IC 917/PID

NTC-PTC/ Pt100-TcJ-TcK

Electronic controller with 2 intervention points, PID regulator and autotuning.

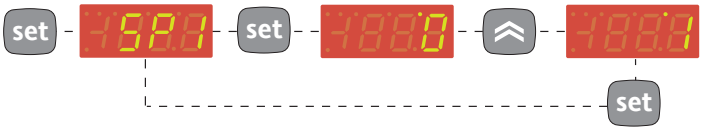


KEYS AND LEDs

⌃	**UP** - Scrolls through menu items - Increases values - Programmable by parameter (see par. H31)	fnc	**fnc** - ESC (exit) function - Programmable by parameter (see par. H33)	out 1	**Relay OUT 1** - ON for relay on (energised); - blinks if there is a delay, a protection, or a blocked start-up	((●))	**Alarm** - ON when alarm is active; - flashes if an alarm is switched off
⌄	**DOWN** - Scrolls through menu items - Decreases values -Programmable by parameter (see par. H32)	set	**set** - Accesses the Setpoint - Accesses menus - Activates functions - Confirms commands - Displays alarms (if active)	out 2	**Relay OUT 2** - ON for relay on (energised); - blinks if there is a delay, a protection or a blocked start-up	🗨	**Soft Start/Autotuning (and SetPoint setting)** - ON during Setpoint setting; - blinks when Soft Start and/or Autotuning function is on
						aux	**Aux** ON when auxiliary output on.

MACHINE STATUS MENU

a) You can access the machine status menu by pressing and releasing the **set** key. Under normal conditions, the menu will contain the labels corresponding to the two Setpoint values. Once the **SP1** label has been displayed, press the 'set' key to display the Setpoint 1 value.



The value of Setpoint 1 appears on the display. To change the Setpoint value, press the **UP** and **DOWN** keys within 15 seconds. If you press the 'set' key again, when the **fnc** key is pressed or 15 seconds elapse, the last value displayed will be stored and the **SP1** label will reappear on the display.

b) If any alarms are active, the '**AL**' label appears.



You can use the **UP** and **DOWN** keys to scroll through all the folders in the menu, as follows:
-**AL**: alarms folder (if alarms active, except for probe errors/faults)
-**SP1/SP2**: Setpoint 1/2 setting folder.

c) If an alarm condition exists when the Machine Status menu is accessed, the '**AL**' folder label appears.



(example: when maximum and minimum temperature alarms are present)

Use the **UP** and **DOWN** keys to scroll the list of active alarms and press 'set' to display the selected alarm.

PROGRAMMING MENU

The menu is divided into 2 levels. Once users have pressed the 'set' key for 5 seconds, they can access the user level folders (1).

Navigation at user level (1):



• By using the 'UP' and 'DOWN' keys you can scroll through all the folders in the programming menu that only contain user level parameters (1).

How to access the installer level (2):



• By using the UP and DOWN keys, scroll through the user level folders (1) until the folder with the 'CnF' label is displayed. Then press 'set' to access the parameters contained in it.



• Use the 'UP' and 'DOWN' keys to display all the user level parameters (1) in 'CnF'. Continue until the 'PA2' label is no longer displayed, then press 'set'.



• By pressing the 'set' key next to 'PA2', the first folder containing installer level parameters will be displayed and then the 'rE1' folder.

Navigation at installer level (2):



• By using the 'UP' and 'DOWN' keys you can scroll through all folders in the programming menu that only contain installer level parameters (2).

How to modify the parameter values (on both levels):



• When the 'set' key is pressed, the first folder in the menu is displayed. (example: 'rE1' folder).



• By using the 'UP' and 'DOWN' keys you can scroll through all the folders in the current level.



• By pressing the 'set' key next to the selected folder (in this case 'AL') the first parameter in the current level will be displayed. Select the desired parameter using the 'UP' and 'DOWN' keys.



• By pressing the 'set' key the value of the selected parameter is displayed. This parameter can be modified using the 'UP' and 'DOWN' keys.

PASSWORD

Access to parameter management both at user level and installer level can be restricted using passwords. Password protection can be enabled by setting the PA1 (user password) and PA2 (installer password) parameters in the 'dIS' folder. The passwords are enabled if the values of the 2 parameters PA1 and PA2 is not 0.



• To access the 'Programming' menu hold down the 'set' key for more than 5 seconds. If specified, the user level (1) access PASSWORD will be requested.



• If password 1 is enabled (not 0), you will be asked to enter it. Select the correct value using the UP and DOWN keys and press the 'set' key to confirm.

Installer level (2) parameters

In the programming menu scroll through the folders containing the user level parameters using the 'UP and 'DOWN' keys until set the CnF folder is displayed.



• Press the 'set' key to enter the 'CnF' folder where the 'PA2' label is present.

• Scroll through the folder parameters and press the 'set' key next to the 'PA2' label; '0' will appear on the display.



• Use the UP and DOWN keys to select the correct value of the installer password, then press the 'set' key to access the installer level parameters.

If the password is incorrect, the display will show the 'PA2' label again and you will have to repeat the operation.

At each level in both menus, when the 'fnc' button is pressed or the 15 second time out elapses, you are taken back to the higher display level and the last value on the display is stored.

COPY CARD

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



• The 'FPr' folder contains the commands necessary for use of the Copy Card. Press 'set' to access the functions.



• Use the 'UP' and 'DOWN' keys to display the desired function. Press the 'set' key and the upload (or download) will be performed.

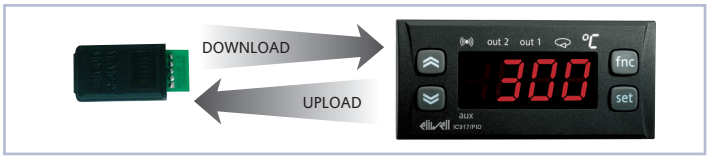


• If the operation is successful 'y' will be displayed, if it is not successful, 'n' will be displayed.

Download from reset

Connect the copy card when the instrument is OFF. The programming parameters are downloaded when the device is switched on. At the end of the lamp test, the following labels are displayed for about 5 seconds:

- dLY label if copy operation is successful
- dLn label if operation fails



Uploading and downloading parameters from instrument

NOTES:

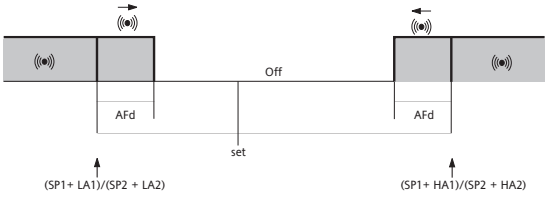
- after the parameters have been downloaded, the device uses the downloaded parameter map settings.
- see 'FPr' folder in Parameter Table.

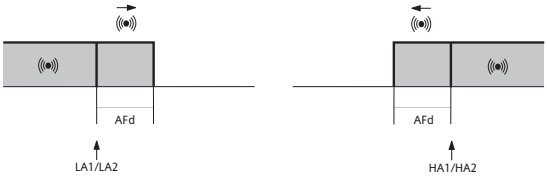
ALARMS

Label	Alarm	Cause	Effects	Remedy
E1	Probe1 faulty (control)	• Measured values are outside nominal range • Control probe faulty/short-circuited/open • (**Only for PT100 probes**) 3rd wire incorrectly connected	• "**E1**" label shown on display • Regulator is activated as indicated by parameters On1(On2) and OF1(OF2) if set for Duty Cycle • Label "Pt3" displayed in AL folder (**Only for PT100 probes**);	• check the probe wiring • replace probe When the probe error condition ceases, regulation resumes as normal
AH1	Regulator 1 HIGH temperature alarm	value read by probe > **HA1** after time of **tAO**. (see MIN MAX ALARMS table and description of parameters **HAL**, **Att** and **tAO**)	• Recording of label **AH1** in folder AL of machine status menu • No effect on regulation	Wait until temperature value read by probe returns below **HA1**.
AH2	Regulator 2 HIGH temperature alarm	value read by probe > **HA2** after time of **tAO**. (see MIN MAX ALARMS table and description of parameters **HAL**, **Att** and **tAO**)	• Recording of label **AH2** in folder AL of machine status menu • No effect on regulation	Wait until temperature value read by probe returns below **HA2**.
AL1	Regulator 1 LOW temperature alarm	value read by probe <**LA1** after time of **tAO**. (see MIN MAX ALARMS table and description of parameters **HAL**, **Att** and **tAO**)	• Recording of label **AL1** in folder AL of machine status menu • No effect on regulation	Wait for the temperature value read by probe to come back above **LA1**.
AL2	Regulator 2 LOW temperature alarm	value read by probe <**LA2** after time of **tAO**. (see MIN MAX ALARMS table and description of parameters **HAL**, **Att** and **tAO**)	• Recording of label **AL2** in folder AL of machine status menu • No effect on regulation	Wait for the temperature value read by probe to come back above **LA2**.
EA	External alarm	Activation of digital input if confi gured as external alarm (see parameter **H11**)	• Alarm icon (LED) permanently on • Recording of label **EA** in folder AL of machine status menu	• Manual silencing to turn off LED • Wait for deactivation of the digital input before restarting the regulators

* Effects common to all alarms: Alarm LED permanently on; Buzzer activated (if present); Relay enabled (if configured as alarm 'H21'=3)

MAX-MIN ALARMS





	Temperature value in relation to setpoint (**Att = 1**)	Temperature expressed as an absolute value (**Att = 0**)	
Minimum temperature alarm	Temp. ≤ SEt+LA1/2*	Temp. ≤ LA1/2	(LA1/2 with sign)
Maximum temperature alarm	Temp. ≥ SEt+HA1/2**	Temp. ≥ HA1/2	(HA1/2 with sign)
Reset by minimum temperature alarm	Temp. ≥ SEt + LA1/2 + AFd ≥ SEt – |LA1/2|+AFd	Temp. ≥ LA1/2 + AFd	
Reset by maximum temperature alarm	Temp. ≤ SEt + HA1/2 - AFd	Temp. ≤ HA1/2 - AFd	

*** if LA1/2 is negative, it will be subtracted from SEt**
**** if HA1/2 is negative, it will be subtracted from SEt**

FUNCTIONS

The following functions are available in the FnC folder (last folder visible from the programming menu, level 1):

Function	Function label ACTIVE	Function label NOT ACTIVE	D.I.	Key	Active signalling function
SOFT START	Son	SoF*	1	1	LED blinking
Economy Setpoint	OSP	SP*	2	2	LED ON
Shutdown	bon	boF*	3	3	LED ON
Periodic cycle	Con	CoF*	4	4	LED ON
Aux	Aon	AoF*	5	5	LED ON
Standby	on*	oF	6	6	LED ON
Maintenance request	Atn*	AtF	7	7	UnP blinking

* indicates default

NOTES: • to modify the status of a given function, press the 'set' key.
• If the instrument is switched off, the function labels will return to the default status.

PID REGULATOR

Depending on the difference between the Setpoint and the current temperature value measured by the probe, this regulator modulates the Duty Cycle of the output relay switching period, in the range from 0 to 100% (heating).
The regulator works **ONLY** with Setpoint '**SP1**'.

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: '**H21**' = 2 (see Parameters, folder labelled '**CnF**').

PARAMETER settings: In addition to '**H21**' it is necessary to set the 'run' parameter. This parameter is used to select the regulating mode: manual* ('**FiH**' - **Duty Cycle**) or automatic ('**Aut**' - **PID**).
Ensure that '**run**' = '**Aut**'.

MANUAL PID: ('**run**' = '**FiH**'). in this case you must set the activation percentage '**dut**'. Then set the period divided with the '**Duty Cycle**' using the '**PEd**' parameter (see parameters).

AUTOMATIC PID: ('**run**' = '**Aut**'). At this point it is enabled for PID regulation, folder 'Pid' is visible in the Programming Menu at levels 1 and 2 and the value of the parameters which it contains can be modified to improve the regulating performance: these parameters can also be modified in automatic mode using the '**Autotuning**' function (see corresponding paragraph).

AUTOTUNING

The setting of the PID regulation parameters can be simplified using the **Autotuning** function, which calculates the PID parameters automatically. If an Autotuning cycle is active on start-up of the device (indicated by a flashing LED on the display (see Keys and LEDs)), once the cycle is complete the PID parameter values will have been calculated automatically, based on the conditions detected by the system.
In particular the following parameters are calculated and overwritten: '**bP**', '**ti**', '**td**' and '**PEd**' (the latter is limited below by '**PEL**').

The **Autotuning** function is deactivated in 2 cases:

1) the temperature detected on start-up of the device is higher than (Setpoint - '**PrS**') (see parameters).
2) the Setpoint is modified during an **Autotuning cycle** by cancelling it.
The **Autotuning cycle** will resume the next time that the device is switched on.

Once the start-up **Autotuning cycle** is complete, the PID is correctly configured.
After the first cycle, in order to prevent a new **Autotuning cycle** from starting each time that the device is switched on, set:

1) parameter '**APO = 0**' (see Parameters, folder labelled '**PID**' in Level 1&2)
2) parameter '**Act = SAu**' (see Parameters, folder with '**PID**' label at Level 1&2) to save the change.

'Fine' Autotuning: You can activate a fine **Autotuning cycle** if you wish to optimise the PID regulation. To do this, set the parameter '**tun = on**' and the corresponding LED will start blinking. When this new cycle is complete, the device will automatically save the new calculated values and will start using them immediately.
This function is useful in the event of a substantial Setpoint variation during regulation. you can set this function by appropriately configuring the '**ASP**' parameter (see parameters).
The corresponding LED will blink during each cycle.

PARAMETER TABLE

USER PROGRAMMING MENU

Press the 'SET' key for at least 5 seconds to access the User level folders, until the 'CP' folder appears. You can press the 'UP' and 'DOWN' keys to scroll through all the folders in the USER programming menu (folders can be selected using the 'SET' key) which contain only USER level parameters.

Par.	Level *	Description		Range	M.U.	NTC/PTC value	PT100/Tc value
SP1		Temperature control SEtpoint1. Opens the Machine Status Menu.		LS1 ... HS1	°C/°F	30.0	30.0
SP2		Temperature control SEtpoint2. Opens the Machine Status Menu.		LS2 ... HS2	°C/°F	0.0	0.0
	1&2	**REGULATOR 1 (folder 'rE1')**					
HC1	2	The regulator will go to **HOT** operating mode (set to '**H**') or **COLD** operating mode (set to '**C**').		H/C	flag	C	C
OS1	2	Offset Setpoint 1.		-30.0 ... 30.0	°C/°F	0.0	0.0
db1	1&2	Operating band 1 - Neutral zone (**see ON-OFF regulation diagram**).		0.0 ... 30.0	°C/°F	1.0	1.0
dF1	1&2	Relay 1 activation differential. The utility stops at the temperature value '**SP1**' (read from the control probe) and restarts at a temperature equal to ('**SP1**' + '**dF1**') (or less, depending on HC1) (**see ON-OFF regulation diagram**)		0.0 ... 30.0	°C/°F	0(nz models) 1.0	0(nz models) 1.0
HS1	2	Maximum value that can be assigned to '**SP1**'. **NOTE: The two setpoints are interdependent: HS1 cannot be less than LS1 and viceversa.**		LS1 ... HdL	°C/°F	140.0	800
LS1	2	Minimum value that can be assigned to '**SP1**'. **NOTE: The two setpoints are interdependent: LS1 cannot be greater than HS1 and viceversa.**		LdL ... HS1	°C/°F	-50.0	-199,9
HA1	1&2	Maximum alarm OUT 1 (**see MAX/MIN Alarms diagram**)	NTC/PTC	LA1 ... 350	°C/°F	140.0	
			PT100/Tc	LA1 ... 1999,9	°C/°F		1999,9
LA1	1&2	Minimum alarm OUT 1 (**see MAX/MIN Alarms diagram**)	NTC/PTC	-99,9 ... HA1	°C/°F	-50.0	
			PT100/Tc	-328 ... HA1	°C/°F		-328
dn1	2	Delayed start. The indicated time must elapse between the request for activation of the regulator relay and switch-on.		0 ... 250	secs	0	0
do1	2	Delay time after switching off . The indicated time must elapse between deactivation of the regulator 1 relay and the next switch-on.		0 ... 250	min	0	0
di1	2	Delay between switch-ons. The indicated time must elapse between two consecutive switch-ons of regulator 1.		0 ... 250	min	0	0
dE1	2	Switch-off delay. The indicated time must elapse between the request for deactivation of the regulator 1 relay and switchoff. **NOTE: for parameters dn1, do1, di1, dE1 , the value 0 = not active.**		0 ... 250	secs	0	0
On1	2	Regulator start time in the event of faulty probe. (**see the Duty Cycle diagram**) If '**On1**' = '1' and '**OF1**' = '0', the regulator remains on continuously; if '**On1**' = '1' and '**OF1**' > '0', it runs in duty cycle mode.		0 ... 250	min	0	0
OF1	2	Regulator switch-off time in the event of a faulty probe. (**see the Duty Cycle diagram**) If '**OF1**' = '1' and '**On1**' = '0', the regulator remains on continuously; if '**OF1**' = '1' and '**On1**' > '0', it runs in duty cycle mode.		0 ... 250	min	1	1
	1&2	**REGULATOR 2 (folder 'rE2')**					
HC2	2	The regulator will go to **HOT** operating mode (set to '**H**') or **COLD** operating mode (set to '**C**').		H/C	flag	C	C
OS2	2	Offset Setpoint 2.		-30.0 ... +30.0	°C/°F	0.0	0.0
db2	1&2	Operating band 2 - Neutral zone (**see ON-OFF regulation diagram**).		0.0 ... +30.0	°C/°F	1.0	1.0
dF2	1&2	Relay 2 activation differential. The utility stops at the temperature value '**SP2**' (read from the control probe) and restarts at a temperature equal to ('**SP2**' + '**dF2**') (or less, depending on HC2) (**see ON-OFF regulation diagram**)		0.0 ... +30.0	°C/°F	0(nz models) 1.0	0(nz models) 1.0
HS2	2	Maximum value that can be assigned to '**SP2**'. **NOTE: The two setpoints are interdependent: HS2 cannot be less than LS2 and viceversa.**		LS2 ... HdL	°C/°F	140.0	800
LS2	2	Minimum value that can be assigned to '**SP2**'. **NOTE: The two setpoints are interdependent: LS2 cannot be greater than HS2 and viceversa.**		LdL ... HS2	°C/°F	-50.0	-199.9
HA2	1&2	Maximum alarma OUT 2 (**see MAX/MIN Alarms diagram**)	NTC/PTC	LA2 ... 350	°C/°F	140.0	
			PT100/Tc	LA2 ... 1999.9	°C/°F		1999.9
LA2	1&2	Minimum alarm OUT 2 (**see MAX/MIN Alarms diagram**)	NTC/PTC	-99.9 ... HA2	°C/°F	-50.0	
			PT100/Tc	-328 ... HA2	°C/°F		-328
dn2	2	Delayed start. The indicated time must elapse between the request for activation of the regulator relay and switch-on.		0 ... 250	secs	0	0
do2	2	Delay time after switching off . The indicated time must elapse between deactivation of the regulator 2 relay and the next switch-on.		0 ... 250	min	0	0
di2	2	Delay between switch-ons. The indicated time must elapse between two consecutive switch-ons of regulator 2.		0 ... 250	min	0	0
dE2	2	Switch-off delay. The indicated time must elapse between the request for deactivation of the regulator 2 relay and switchoff. **NOTE: for parameters dn2, do2, di2, dE2 the value 0 = not active.**		0 ... 250	secs	0	0
On2	2	Regulator start time in the event of faulty probe. (**see the Duty Cycle diagram**) If '**On2**' = '1' and '**OF2**' = '0', the regulator remains on continuously; if '**On2**' = '1' and '**OF2**' > '0', it runs in duty cycle mode.		0 ... 250	min	0	0
OF2	2	Regulator switch-off time in the event of a faulty probe. (**see the Duty Cycle diagram**) If '**OF2**' = '1' and '**On2**' = '0', the regulator remains on continuously; if '**OF2**' = '1' and '**On2**' > '0', it runs in duty cycle mode.		0 ... 250	min	1	1
	1&2	**PID REGULATOR (folder 'PID') - (see corresponding paragraph)**					
tun	1&2	Autotuning activated.		oFF, on	flag	oFF	oFF
run	1&2	Select Automatic mode '**Aut**' (PID) or Manual mode '**FiH**' (fi xed duty cycle).		FiH, Aut	flag	Aut	Aut
dut	1&2	Duty Cycle to use when manual mode is activated ('**run**' ='**FiH**').		U_min ... U_max	%	0.0	0.0
SEt	2	Set of parameters to use.		P1/P2/P3	num	P1	P1
Act	1&2	Action to be performed on the selected set of parameters. ('**Abo**' = returns to previous menu if no changes have been made; '**LoA**' = parameters are loaded in autotuning; '**SAu**' = parameters are saved in autotuning).		Abo/LoA/SAu	num	Abo	Abo
bP	1&2	Proportional band.		0.1 ... 1999.9	°C/°F	10.0	10.0
ti	1&2	Full time.		0 ... 19999	secs	1000	1000
td	1&2	Derivative time.		0 ... 19999	secs	250	250
OSr	2	Overshoot Reduction (proportional setpoint weighting).		0 ... 200	num	100	100
SLO	2	Minimum output saturation (percentage).		U_min ... SHI	%	0,0	0,0
SHI	2	Maximum output saturation (percentage).		SLO ... U_max	%	100.0	100.0
PEd	1&2	Period divided with Duty Cycle.		PEL ... 1999.9	secs	15.0	15.0
PEL	2	Minimum value of period divided with Duty Cycle.		0.1 ... 1999.9	secs	4.0	0.1
Fun	1&2	Type of regulator desired.		P/PI/PD/PID/FAS	num	PID	PID
AHr	1&2	Relay hysteresis for autotuning.		0.1 ... 1999.9	°C/°F	0.5	0.5
ASA	2	Automatic saving of parameters after autotuning.		n/y	flag	y	y
APO	1&2	Autotuning activated at power-on. (**oFF** (**0**) = no Autotuning; **on** (**1**) = Autotuning). **NOTE: only from Param Manager, the parameter can also be set to:** **2 = (Autotuning + 'Fine' Autotuning) and 3 = only 'Fine' Autotuning.**		oFF, on	num	on	on
ASP	2	Fine Autotuning activated at change of setpoint. The value '**ASP**' = 0.0 corresponds to OFF.		0.0 ... 1999.9	°C/°F	0.0	0.0
PrS	2	Pretuning safety band.		0.1 ... 1999.9	°C/°F	5.0	5.0

USER PROGRAMMING MENU

Press the 'SET' key for at least 5 seconds to access the User level folders, until the 'CP' folder appears. You can press the 'UP' and 'DOWN' keys to scroll through all the folders in the USER programming menu (folders can be selected using the 'SET' key) which contain only USER level parameters.

Par.	Level *	Description		Range	M.U.	NTC/PTC value	PT100/Tc value
	1&2	**SOFT START (folder 'SFt')**					
dSi	2	Value (in degrees) of each subsequent increase (dynamic) of the adjustment point. (**0** = function disabled).		0 ... 25.0	°C/°F	0.0	0.0
dSt	2	Time between two subsequent increases (dynamic) of the Setpoint.		0 ... 250	min	0	0
Unt	2	Unit of measurement (hours, minutes, seconds).		0/1/2	num	1	1
SEn	2	Function sensitivity Outputs enabled. Establishes which outputs the function must be enabled on: 0 = disabled; 1 = enabled **OUT1**; 2 = enabled **OUT2**; 3 = enabled **OUT 1 & 2**.		0/1/2/3	num	1	1
Sdi	2	Function reinsertion threshold. Establishes the threshold beyond which the SOFT START function is automatically re-inserted.		0.0 ... 30.0	°C/°F	0.0	0.0
	1&2	**PERIODIC CYCLE (folder 'cLc')**					
Con	2	Output ON time.		0 ... 250	min	0	0
CoF	2	Output OFF time.		0 ... 250	min	0	0
	1&2	**ALARMS (folder 'AL')**					
Att	1&2	Parameter '**HA1/2**' and '**LA1/2**' modes, as absolute temperature values or as differential compared with the Setpoint. (**0** = absolute value; **1** = relative value).		Abs/reL	flag	Abs	Abs
AFd	2	Alarm differential. Alarm activation differential. Works with parameters '**HAL**' and '**LAL**'. See the High/Low alarms diagram.		1.0 ... 50.0	°C/°F	2.0	2.0
PAO (!)	1&2	Power-on Alarm override. Alarm exclusion time (expressed in hours) after instrument is switched on following a power failure.		0 ... 10	hours	0	0
SAO	1&2	Alarm exclusion time until the Setpoint is reached. **0 =** disabled. If **>0**, an alarm will be generated if the Set point is not reached after the time (in hours) set by this parameter.		0 ... 10	min	0	0
tAO	1&2	Temperature Alarm Override. Temperature alarm signal delay time.		0 ... 250	min	0	0
AOP	2	Alarm output polarity. (**0** = alarm active and output disabled; **1** = alarm active and output enabled).		nc/no	flag	nc	nc
tp	2	Enables the user to silence alarms by pressing any key.		n/y	flag	y	y
	1&2	**SET-UP DISPLAY (folder 'diS')**					
LOC	1&2	LOCK. Lock Setpoint modification. You can still access the parameter programming menu and edit the parameters, including this parameter, in order to allow keypad unlocking. (**y** = Keypad LOCKED; **n** = Keypad UNLOCKED).		n/y	flag	n	n
PA1	1&2	Passcode 1. When enabled (value other than 0), it represents the access key for level 1 parameters.		0 to 250	num	0	0
PA2**	2	Passcode 2. When enabled (value other than 0), it represents the access key for level 2 parameters.		0 to 250	num	0	0
ndt	1&2	Display with decimal point. The values can be displayed with or without the decimal point (**y** = yes; **n**= no).		n/y	flag	n	n
CA1	2	CAlibration 1. Probe 1 calibration. Positive or negative temperature value added to the value read from probe 1, according to the setting of parameter '**CA**'.		-30.0 to +30.0	°C/°F	0.0	0.0
CAi	2	Calibration intervention. For calibrating the displayed temperature value or the temperature control value or both: 0 = ONLY modifies the displayed temperature. 1 = Only modifies the temperature used by the regulators, the displayed temperature remains unchanged. 2 = Modifies the displayed temperature and the temperature used by the regulators.		0/1/2	num	2	2
LdL	2	Low display Level. Minimum value that can be displayed by the device.	NTC/PTC	-67.0 ... HdL	°C/°F	-50.0	
			PT100/Tc	-328 ... HdL	°C/°F		-328
HdL	2	High display Level. Maximum value that can be displayed by the device.	NTC/PTC	LdL ... 302	°C/°F	140.0	
			PT100/Tc	LdL ... 1999.9	°C/°F		1999.9
dro	2	Display readout. For selecting whether the temperature read by the probe is displayed in °F or °C (**0** = °C; **1** = °F). **IMPORTANT**: Switching from °F to °C **DOES NOT** modify the Setpoint, Differentials, etc. (e.g.: set = 10 °F becomes 10 °C).		0/1	num	0	0
ddd	2	For selecting the type of value to display (**0** = Setpoint; **1** = Temperature Control Probe).		0/1	num	1	1
	1&2	**CONFIGURATION (folder 'CnF')**					
H00 (!)	1&2	Selection of probe type according to the model.	NTC/PTC	Ptc/ntc	num	ntc	
			PT100/Tc	Jtc/Htc/Pt1	num		Pt1
H01	1&2	Output link: **0** = independent; **1** = dependent; **2** = Neutral Zone (or window).		0/1/2	num	0	0
H02	2	Press the ESC, UP and DOWN keys (if confi gured for a second function) for the time '**H02**' to activate the function itself. **NOTE**: The AUX function has a fi xed activation time of 1 second.		0 to 15	secs	5	5
H05	2	Window filter: '**-2**'=very fast; '**-1**'=fast; '**0**'=normal; '**1**'=slow; '**2**'=very slow.		-2/-1/0/1/2	num	0	0
H06	2	Key or Digital Input with aux/light door switch active with the device OFF (but powered).		n/y	flag	y	y
H08	2	Standby mode. **0**=only display is switched off ; **1**=display on and regulators locked; **2**= display off and regulators locked.		0/1/2	num	2	2
H10	1&2	Output delay from power-on. **IMPORTANT**! If 'H10'=0 the delay is NOT active; if 'H10' is diff erent from 0 the output will not be activated before this time has expired.		0 ... 250	min	0	0
H11	2	Configuration of Digital Inputs. **0** = disabled; **1** = SOFT START; **2** = Off set setpoint; **3** = Outputs stopped; **4** = Periodic cycle; **5** = Auxiliary Output; **6** = Standby; **7** = Not used; **8** = External alarm; **9** = External alarm to lock regulators.		0 ... 9	num	0	0
H13	2	Polarity and priority of Digital Inputs. **no** = normally open; **nc** = normally closed; **noP** = normally open with polarity; **ncP** = normally closed with polarity.		no/nc/noP/ncP	num	no	no
H14	2	Digital Input activation delay.		0 ... 250	num	0	0
H21	2	Configuration of Digital Output1 (OUT1). **0** = Disabled; **1** = on-off; **2** = PID*; **3** = Alarm; **4** = Cyclical; **5** = Aux/Light; **6** = Standby. *** NOTE : If 2 = PID, output OUT1 works in heating mode.**		0 ... 6	num	2	2
H22	2	Configuration of Digital Output2 (OUT2). Same as '**H21**'. *** NOTE : If 2 = PID, output OUT1 works in cooling mode.** *** NOTE : The PID regulator only acts on output OUT1.**		0 ... 6	num	0	0
H31	2	UP key configuration. **0** = disabled; **1** = SOFT START; **2** = Offset setpoint; **3** = Outputs stopped; **4** = Periodic cycle; **5** = Auxiliary output (aux); **6** = Standby; **7** = Not used.		0 ... 7	num	0	0
H32	2	DOWN key configuration. Same as '**H31**'. (0 = disabled; default).		0 ... 7	num	0	0
H33	2	ESC key configuration. Same as '**H31**'. (0 = disabled; default).		0 ... 7	num	0	0
reL	1	reLease fi rmware. Device software version: **read-only parameter.**		/	/	/	/
tAb	1	tAble of parameters. Reserved: **read-only parameter.**		/	/	/	/

USER PROGRAMMING MENU

Press the 'SET' key for at least 5 seconds to access the User level folders, until the 'CP' folder appears. You can press the 'UP' and 'DOWN' keys to scroll through all the folders in the USER programming menu (folders can be selected using the 'SET' key) which contain only USER level parameters.

Par.	Level *	Description	Range	M.U.	NTC/PTC value	PT100/Tc value
	1&2	**COPY CARD (folder 'Fpr')**				
UL	1&2	Upload. Transfer of programming parameters from instrument to Copy Card.	/	/	/	/
dL	1&2	Download. Transfer of programming parameters from Copy Card to instrument.	/	/	/	/
Fr	2	Format. Cancels all data entered in the Copy Card. **IMPORTANT**: if '**Fr**' parameter (Copy Card formatting) is used, the data entered in the card will be permanently lost. This operation cannot be cancelled.	/	/	/	/

NOTES

* The '**Level**' column indicates the visibility level of parameters that can be accessed using a password. ('**1**' = Visible at level 1; '**2**' = Visible at level 2; '**1&2**' = Visible at level1 and level2).

** **PA2** is visible (if it will be requested or if specifi ed) at Level1 in the '**CnF**' folder and can be set (or modifi ed) at Level2 in the '**diS**' folder.

(!) IMPORTANT!

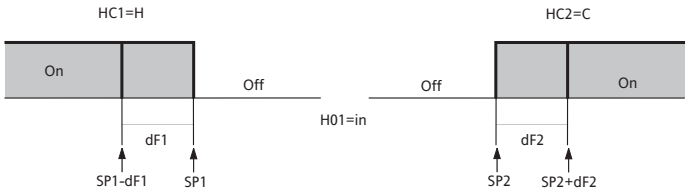
* If one or more parameters marked with (!) are modifi ed, the controller **MUST** be switched off after the modifi cation and then switched back on.

* It is strongly recommended that you switch the instrument off and on again each time the parameter confi guration is changed, in order to prevent malfunctioning of the confi guration and/or ongoing timings.

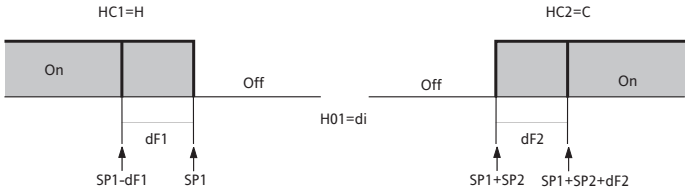
ON-OFF REGULATION DIAGRAM

HC1	HC2	H01	Regulation type
H	C	0	Independent setpoint
H	C	1	Dependent setpoint
-	-	2	Neutral zone (or window)

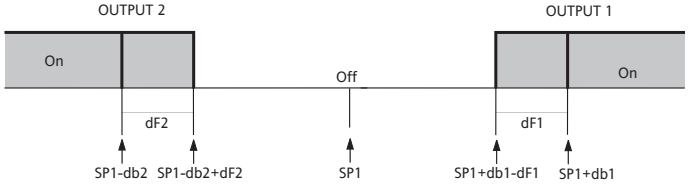
NOTE: examples with HC1=H and HC2=C.



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



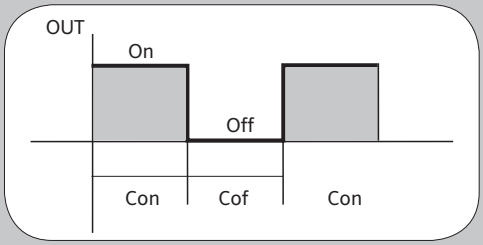
2 ***dependent ON-OFF regulation diagram***.
Setpoint 2 (SP2) regulates relative to SP1.



3 ***ON-OFF regulation diagram with Neutral Zone (or window).***
NOTE: if dF1=0 and dF2 = 0, the outputs are deactivated when SP1 is reached.

Periodic cycle DIAGRAM
(folder "cLc")

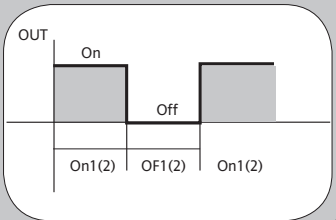
The PERIODIC CYCLE function can be selected by key, by D.I. or by a function.
This function can be associated with both the outputs by relay (by setting parameters H21, H22 to 4), and can be used to actuate 'Duty Cycle' regulation with the intervals set by parameters Con and CoF.



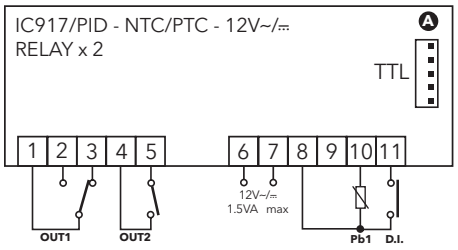
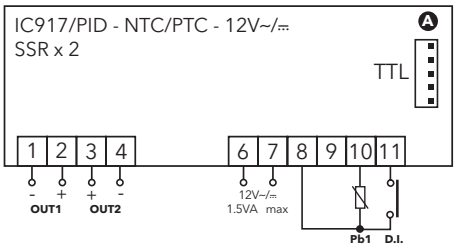
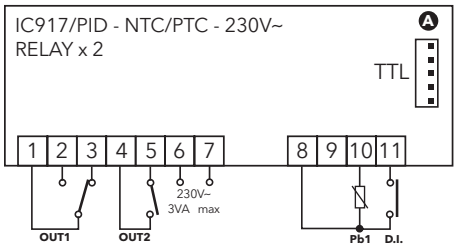
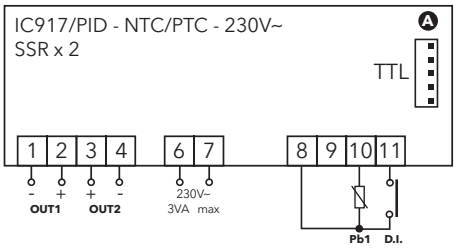
Duty Cycle DIAGRAM

The device uses parameters On1(2) OF1(2) set for Duty Cycle. An error condition in probe1 (regulation) 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)	Exit Regulator
0	0	OFF
0	> 0	OFF
> 0	0	ON
> 0	> 0	Duty Cycle



TECHNICAL DATA	NTC/PTC + 2 RELAY	NTC/PTC + 2 SSR
Front protection	IP65	
Casing	PC+ABS plastic resin casing, UL94 V-0, polycarbonate window, thermoplastic resin keys	
Dimensions	front 74x32 mm, depth 59 mm (without terminals)	
Mounting	panel mounting with 71x29mm (+0.2/-0.1 mm) drilling template	
Operating temperature	-5°C...55°C	
Storage temperature	-30°C...85°C	
Ambient operating/storage humidity	10...90% RH (non-condensing)	
Display range	NTC: -50...110°C (-58...230°F) - PTC: -50...140°C (-58...302°F) on display with 3 ½ digits + sign	
Analogue Input	1 NTC or 1 PTC (configurable)	
Serial	TTL for connection to Copy Card	
Digital outputs (configurable)		
- output OUT1	1 SPDT 8(3)A 1/2 hp 250 V~	see "SSR Outputs" table
- output OUT2	1 SPST 8(3)A 1/2 hp 250 V~	see "SSR Outputs" table
Measurement range	from -55 to 140°C	
Accuracy	better than 0.5% of end of scale +1 digit	
Resolution	0.1°C (0.1°F up to +199.9°F; 1°F beyond this range)	
Consumption	1.5 VA max (mod. 12V) / 3 VA max (mod. 230V)	
Power Supply	12V~/⎓ (10%), 220/230V~ (10% 50/60 Hz)	

WIRING DIAGRAM	NTC/PTC + 2 RELAYS	NTC/PTC + 2 SSR
12V model		
230V model		
Terminals	**1-2** N.O. regulator relay OUT1 **1-3** N.C. regulator relay OUT1 **4-5** N.O. regulator relay OUT2 **6-7** Power Supply **8-10** Probe input Pb1 **8-11** Digital Input D.I. **A** TTL input for Copy Card	**1-2** SSR Output OUT1 **3-4** SSR Output OUT2 **6-7** Power Supply **8-10** Probe input Pb1 **8-11** Digital Input D.I. **A** TTL input for Copy Card

PT100/ TcJ/ TcK models

Pt100:

Accuracy:
0.5% for whole scale + 1 digit
0.2% from -150 to 300°C

Resolution:
0.1°C (0,1°F) up to 199.9°C (1°F) beyond

TcJ:

Accuracy:
0.4% for whole scale + 1 digit

Resolution:
1°C (1°F)

TcK:

Accuracy:
0.5% for whole scale + 1 digit
0.3% from -40 to 800°C

Resolution:
1°C (1°F)

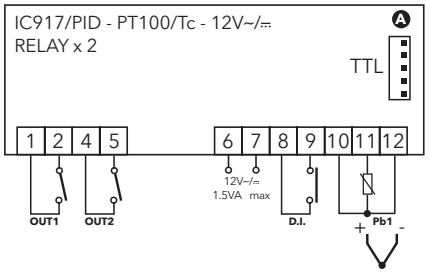
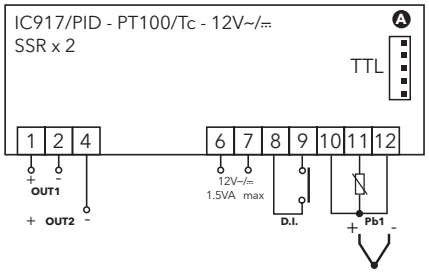
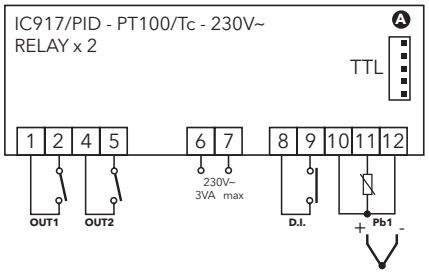
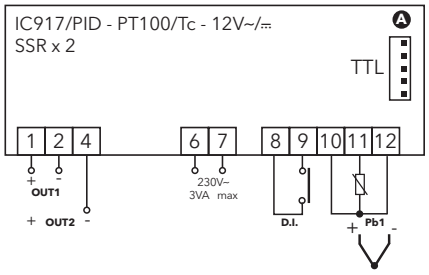
SSR Outputs

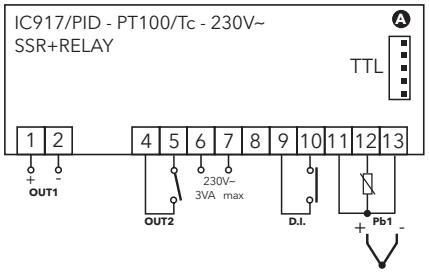
SPECIFICATIONS:

- **Version HV 230V~ ±10% - 50/60Hz (2 SSR)**:
  - 1 SSR (500Ω) V_{OUT} = 11.3 V; I_{OUT} = 22.6 mA
  - 1 SSR (3kΩ) V_{OUT} = 16.2 V; I_{OUT} = 5.4 mA
  - 2 SSR (2x500Ω) V_{OUT} = 10.6 V; I_{OUT} = 21.2 mA
  - 2 SSR (2x3kΩ) V_{OUT} = 15.8 V; I_{OUT} = 5.3 mA
- **Version LV 12V⎓ ±10% (2 SSR)**:
  - 1 or 2 SSR (500Ω) V_{OUT} = 7.7 V; I_{OUT} = 15.4 mA
  - 1 or 2 SSR (3kΩ) V_{OUT} = 9.9 V; I_{OUT} = 3.3 mA
- **Version LV 12V~ ±10% - 50/60 Hz (2 SSR)**:
  - 1 or 2 SSR (500Ω) V_{OUT} = 10.7 V; I_{OUT} = 21.4 mA
  - 1 or 2 SSR (3kΩ) V_{OUT} = 13.9 V; I_{OUT} = 4.6 mA
- **Version HV 230V~ ±10% - 50/60 Hz (SSR+RELÉ)**:
  - 1 SSR (500Ω) V_{OUT} = 15.0 V; I_{OUT} = 30.0 mA
  - 1 SSR (3kΩ) V_{OUT} = 17.5 V; I_{OUT} = 5.8 mA
  - 1 Relay + 1 SSR (500Ω) V_{OUT} = 13.7 V; I_{OUT} = 27.4 mA
  - 1 Relay + 1 SSR (3kΩ) V_{OUT} = 15.5 V; I_{OUT} = 5.2 mA

NOTE: the indicated values refer to SSR relays with input voltage in the the range 3V ... 35 V and resistance of between 500Ω and 3kΩ.

TECHNICAL DATA	PT100/Tc + 2 RELAYS	PT100/Tc + 2 SSR	PT100/Tc + SSR/RELAY
Front protection	IP65		
Casing	PC+ABS plastic resin casing, UL94 V-0, polycarbonate window, thermoplastic resin keys		
Dimensions	front 74x32 mm, depth 59 mm (without terminals)		
Mounting	panel mounting with 71x29mm (+0.2/-0.1 mm) drilling template		
Operating temperature	-5°C...55°C		
Storage temperature	-30°C...85°C		
Ambient operating/storage humidity	10...90% RH (non-condensing)		
Display range	PT100: -150...650°C (-58...230°F) - TcJ: -40...750°C / TcK: -40...1350°C on display with 3 ½ digits + sign		
Analogue Input	1 PT100 or 1 TcJ or 1 TcK (configurable)		
Serial	TTL for connection to Copy Card		
Digital outputs (configurable)			
- output OUT1	1 SPDT 8(3)A 1/2 hp 250V~	see "SSR Outputs" table	see "SSR Outputs" table
- output OUT2	1 SPST 8(3)A 1/2 hp 250V~	see "SSR Outputs" table	1 SPST 8(3)A 1/2 hp 250V~
Measurement range	from -150 to 1350°C		
Accuracy	see "PT100/TcJ/TcK models" table		
Resolution	see "PT100/TcJ/TcK models" table		
Consumption	1.5 VA max (mod. 12V) 3 VA max (mod. 230V)	1.5 VA max (mod. 12V) 3 VA max (mod. 230V)	3 VA max
Power Supply	12V~/⎓ (±10%) 230V~ (±10% - 50/60 Hz)	12V~/⎓ (±10%) 230V~ (±10% - 50/60 Hz)	230V~ (±10% - 50/60 Hz)

WIRING DIAGRAM	PT100/TcJ/TcK + 2 RELAYS	PT100/TcJ/TcK + 2 SSR
12V model		
230V model		
Terminals	**1-2** N.O. regulator relay OUT1 **4-5** N.O. regulator relay OUT2 **6-7** Power Supply **8-9** Digital Input D.I. **10-11-12** Probe input Pb1 (**PT100**: 10-11-12; **Tc**: 11-12) **A** TTL input for Copy Card	**1-2** SSR Output OUT1 **4-5** SSR Output OUT2 **6-7** Power Supply **8-9** Digital Input D.I. **10-11-12** Probe input Pb1 (**PT100**: 10-11-12; **Tc**: 11-12) **A** TTL input for Copy Card

PT100/TcJ/TcK + SSR/RELAY		
Only 230V model		**1-2** SSR Output OUT1 **4-5** N.O. regulator relay OUT2 **6-7** Power Supply **9-10** Digital Input D.I. **11-12-13** Probe input Pb1 (**PT100**: 10-11-12; **Tc**: 11-12) **A** TTL input for Copy Card

NOTE:

1) For thermocouples TcJ and TcK provide an electrically separated supply for each instrument.
   Furthermore for thermocouples TcJ and TcK it is recommended to use an insulated junction.
2) The technical specifications stated in this document regarding the measurement (range, accuracy, resolution, etc.) refer strictly to the instrument and not to any accessories provided, such as the probes. This means, for example, that the error introduced by the probe must be added to the error of the instrument.

H13 PARAMETER CONFIGURATION

H13	D.I. state	FUNCTION STATE	from KEY or from MENU		COMMENTS
			ENABLED	DISABLED	
no	OPEN	ON	YES	YES	Enabled/Disabled with each mode
	CLOSED	OFF	YES	YES	Enabled/Disabled with each mode
nc	OPEN	OFF	YES	YES	Enabled/Disabled with each mode
	CLOSED	ON	YES	YES	Enabled/Disabled with each mode
noP	OPEN	ON	YES	YES	Enabled only from D.I./Disabled with each mode
	CLOSED	OFF	NO	N/A	Enabled only when D.I. is reopened
ncP	OPEN	OFF	YES	YES	Enabled with each mode/Disabled only from D.I.
	CLOSED	ON	N/A	NO	Disabled only from D.I.

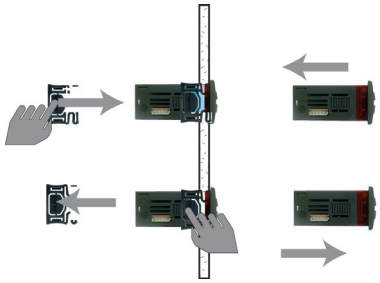
ELECTRICAL CONNECTIONS

IMPORTANT! Make sure the machine is switched off before working on the electrical connections.

The device is equipped with screw terminals for connecting electric cables of 2.5 mm^2 maximum crosssection (one wire per terminal in the case of power connections): for the capacity of the terminals, see the label on the instrument.
The relay outputs are voltage free. Do not exceed the maximum permitted current; for higher loads, use a contactor with sufficient power capacity.
Make sure that power supply is of the correct voltage for the instrument. 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.

MECHANICAL ASSEMBLY

The instrument is designed for panel mounting.
Make a 29x71 mm hole and insert the instrument; secure it with the special brackets provided. Do not mount the instrument 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 instrument cooling slots adequately ventilated.



LIABILITY AND RESIDUAL RISKS

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

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The same applies to any person or company involved in the creation and preparation of this document. Eliwell reserves the right to make aesthetic or functional changes at any time without notice.

CONDITIONS OF USE

Permitted use

For safety reasons, the instrument 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 with regard to the application, and must only be accessible using a tool (except 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:
- in terms of construction, as a built-in automatic electronic controller;
- according to the characteristics of automatic operation, as a type 1 B controller;
- in terms of software class and structure, as a Class A controller.

Uses not permitted

Any use other than that expressly permitted is prohibited. The relay contacts provided are of a functional type and subject to failure: any protection devices provided for by the product standards or suggested by common sense for obvious safety requirements must be installed externally to the instrument.

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ISO 9001

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