brought into the STOP position.

Alarms Folder*

On the ALAr label, press Set to access the alarms folder.
This folder contains all the alarms managed by the device.

If no alarms are present, the folder does not appear in the menu.



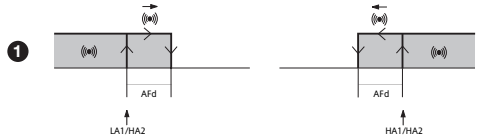
If there are alarms present, the UP and DOWN keys can be used to scroll through and display them

* Appears only if at least one alarm is present.

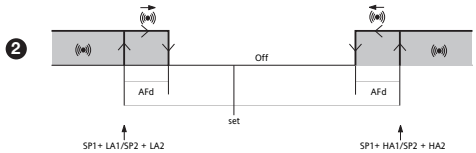
LABEL	CAUSE	EFFECTS*	Problem solving
E1	• measured values are outside the nominal range • regulating probe faulty/ short-circuited/open	Label E1 shown on main display but not in the ALAr folder;	• check the probe wiring • replace probe
HA1	value read by probe > HA1/2 after time “tAO”. (see “ALARMS MIN MAX” diagram and description of parameters “HA1/2” and “Att” and “tAO”)	Alarm created in the ALAr folder through label HA1/ HA2	Wait for the temperature value read by the probe to come back below HA1/2-AFd
LA1	value read by probe < LA1/2 after time “tAO”. (see “ALARMS MIN MAX” diagram and parameters “LA1/2” and “Att” e “tAO”)	Alarm created in the ALAr folder through label LA1/ LA2	Wait for the temperature value read by the probe to come back above LA1/2-AFd
tOA	Autotuning cycle aborted within AtO time out	Autotuning is blocked Label tOA shown on SV display Autotuning is blocked	Press ‘set’ button to restore the normal display
nOC	Autotuning cycle failure before time out	Autotuning is blocked Label nOC shown on SV display	

MAX- MIN ALARMS

Absolute temperature value (par “Att”=0) Abs(olute)



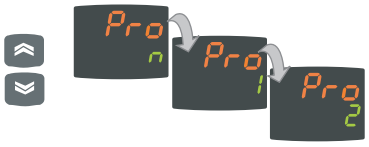
Temperature relative to Setpoint value (par “Att”=1) rEL(ative)



	Absolute temperature value (par “Att”=0) Abs(olute)	Temperature relative to Setpoint value (par “Att”=1) rEL(ative)
Minimum temperature alarm	Temperature less than or equal to LA1/2 (LA1/2 with sign)	Temperature less than or equal to set+LA1/2 (LA1/2 positive only)
Maximum temperature alarm	Temperature greater than or equal to HA1/2 (HA1/2 with sign)	Temperature greater than or equal to set+HA1/2 (HA1/2 positive only)
Returning from minimum temperature alarm	Temperature greater than or equal to LA1/2+AFd	Temperature greater than or equal to set + LA1/2 + AFd set -|LA1/2|+AFd
Returning from maximum temperature alarm	Temperature less than or equal to HA1/2-AFd	Temperature less than or equal to set+HA1/2-AFd
		if Att=reL(ative) LA1/2 must be negative: therefore, set+LA1/2<set since set+(-|LA1/2|)=set-|LA1/2|

Programs Folder

The unit can be used to program 2 different sequences, each with 8 steps; the individual steps can be set in the StEP folder in the parameter setting menu. (see “STEP Folder” on page 3)
The Pro folder can be opened and the desired steps in the 2 possible sequences (programs) can be set by pressing the Set key.





When the desired program has been set, it can be activated by selecting the special StEP function in the Functions folder.

To indicate that a program is running, the display on the device shows SV and the current step, from first (Step 0) to last (Step 7).

Copy Card

The Copy Card is an accessory which, when connected to the TTL serial port, allows quick programming of the device parameters (upload and download of a parameter map to or from one or more devices of the same type). The upload (label UL), download (label dL) and key formatting (label Fr) operations are performed as follows:



• The FPr folder, located in the USEr level of the programming menu, contains the commands necessary for using the Copy Card. Press Set to access the functions.



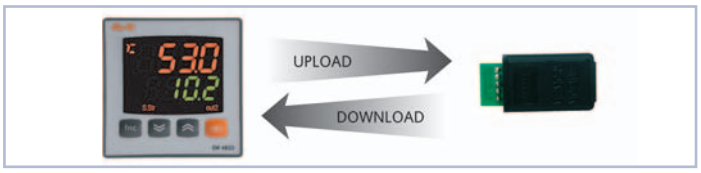
• Scroll with the UP and DOWN keys to find the desired function. Press the Set key and the desired function (upload, download or formatting) will be carried out.



• If the operation is successful, the display shows y; otherwise, it shows n.

Download reset: Connect the key with the device OFF. When the device is switched on, the programming parameters are loaded into the device; After the lamp test, the display shows the following for about 5 seconds:

• label dLY, if the operation is successful
• label DLn otherwise.



NOTES:

• after the reset download operation, the device will operate with the settings in the map that has been newly loaded.
• see folder FPr, “Parameters” on page 4-5
• Connect Copy Card with “MEMORY MODULE” label upside”

Passwords

Passwords can be set to limit the accesses to each parameter management level. The two different passwords can be activated by setting parameters PA1 and PA2 in folders “diSP” (PA1 at USEr level and PA2 at InSt level). The password is enabled if the value of parameter PA1/PA2 is different from 0.



• To access the “Programming” menu, hold down the “set” key for more than 5 seconds”. If it has been set, the PASSWORD will be requested; press Set again.



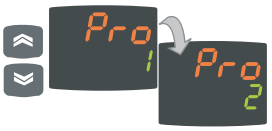
• If activated (value different from 0), password PA1 must be entered. Carry out this operation by selecting the correct value using the UP and DOWN keys, then confirm by pressing the Set key.

If the password entered is incorrect, the device displays label PAS1 again and the operation must be repeated.

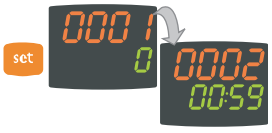
Password PAS2, for the InSt level, works in the same way as password PAS1.

STEP Folder

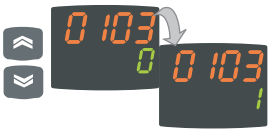
Only Installer level (InSt) shows the StEP folder, which can be used to store two working programs, each consisting of up to 8 steps; 9 parameters must be set for each step. The operations for setting these parameters correctly are described below.
Press and release the Set key on the StEP folder label to access the folder:



• Use the UP and DOWN keys to select one of the two programs available, and press Set on either 1 or 2.

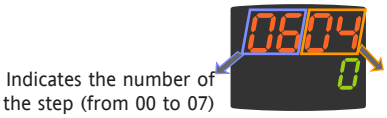


• The first parameter (01), corresponding to the first step (00) is then displayed; use the Set key to scroll through the parameters.



• To change the value of a parameter, use the UP and DOWN keys.

Each label is made up of 4 digits, which indicate the step and the number of the parameter it contains:



Indicates the number of the step (from 00 to 07)

Indicates the number of the parameter (from 01 to 09)

To exit from any level of the StEP folder, simply press the “fnc” key, or allow the 15 second timeout to elapse.

Parameter Description - Parameters Table

0x01 Step activation delay. Defines the delay at which the step is activated after starting.
If it is the first step in the program, it is activated by the “Start process” key
During the delay time, the working set is the one defined by Fine Step mode.

0x02 Step duration. Defines the length of time of the step: expressed in hours/minutes;
if set a - - - indicates that the step ends when a temperature is reached.

0x03 Length of time from start, or from when Setpoint is reached. Defines whether step duration is to be calculated from when the step started (value 0), or from when the Setpoint (value 1) is reached within the step.

0x04 Setpoint step. Defines the regulation set for the step.

0x05 Regulator active. Indicates which regulator is active in the step:
On1=on/off1; On2=on/off2; Ne=neutral zone; Cyc=cyclic;
PH=Pid heating; PC=Pid cooling; PHC=Pid heating/cooling;

0x06 Enable/disable Soft Start. Indicates whether the Soft Start function is enabled during the step.

0x07 AUX relay mode. Indicates a mode for the AUX relay, if configured, during the the step between ON, OFF and Duty Cycle

0x08 Fine step mode. Indicates the way in which the step ends; any of the following can be selected:
1= end program; 2*=go to next step, maintaining the current setpoint;
3*=go to next step waiting for the new set point (unregulated);
4=go back to start of sequence; 5=go back to sequence No. xx; 6=infinite duration, maintaining the setpoint

0x09 Go back to sequence No.xx. indicates the sequence number to go back to. This parameter has a value only if parameter 0x08 is set to 5.

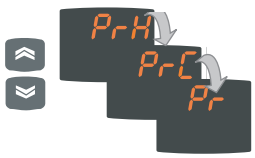
StEP Folder Parameters - Prog 1/2

Par.	Range	default*	U.M.	Level
0x01	0...99:59	0	h/min	Inst
0x02	0...99:59	00:59	h/min	Inst
0x03	0...1	0	flag	Inst
0x04	-328...2910	0	°C/°F	Inst
0x05	On1/On2/ Ne/CyC/ PH/ PC/ PHC	On1	num	Inst
0x06	0...1	0	flag	Inst
0x07	0...1	0	flag	Inst
0x08	1...7	2	num	Inst
0x09	0...7	0	num	Inst

* NOTE: The values 2 and 3 are disabled only for parameter 0708, therefore the setting of values 2 and 3 is not possible for this parameter.

Dynamic Parameter Folders

The two folders Pid and Aut are visible only if the device has been set for PID regulation, i.e. if parameter H01 is equal to 2-3-7-8-9-10-11. These folders can be navigated along with their subfolders, and there is a procedure for saving values when exiting from these subfolders. How to navigate inside the two Pid and Aut dynamic parameter folders is described below:



Press the Set key on the Pid label the label of the first subfolder PrH is displayed. Scroll through the subfolders using the UP and DOWN keys.



Press the Set key on the desired subfolder to access the parameters. To scroll through the parameters, use the Set key, and to change a value, use the UP and DOWN keys.



When exiting the subfolders using the “fnc” key, or after the 15 second timeout has elapsed, the user will be asked whether to save any changes that have been made.



Use the UP and DOWN keys to select y (save changes) or n (not to save changes), then press Set to exit the folder.

PARAMETERS TABLE

Par.	Range	default	U.M.	Level
SP1	0...99:59	0.0	°C/°F	/
SP2	0...99:59	0.0	°C/°F	/
Regulator 1 - label rE1				
OS1	-30.0...+30.0	0	°C/°F	Inst
db1	0.0...+30.0	1.0	°C/°F	USEr/Inst
dF1	-30.0...+30.0	-1.0	°C/°F	USEr/Inst
HS1	LS1...HdL	800.0	°C/°F	USEr/Inst
LS1	LdL...HS1	-200.0	°C/°F	USEr/Inst
HA1	LA1...2910.0	2910	°C/°F	USEr/Inst
LA1	-328.0...HA1	-328	°C/°F	USEr/Inst
dn1	0...255	0	sec	Inst
do1	0...255	0	min	Inst
di1	0...255	0	min	Inst
dE1	0...255	0	sec	Inst
On1	0...255	0	min	Inst
OF1	0...255	1	min	Inst
Regulator 2 - label rE2				
OS2	-30.0...+30.0	0	°C/°F	Inst
db2	0.0...+30.0	1.0	°C/°F	USEr/Inst
dF2	-30.0...+30.0	-1.0	°C/°F	USEr/Inst
HS2	LS2...HdL	800.0	°C/°F	USEr/Inst
LS2	LdL...HS2	-200.0	°C/°F	USEr/Inst
HA2	LA2...2910.0	2910	°C/°F	USEr/Inst
LA2	-328.0...HA2	-328	°C/°F	USEr/Inst
dn2	0...255	0	sec	Inst
do2	0...255	0	min	Inst
di2	0...255	0	min	Inst
dE2	0...255	0	sec	Inst
On2	0...255	0	min	Inst
OF2	0...255	1	min	Inst
Reg. PID - Pid (1)				
Regulator PID - Pr				
run	0...1	1	flag	USEr/Inst
dut	-100...100	0	num	USEr/Inst
tun	HEA/COO	HEA	flag	USEr/Inst
ASP	0...999.9	0	°C/°F	USEr/Inst
PrS	0...999.9	5.0	°C/°F	Inst
PrAt	0...200	100	num	Inst
Pid Heating - PrH*				
bP	0.1...999.9	10.0	°C/°F	USEr/Inst
ti	0...9999	100	sec	USEr/Inst
td	0...9999	25	sec	USEr/Inst
OSr	0...200	100	num	Inst
SLO	0...SHi	0	num	Inst
SHi	SLO...100	100	num	Inst
PEd	PEL...999	15	sec	USEr/Inst

Par.	Range	default	U.M.	Level
PEL	0.1...999	4	sec	Inst
Fun	P/Pi/Pd/Pid/ PidF	Pid	num	USEr/Inst
AHr	0.0...999.0	0.5	°C/°F	Inst
Pid Cooling - Prc**				
bP	0.1...999.9	10.0	°C/°F	USEr/Inst
ti	0...9999	100	sec	USEr/Inst
td	0...9999	25	sec	USEr/Inst
OSr	0...200	100	num	Inst
SLO	0...SHi	0	num	Inst
SHi	SLO...100	100	num	Inst
PEd	PEL...999	15	sec	USEr/Inst
PEL	0.1...999	4	sec	Inst
Fun	P/Pi/Pd/Pid/ PidF	Pid	num	USEr/Inst
AHr	0.0...999.0	0.5	°C/°F	Inst
label AnOu(2) * **				
AOL	020/420/001/ 005/010	020	num	USEr/Inst
AOF	rO/Er/cPH/ cPc/diS	rO	num	USEr/Inst
AOS	Aon/AoF	AoF	flag	USEr/Inst
LAO	LdL...HdL	0	num	USEr/Inst
HAO	LdL...HdL	100.0	num	USEr/Inst
STEP (3)				
Pro 1	program 1 parameters			Inst
Pro 2	program 2 parameters			Inst
SFt				
dSi	0...25	0	°C/°F	Inst
Std	0...255	1	h/m/s	Inst
unt	0...2	1	num	Inst
SEn	0...3	0	num	Inst
Sdi	0...30	0	°C/°F	Inst
cLc				
Con	0...255	0	min	Inst
CoF	0...255	0	min	Inst
ALAr				
Att	AbS/rEL	AbS	flag	Inst
AFd	1...50	2	°C/°F	Inst
PAO	0...10	0	h	USEr/Inst
SAO	0...24	0	h	USEr/Inst
tAO	0...255	0	min	USEr/Inst
AOP	nC/nO	nO	flag	Inst
tP	n/y	n	flag	Inst

Par.	Range	default	U.M.	Level
Add				
PtS	n/y	n	flag	USEr/Inst
dEA	0...14	0	num	USEr/Inst
FAA	0...14	0	num	USEr/Inst
PtY	n/E/o	n	num	USEr/Inst
StP	1b/2b	1b	flag	USEr/Inst
diSP				
LOC	n/y	n	flag	USEr/Inst
PA1	0...999	0	num	USEr/Inst
PA2	0...999	0	num	Inst
ndt	n/y	y	flag	USEr/Inst
CA1	-30...30	0	°C/°F	USEr/Inst
CAi	0...2	2	num	Inst
LdL	-328...HdL	0.0	°C/°F	Inst
HdL	LdL...2910.0	999.9	°C/°F	Inst
dro	0...1	0	flag	USEr/Inst
CnF				
H00	ntc/Ptc/Pt10/ tcJ/tcH/tcS/ tcr/tct/Pt1	Pt1	flag	USEr/Inst
H01 configuration: see table at page 6/9				
H01	0...11	4	num	Inst
H02	0...15	5	sec	Inst
H06	n/y	y	flag	Inst
H08	0...2	2	num	Inst
H10	0...255	0	num	USEr/Inst
H21	0...4	0	num	Inst
H22	0...4	0	num	Inst
H31	0...9	9	num	Inst
H32	0...8	0	num	Inst
rEL	/	/	num	USEr/Inst
tAb	/	/	num	USEr/Inst
FPr				
UL	/	/	/	USEr/Inst
dL	/	/	/	USEr/Inst
Fr	/	/	/	USEr/Inst

NOTES:
(1) Folder visible if H01= 2-3-7-8-9-10-11.
(2) Folder present only in models equipped with an analog output
(3) see paragraph ”STEP Folder” on page 3

* These subfolders are visible only if H01=2-7-8-10
** These subfolders are visible only if H01=3-7-9-11
*** Folder AnOu is visible in models equipped with an analog output

SP1/SP2 Setpoint 1/2 Control Setpoint

REGULATOR 1/2 (folder with label "rE1"/"rE2")

OS1/OS2 Offset Setpoint 1/2. Temperature value to be added arithmetically to the Setpoint if a reduced set is enabled; it cannot have a 0 value.

db1/db2 Response band above Setpoint 1/2

dF1/dF2 Setpoint 1/2 differential band. With negative sign Hot operation; with positive sign, Cold operation. If dF1=0 goes back above SP1/2, dF1=db1

HS1/HS2 Maximum value that can be assigned to setpoint 1/2.

LS1/LS2 Minimum value that can be assigned to setpoint 1/2.

HA1/HA2 Maximum temperature alarm. Temperature limit (the relative or absolute status of this value is controlled by "Att", present in the installer menu, folder ALAr), beyond which the alarm is activated.

LA1/LA2 Minimum temperature alarm. Temperature limit (the relative or absolute status of this value is controlled by "Att", present in the installer menu, folder ALAr) below which the alarm is activated.

dn1/dn2 Delay after which regulator 1/2 is started. The delay time indicated must elapse between the request for activation of the regulator relay and switch-on.

do1/do2 Delay time after switching off. The delay time indicated must elapse between deactivation of the regulator relay and the next switch-on.

di1/di2 Delay between switch-ons. The delay time indicated must elapse between two consecutive switch-ons of the regulator.

dE1/dE2 Switch-off delay. The delay time indicated must elapse between the request for deactivation of the regulator relay and switch-off. NOTE: for parameters dn1/2, do1/2, di1/2, dE1/2, 0= not active

On1/On2 Switch-on time for regulator if probe faulty. If set to "1" with Of1/2 at "0", the regulator remains on continuously, and with Of1/2 >0, it operates in Duty Cycle mode. See the Duty Cycle diagram.

OF1/OF2 Regulator switch-off time if probe faulty. If set to "1" with On1/2 at "0", the regulator remains off continuously, and with On1/2 >0 it operates in Duty Cycle mode. See the Duty Cycle diagram.

PID REGULATOR (folder with label "Pid")

(folder visible only if H01=2-3-7-8-9-10-11)

PID regulator, common parameters heating/cooling (subfolder with label Pr)

run Manual or automatic mode selection: 0=manual; 1=automatic;

dut PID Duty Cycle in manual mode.

tun Hot/cold Autotuning selection; 0=hot, 1=cold; IMPORTANT:parameter visible only if H01=7;

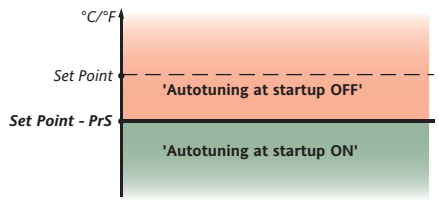
ASP Autotuning activation band at change of setpoint. This parameter defines the following temperature interval:

Setpoint - ASP ... Setpoint + ASP

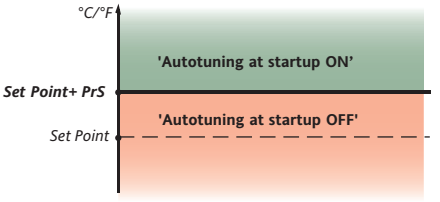
If the setpoint changes and the new value is outside this interval, a new autotuning cycle will be activated

PrS Autotuning safety band when device is switched on Sets a switching on temperature interval within which Autotuning will not be activated. The limits of this interval vary in accordance with the Autotuning mode (hot or cold) selected (see tun parameter).

If tun = 0 (Autotuning in 'Hot' mode)
Autotuning at startup is only activated if the recorded temperature is lower than the Setpoint - PrS (see diagram)



If tun = 1 (Autotuning in 'Cold' mode)
Autotuning at startup is only activated if the recorded temperature is higher than the Setpoint - PrS (see diagram)



PrAt Hot/cold power ratio after hot autotuning
At the end of hot actuator Autotuning the 'cold' proportional band is adjusted in accordance with the formula:

bP(C)=bP(H) x 100/PrAt

This allows balancing between the 'hot' and 'cold' actuators

PID heating regulator (subfolder with label PrH)/ PID cooling regulator (subfolder with label PrC)

bp PID proportional band

ti Total PID time; OFF if =0

td derivative time

OSr Reduction in PID overshooting (the lower the OSr value, the smaller the overshoot)

Fun PID regulator selection
0=P; 1=Pi; 2=Pd; 3=Pid; 4=Pid "fast"
Note: Values 1...3 are not recommended for use with relays

AHr relay hysteresis in Autotuning

SLO minimum output saturation

SHi maximum output saturation

PEd Output activation/deactivation cycle duration
Value (in seconds) expressing the fixed period of time which must elapse between 2 successive output activations

PEL Minimum output activation/deactivation cycle duration; defines the minimum value of the PEd parameter

AHr relay hysteresis in Autotuning

CONFIGURATION OF ANALOG OUTPUT (folder with label "AnOu")

AOL Analog output mode:
020=0...mA; 420=4...20mA;
001=0-1V; 005=0-5V; 010=0-10V;

AOF Analog output mode:
dis=output disabled;
ro=read out, output proportional to probe reading, within the range set by parameters LAO and HAO
Er=error, output proportional to error between setpoint 1 and the value read on the probe, within the error range specified by the parameters LAO and HAO
cPH= PID Hot control variable, output proportional to the percentage power output, if PID Hot is selected.
cPC= PID control variable, output proportional to the percentage power output, if PID Cold is selected.

AOS Analog output mode if probe faulty:
Aon=analog output ON; AoF=analog output OFF;

LAO Analog output minimum limit*

HAO Analog output maximum limit*

* Warning: do not change the default values in the event of PID regulation

PROGRAM 1/2 PARAMETERS FOLDER

(folder with label "StEP")
Program 1/2 parameters subfolder
Inside folder StEP there are 2 subfolders that contain the parameters that make up the steps in each program. It is possible to set 2 different programs, each with 8 steps and each step made up of 9 parameters. see "STEP Folder"

SOFT START REGULATOR (folder with label "SFt")

see "Soft Start"

dSi Soft Start regulator step value

Std Duration of step for Soft Start regulator (unit of measurement defined by unt)

unt Unit of measurement for step duration (defines the unit of measurement for Std): 0=hours; 1=minutes; 2=seconds;

SEn Regulator selection for Soft Start function. Determines the regulator on which the Soft Start function is to be enabled.
0=disabled; 1=enabled on regulator 1;
2=enabled on regulator 2 3=enabled on regulators 1 and 2;

Sdi Automatic return band for Soft Start function

CYCLIC REGULATOR (folder with label "cLc")

see "Cyclic Regulator", page 7

Con ON time for cyclic regulator output

CoF Off time for cyclic regulator output

ALARM REGULATOR (folder with label "ALAr")

Att Modes of parameters HA1/HA2 and LA1/LA2:
Abs=absolute; rEL=relative;

AFd Alarm differential

PAO Alarm exclusion time after the device is switched on, following a power failure.

SAO Timeout for "set point not reached" alarm indication

tAO Time delay for temperature alarm indication.

AOP Alarm output polarity: nc=normally closed; no=normally open;

tP Silence alarm.
y= yes. Silence the alarm by pressing one of the four keys. n= no

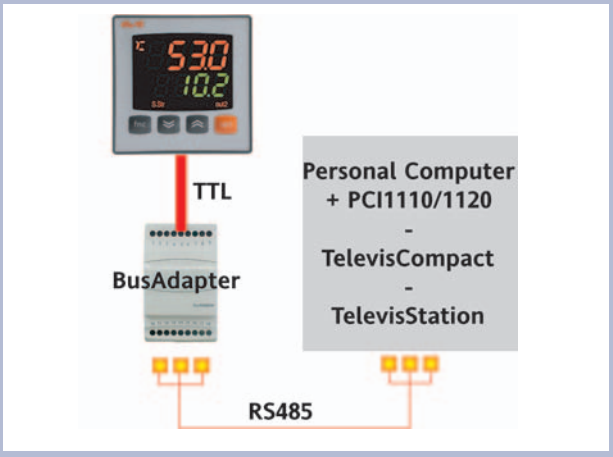
COMMUNICATION (folder with label "Add")

PtS Protocol selection: t=Televis; d=Modbus
dEA index of the device within the family (valid values from 0 to 14)
FAA device family (valid values from 0 to 14)
The pair of values FAA and dEA represents the network address of the device and is indicated in the format "FF.DD" (where FF=FAA and DD=dEA).
PtY Modbus parity bit: n=none; E=Even; o=odd;
StP Modbus stop bit: 1b=1 bit; 2b=2 bit;

DISPLAY (folder with label "diSP")

LOC Keyboard lock (set and keys). It is still possible to go into parameter programming and modify the parameters, including this one, in order to allow keyboard unlocking. y = yes; n = no.
PA1 Password 1. When enabled (value other than 0), this is the access key to the user level parameters (USEr).
PA2 Password 2. When enabled (value other than 0), this is the access key to the installer level parameters (inSt).
ndt Format with decimal point. y = yes; n = no.
CA1 Calibration 1. Positive or negative temperature value added to the value read from probe 1, according to the setting of parameter "CA"
CAi Calibration operation:
0=sum with displayed temperature only;
1=sum with only the temperature used by the regulators; not for the display, which remains unchanged;
2=sum with the displayed temperature, which is also used by the regulators;
LdL Minimum value that can be displayed by the device.
HdL Maximum value that can be displayed by the device.
dro Selection of °C or °F for displaying the temperature read from the probe. 0 = °C, 1 = °F.
PLEASE NOTE: if °C is changed to °F or vice versa, the values for setpoint, differential, etc., are not changed. (for example, set=10°C becomes 10°F)

TELEVIS SYSTEM & MODBUS



The device can be connected to Televis remote control systems through a TTL serial port (use TTL- RS interface module 485 BUS ADAPTER 150) or, in models where provided for (EW4821), by means of direct RS485 connection. To configure the device for this purpose, open the folder identified by the "Add" label and use parameters "dEA" and "FAA".

CONFIGURATION PARAMETERS (folder with label "CnF")

H00 Selection of probe type:
ntC=Ntc; PtC=Ptc; Pt10=Pt1000; tcJ=tcJ; tcH=tCK; tcS=tcS; tcr=tcr; tct=tct; Pt1=Pt100;

H01 Configuration of regulators:

H01	Description	OUT1	OUT2
0	free	H21	H22
1	ON/OFF	H/C	H22
2	PID Heating	H	H22
3	PID Cooling	C	H22
4	two independent ON/OFFs	H/C	H/C
5	two related ON/OFFs	H/C	H/C
6	neutral zone	H/C	H/C
7	PID Heating-Cooling	H	C
8	PID Heating-O/OFF	H	H/C
9	PID Cooling-ON/OFF	C	H/C
10	PID Heating-Alarm	H	Alarm
11	PID Cooling-Alarm	C	Alarm

H02 Activation time for keyboard functions. For the ESC, UP and DOWN keys, which are configured with a second function, a time is set for activation of the second function. One exception is the AUX function, which has a fixed delay of 0.5 sec.
H06 Key or aux/light digital input active with the device OFF:
0=n=not active; 1=y=active;
H08 Stand By mode:
0= Only display switches off.
1= Display on, control devices and alarms off.
2= Display off, control devices and alarms off.
3= PV display with label OFF and control devices off.
H10 Delay for output activation after Power On; Minimum delay time for connection of utilities in the event of restart after a power failure;
H21* Configurability of digital output 1:
0=disabled; 1=alarm; 2=cyclic; 3=aux/light;
4=stand-by; 5=not used;
H22* Configurability of digital output 2: Same as H21
* see table of H01 parameter
H31 Configurability of UP key:
0=disabled;
1=activates/deactivates soft start;
2=activates/deactivates OSP;
3=activates/deactivates cyclic regulator;
4=activates/deactivates aux output;
5=activates/deactivates stand-by;
6=not used;
7=activates/deactivates autotuning;
8=activates/deactivates step control;
H32 Configurability of DOWN key: Same as H31
rEL Device version. read-only parameter.
tAb Reserved. Read-only parameter.

COPY CARD (folder with label "Fpr")

see "Copy Card", page 3

UL UpLoad: transfer parameters from device to CopyCard.
dL downLoad: transfer parameters from Copy Card to device.
Fr Format. Erase all data entered in the key.

Description of Regulators

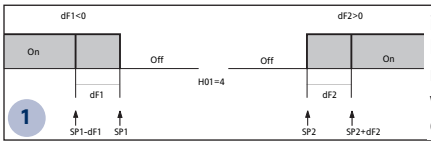
Regulator On/Off

The device has two ON/OFF type regulators that can be configured by the user through the H01 parameter:

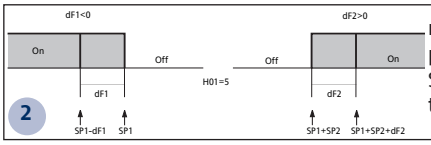
- H01=4, 5 threshold regulator
- H01=5 regulator with window

dF1<0	dF2>0	H01	regulation type
hot	cold	4	independent setpoints
hot	cold	5	relative setpoints
-	-	6	Neutral Zone (or window)

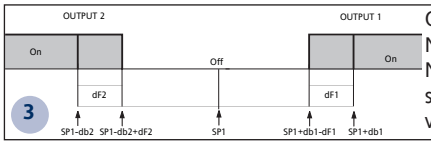
NOTE: examples with dF1<0 ((hot) and dF2>0 (cold)



independent ON-OFF regulation plan. The two outputs regulate as though they were completely independent of each other



relative ON-OFF regulation plan.
Setpoint SP2 regulates relative to SP1



ON-OFF regulation plan with Neutral Zone (or window).
NOTE: if both dF1 and dF2 are set to 0, the outputs are deactivated when SP1 is reached

PID Regulator / Autotuning

The PID regulator is available as an alternative to the on/off regulator, if greater control precision is required.

Enabling:
The PID regulator is enabled if:

- H01 = 2-3-7-8-9-10-11 (see Parameters, folder CnF)

This setting of parameter H01 enables displaying of the Pld and Aut folders in the parameter Programming Menu.

Parameter settings:
It is also necessary to set the run parameter. This parameter is used to select the regulating mode: manual* (Duty Cycle) or automatic (PID). The run parameter is therefore set to =1.

The device is now enabled for PID regulation; the Pld folder can be seen in the Programming Menu and the parameters contained within it can be modified in order to improve regulating performance: these parameters can also be modified automatically using the Autotuning function.

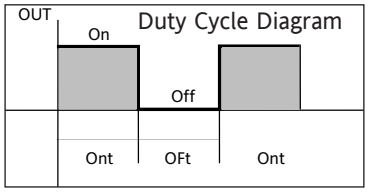
* if manual regulation (run=0) is selected, the dut activation percentage must be set (see 'Parameters'). Then set the period divided with the Duty Cycle, using the PEd parameter (see 'Parameters')

Mode setting:
If parameter H07 is set to 7 (PID hot-cold regulation), Autotuning must be carried out twice: once for cold and once for hot.
In this mode, the tun parameter is also visible in the PA subfolder located in the Aut folder; this parameter is used to select the Autotuning mode: hot (tun=0)/cold (tun=1).
To carry out autotuning in PID hot-cold mode (H01=7), therefore, proceed as follows:

- set H01=7
- set tun=0
- activate the Autotuning function in the Functions Folder
- wait for the Autotuning function to be performed
- set tun=1
- activate the Autotuning function in the Functions Folder

Autotuning
The setting of the PID regulation parameters can be simplified using the Autotuning function, which can calculate the PID parameters automatically.
Every time the device is switched on, an "Autotuning at startup" cycle is activated. Once "Autotuning at startup" has been completed, the PID parameter values are calculated automatically, in accordance with the conditions detected by the system; the 'Tun' LED on the display flashes to indicate this phase is in progress (see Display and LEDs).
The "Autotuning at startup" function is deactivated in 2 cases:
1. if the temperature detected at startup is outside the band established using the PrS parameter (see description in paragraph PrS)
2. if the function is deactivated using a key: the function associated with the UP key (see paragraph H31) can be used to select Autotuning activation/deactivation the next time the device is switched on. If the Autotuning at startup function is activated, the Tun LED will be switched off. If, on the other hand, the
Autotuning at startup function is not activated, the Tun LED remains lit steadily and the usual Autotuning cycle will not take place the next time the device is switched on.
Once the Autotuning at startup cycle is complete, the PID is correctly configured. However, further autotuning cycles may be activated if the operating conditions change. Autotuning can be activated manually through the dedicated function in the Functions folder (see Quick Start Menu), or using a suitably configured key (see parameter H31, H32).
EW4800 also offers automatic Autotuning activation in the event of significant Setpoint variations during regulation: this function can be set through suitable configuration of the ASP parameter (see description in paragraph ASP).
The 'Tun' LED on the display flashes to indicate every Autotuning cycle in progress.

Outputs protection



An error condition in the probe causes one of the following actions:

- code E1 is shown on the display
- the regulator is activated as indicated by parameters On1/On2 and OF1/OF2 if set for Duty Cycle

On1/On2	OF1/OF2	Compressor output
0	0	OFF
0	>0	OFF
>0	0	ON
>0	>0	dc

parameters On1/On2, OF1/OF2 set for Duty Cycle

Auxiliary Regulator

This function is used to energise the relay (parameters H21(22)=4) if it was de-energised, or vice versa. The relay status is stored in order to maintain correct operation in the event of a power failure.

Soft Start

NOTE: The SOFT START function can be selected by key, or by a function.
The Soft Start regulator can be used to set the temperature gradient over which a given setpoint is reached within a predefined time.
With this function, the regulation Setpoint is raised progressively and automatically from value Ta (ambient temperature when switched on) to the value actually set on the display; this allows the initial temperature rise to be slowed down and thus reduce the risk of "overshoot".

Cyclic Regulator

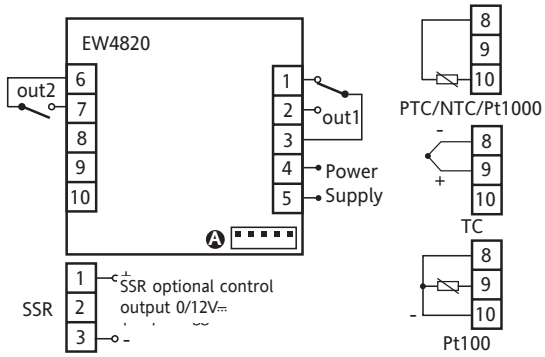
NOTE: The PERIODIC CYCLE function can be selected by key
This function can be associated with both the outputs by relay (by setting parameters H21, H22 to 2), and can be used to actuate "Duty Cycle" regulation with the intervals set by parameters Con and CoF.

TECHNICAL DATA EW4820

Front protection	IP65
Container	PC+ABS plastic resin body PC+ABS UL94 V-0
Dimensions	front 48x48 mm, depth 113mm
Mounting	and panel with 45x45mm drilling template
Usage temperature	-5°C...55°C
Storage temperature	-20°C...85°C
Ambient humidity in use and in storage	10...90% RH (non-condensing)
Display range	See Probes Table
Analog input	1 input selectable by parameter H00
Serial	TTL for connection to Copy Card or TelevisSystem
Digital outputs (configurable) - output OUT1 - output OUT2 - SSR control output*	 1 SPDT 3A 250 V~ 1 SPST 2A 250 V~ Vout = 0...12V⎓ / Imax = 0...15mA / Vmin = 7,5V
Accuracy	See Probes Table
Resolution	See Probes Table
Consumption	2,45W (12-24V~/12-36V⎓ model) 2,40W (100-240 V~ model)
Power supply	12-24V~ ±10% / 12-36V⎓ ±10% / 100-240 V~ ±10%

*optional output alternative to out1

WIRING DIAGRAM



TERMINALS

1 - 3	-N.C. out1 relay output, see H21 -SSR control output 0/12V⎓ 15mA*
2 - 3	N.O. out1 relay output, see H21
6 - 7	N.O. out2 relay output, see H22
8-9-10	Probe input
4 - 5	Power supply
A	TTL input for Copy Card

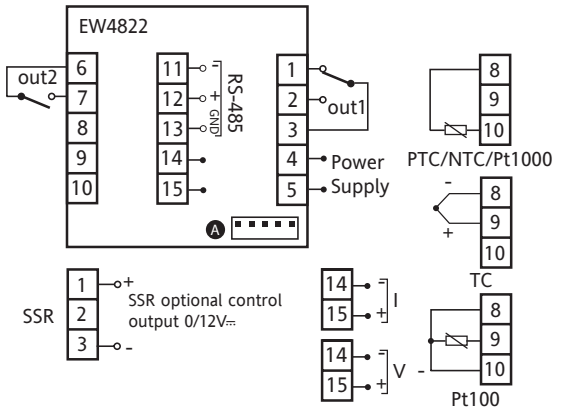
TECHNICAL DATA EW4822

Front protection	IP65
Container	PC+ABS plastic resin body PC+ABS UL94 V-0
Dimensions	front 48x48 mm, depth 113mm
Mounting	and panel with drilling template 45x45mm
Usage temperature	-5°C...55°C
Storage temperature	-20°C...85°C
Ambient humidity in use and in storage	10...90% RH (non-condensing)
Display range	See Probes Table
Analog input	1 input selectable by parameter H00
Serial	TTL for connection to Copy Card and RS-485 serial port
Analog output*	Analog output I: 4...20mA MAXIMUM LOAD 350Ohm Analog output V: 0-1V / 0-5V / 0-10V MAXIMUM LOAD See Table (§)
Digital outputs (configurable) - output OUT1 - output OUT2 - SSR control output**	 1 SPDT 3A 250 V~ 1 SPST 2A 250 V~ Vout = 0...12V⎓ / Imax = 0...15mA / Vmin = 7,5V
Accuracy	See Probes Table
Resolution	See Probes Table
Consumption	2,80W (12-24V~/12-36V⎓ model) 2,60W (100-240 V~ model)
Power supply	12-24V~ ±10% / 12-36V⎓ ±10% / 100-240 V~ ±10%

**optional output alternative to out1

(§)output	maximum load
0-1 V	20mA with minimum load resistance 50 Ohm
0-5 V	20mA with minimum load resistance 250 Ohm
0-10 V	20mA with minimum load resistance 500 Ohm

WIRING DIAGRAM



TERMINALS

1 - 3	N.O. relay output out1,see H21 -SSR control output 0/12V⎓ 15mA*
2 - 3	N.O. relay output out1, see H21
6 - 7	N.O. relay output out2, see H22
8-9-10	Probe input
4 - 5	Power supply
A	TTL input for Copy Card
11-12-13	RS-485 serial port
14-15	Analogic output I or V

Probes Table

Probe*	Range	Probe error limits	Resolution	Accuracy**
Ptc	-55...150°C	-60...155°C	0.1°C (0.1°F)	0.5% end of scale + 1 digit
Ntc	-50...110°C	-55...115°C	0.1°C (0.1°F)	0.5% at end of scale + 1 digit
Pt1000	-200...800°C	-210...810°C	0.2°C	0.5% end of scale + 1 digit
TCj	-40...760°C	-50...770°C	0.6°C (0.6°F)	0.4% end of scale + 1 digit
TCk	-40...1350°C	-50...1360°C	0,6°C (0,7°F)	0.5% end of scale + 1 digit (over entire scale) 0.3% end of scale + 1 digit (-40...800°C)
TCS	0...1600°C	-10...1610°C	0,6°C (0,8°F)	0.5% end of scale + 1 digit (over entire scale) 0.3% end of scale + 1 digit (-40...800°C)
TCR	0...1600°C	-10...1610°C	0,6°C (0,7°F)	0.5% end of scale + 1 digit (over entire scale) 0.3% end of scale + 1 digit (-40...800°C)
TCT	-40...350°C	-50...360°C	0,6°C (0,7°F)	0.5% end of scale + 1 digit (over entire scale) 0.3% end of scale + 1 digit (-40...800°C)
Pt100	-200...800°C	-210...810°C	0,1°C (0,2°F)	0.5% end of scale + 1 digit (over entire scale) 0.2% end of scale + 1 digit (-150...300°C)

* Important! Check the probes and models available.
** NOTE: The accuracy values shown are valid for an ambient temperature of 25°C

The technical specifications in the document that relate to measurement (range, accuracy, resolution, etc.,) refer to the device in the strict sense, not to any of the accessories supplied, for example probes. Consequently, any errors introduced by the probe must be added to the characteristic error of the device

MECHANICAL ASSEMBLY

The device is designed for panel mounting. Make a 45x45 mm drill hole and insert the device; fix it with the special brackets provided. Do not mount the device in damp and/or dirt-laden areas. It is suitable for use in places with ordinary or normal levels of pollution. Keep the area around the device cooling slots adequately ventilated

ELECTRICAL CONNECTIONS

Warning! Switch off the device before working on the electrical connection. The device is equipped with screw terminals for connecting electric cables of 2.5 mm2 maximum cross-section(one wire per terminal in the case of power connections): for the capacity of the terminals, see the label on the device. The relay outputs are free of voltage. Do not exceed the maximum permitted current; for higher loads, use a contactor with sufficient power capacity. Make sure that power supply is the correct voltage for the device. The probe has no specific connection polarity and can be extended using a normal two-pole cable (note that extending the probe has a negative effect on the device's EMC characteristics: take great care with the wiring). The probe cables, power supply cables and the TTL serial cable should be kept separate from the power cables.

RESPONSIBILITY AND RESIDUAL RISKS

Eliwell Controls will not be liable for damage resulting from:
- installation/uses other than those specified and, in particular, which do not comply with the safety requirements set out in the regulations and/or stated herein;
- use on panels that do not provide adequate protection against electric shock, water or dust when assembled;
- use on panels that allow access to dangerous parts without having to use tools;
- tampering and/or modification of the product;
- installation/use on panels that do not comply with the current standards and regulations.

CONDITIONS OF USE

PERMITTED USE

For safety reasons, the device must be installed and used according to the instructions provided. In particular, parts carrying dangerous voltages must not be accessible in normal conditions.
The device must be adequately protected from water and dust according to the application, and must also only be accessible using tools (with the exception of the front panel).
The device is suitable for use in household refrigeration appliances and/or similar equipment and has been tested for safety aspects in accordance with the harmonised European reference standards. It is classified as follows:
• depending on construction, as a built-in automatic electronic control device;
• according to its automatic operating characteristics, as a type 1B control type device;
• according to its software class and structure, as a Class A device.

USES NOT PERMITTED

The device must not be used for applications other than those described.
Note that the relay contacts provided are of a functional type and therefore subject to malfunction: Any protection devices required by product standards, or suggested by common sense, must be installed externally to the instrument for obvious safety reasons.

DISCLAIMER

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Eliwell Controls s.r.l.
Via dell'Industria, 15 • Zona Industriale Paludi • 32010 Pieve d'Alpago (BL)
ITALY
Telephone +39 0437 986 111 • Facsimile +39 0437 989 066
Sales +39 0437 986 100 (Italy) • +39 0437 986 200 (other countries)
• E-mail saleseliwell@invensys.com
Technical helpline +39 0437 986 300
• E-mail techsuppeliwell@invensys.com
www.eliwell.it

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