

eliwell

FC BASIC Electronic Fan-Coil Controller



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1 HOW TO USE THIS MANUAL

In order to refer to the manual quickly and easily, customers may find the following useful:

Call-outs

Callout column:

Callouts on the topics described are placed to the left of the text to allow the user to find the required information quickly.

Cross references

Cross references:

All the words in *italics* are listed in the index with a reference to the page where they are described in more detail; the text below serves as an example:

"activation of the alarm stops the *compressors*"

The italics indicate that under Compressors in the index there is a reference to the page where compressors are described in more detail.

If the online Help on the PC is used, the words in italics become proper hyperlinks (automatic links activated by a click of the mouse) that connect the different sections in the manual and allow you to navigate through the document.

Highlighted icons:

Some parts of the text are highlighted in the callout column using icons with the following meanings:



Note: draws attention to a specific topic that users should take into account.



Tip: highlights a suggestion that helps users to understand and use the information on the topic described.



Attention! : highlights

1. information that may damage the system or place persons, equipment, data, etc at risk if not known. These sections must always be read prior to use.
2. a specific topic that users should take into account so that the system does not malfunction or is used improperly.

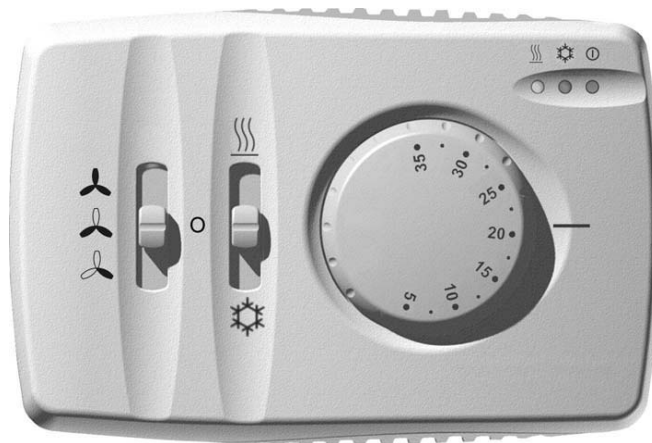
2 INTRODUCTION

FC BASIC is an electronic controller for 2-4 pipe fan-coils. It controls the fan and the valves that regulate water flow and can also control a battery of *electric heaters* for winter operation. A compact wall-mounted version is available which is easy to install and to wire.

Interface F1

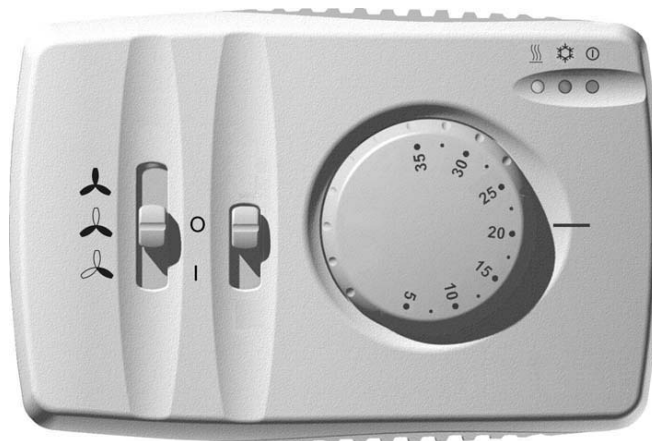
FC Basic

Interface F1



Interface F2

Interface F2



A knob on the panel is used to adjust the set point, and two slider switches are used to set

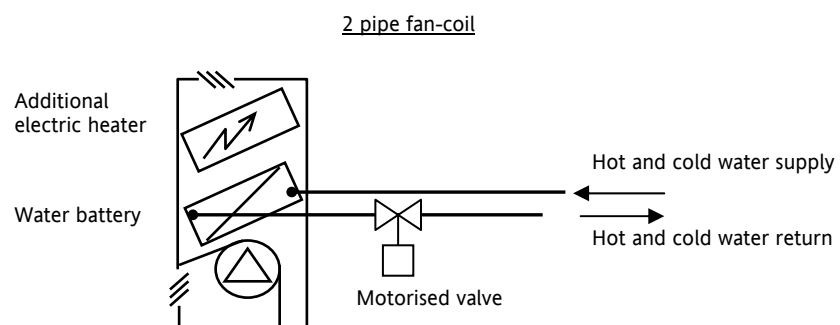
- the mode
 - for **Interface F1** (heating/off/cooling)
 - for **Interface F2** (on/off)
- the fan speed (low/medium/high).

Some models also feature a *remote Heating/cooling* control and an *economy* function.

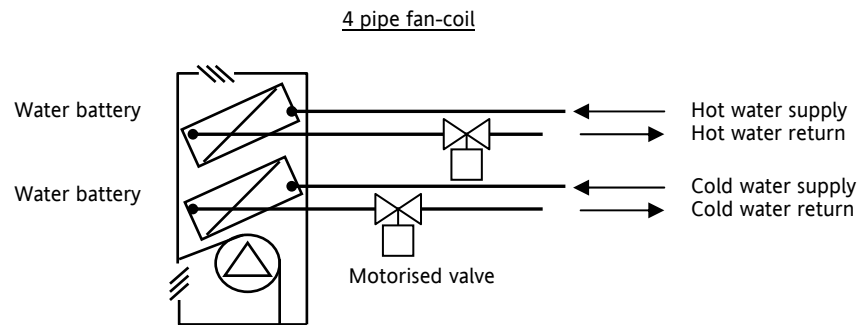
2.1 Example of a Fan-coil installation

Typical 2 and 4 pipe fan-coil installations are illustrated below:

2 pipe installation



4 pipe installation



Fan control

DELIVERY FAN:

The fan is located just before the *finned battery*; and it takes back the room air via the inlet air duct. The air flows across the batteries before being released into the room.

If the control is installed on the fan coil unit itself, an additional return air sensor, positioned in the flow of inlet air detects the room temperature. In this case, the temperature measurement is valid only if the flow of inlet air is sufficient to nullify or reduce stratification phenomena in the room.

Finned battery

WATER BATTERY – MOTORISED VALVE

Consists of a water-air exchanger, located internally, across which the inlet air travels. Hot or cold water, produced by a boiler or a chiller, flows through the exchanger.

Valve

There may be a dual battery supply circuit (4-pipes); the 4-pipe configuration may be set up with two motorised valves and two independent exchangers, or with a single exchanger (2-pipes). In some cases it is important to be able to measure the temperature of the water supplied to the battery, which may be done with a water sensor located downstream of the battery's return and the *valve*.
(see *Anti valve sticking*)

Electric heaters

ELECTRIC HEATERS

The electric battery may be used to *heat* air in 2-pipe systems when there is only cold water available (*electric heaters* in regulation), or to assist heating using water when room temperature is far from setpoint (2nd step *electric heaters* in integration).

2.2 Available models

14 versions of FC Basic are available with different operating features, summed up in the table below:

Table of models

Product code explanation:

Position	Character	Description
1st	2	2-pipe fan coil system only
	4	4-pipe fan coil system only
	U	Universal model, selectable 2- or 4-pipe fan coil system (<i>Dip switch</i>)
2nd	1	Mode slider switch Heating/Off/Cooling (<i>Interface F1</i>)
	2	Mode slider switch On/Off (<i>Interface F2</i>)
3rd	0	Electric heater not present
	1	Electric heater present
	2	Electric heater presence selectable (<i>Dip switch</i>)
	3	INTEGRATED AND AUTOMATICALLY ADJUSTING electric heater
4th	E	<i>Economy</i> switch present on top of controller
	N	Economy Function, available on terminals
5th	/L	Local Heating/Cooling mode selection (local slider switch)
	/R	<i>Remote Heating/Cooling</i> mode selection (external switch)
	/W	Water sensor use requested

Example:

- ❑ **210/L** : 2-pipe fan coil + H/Off/C mode slider (*Interface F1*) + electric heater present + local mode selection
- ❑ **U22E/R** : Universal (2- or 4-pipe fan coil) + On/Off mode slider (*Interface F2*) + electric heater presence selectable + *Economy* switch + remote H/C mode selection
- ❑ **U22N/R** : Universal (2- or 4-pipe fan coil) + On/Off mode slider (*Interface F2*) + electric heater presence selectable + *Economy* Function (available on terminals*) + remote H/C mode selection

*see electrical diagram, terminals 21-22

Remote air sensor and water sensor

Remote air sensor and water sensor:

- Temperature sensor NTC, plastic cap 7x25, reinforced insulation PVC cable length=1,5m
- Temperature sensor NTC, metal cap 6x40, reinforced insulation PVC cable length=1,5m

Product models selection guide:

	Models	210*/L	211*/L	220*/W	220*/R	221*/W	221*/R	410*/L	420*/W	420*/R	U12*/L	U22*/W	U22*/R	223*/W	U23*/W
2 pipe fan coil model		•	•	•	•	•	•				•	•	•	•	•
4 pipe fan coil model								•	•	•	•	•	•		•
Universal use model											•	•	•		•
Mode Slider	Interface F1	•	•					•			•	•	•		
	Interface F2			•	•	•	•		•	•				•	•
Water sensor		•	•	•		•	•		•	•	•	•	•	•	•
Remote H/C					•		•			•			•		
Manual change-over		•	•		•		•			•			•		
Automatic change-over				•		•			•			•		•	•
Outputs (water valve)	H or C	•	•	•	•	•	•				X	X	X	•	•
	H and C							•	•	•	X	X	X		
Electrical Resistors	Electric H		•			•	•				X	X	X	•	•
Thermo-regulator	H/C	•	•	•	•	Y	•	•		•	•	Y	•		
	Dead Zone					Y			•		Y			•	•
Hot Start driver	Timer	•	•		•	•	•	•	•	•	•	•	•		
	Temperature	•	•	•		•		•	•		•	•			
Window contact input	Frost mode	•	•	•		•		•	•		•	•			

- = E for models with additional **ECONOMY** switch on top of controller
- = E for models with additional **ECONOMY** Function, available on terminals: clean contact or under voltage (see electrical diagram, terminals 21-22)
- x : designation of output use depends on **Dip switch 1, 2 and 3** position
- Y : designation of function use depends on **Dip switch 3** position

PLEASE NOTE:

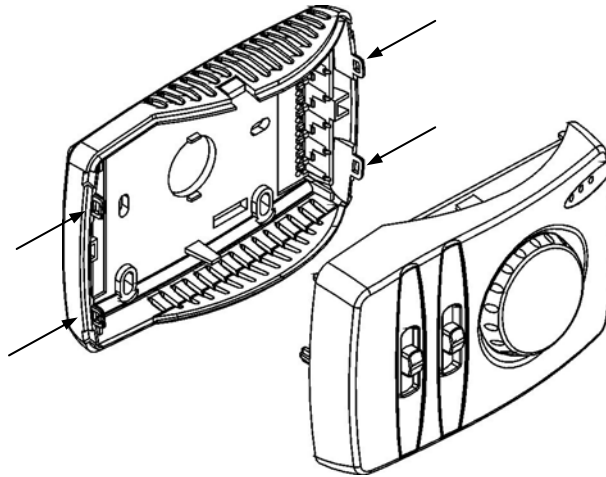
Water Probe mandatory for FC Basic 2 pipes model with

- electrical heaters not present
- electrical heaters present in integration mode

3 INSTALLATION

The wall-mounted version of FC Basic consists of two parts:

- the first part (connector base plate) contains connectors only, and is anchored to the wall;
- the second part (main interface) contains all electronics and controls, and can easily be fitted onto the first part.



This set-up permits easy *installation* with no danger of damage to electronic components.

To separate the connector base plate from the main interface, use a tiny screwdriver, insert the screwdriver into the appropriate holes (at the side of the housing), wrest gently till both parts are separated.

FC Basic can also be installed inside the fan-coil unit. An additional remote air sensor needs to be mounted in the return air flow on the unit.

3.1 Warnings

INSTALLATION MUST BE CARRIED OUT BY QUALIFIED PERSONNEL ONLY!

Due to the numerous *functions* and versions of controllers available, models offer different *functions* and options.

The description of the controllers in this document is general and is provided for information only.

For detailed information on the *functions* available, please contact an authorized dealer or the Sales Office of Eliwell.

Before *installation*, always read the labels fitted on the device.

Parts which are under hazardous voltage must not be accessible under regular operating conditions.

The device must be adequately protected from water and dust.

Do not install the control in environments with the following characteristics:

- Relative humidity (non-condensing) over 90%,
- Strong vibrations or shocks
- Ongoing exposure to jets of water under pressure
- Exposure to aggressive, polluting atmospheric agents which could cause corrosion or oxidation (such as sulphuric or ammoniac substances, salt mists, fumes)
- Presence of considerable magnetic or radio interference (such as transmission antennas)
- Exposure to direct sunlight or atmospheric agents.

When connecting up controls with one another, with accessories, electric loads or other devices, take great care in relation to the following:

- Incorrect connection with the power supply voltage could damage the control.
- Use of wire terminals which are appropriate for the terminals. Slacken the terminal screw, insert the wire terminal, and then tighten the screw again. Check that it is tight by pulling gently on the wire. Do not use an automatic screwing machine (or use with a torque setting of less than 50 N*cm)
- Possible electromagnetic interference: wire up low voltage utilities separately from high voltage utilities. Keep temperature sensor cables and digital inputs separate from cables with inductive loads or power cables as much as possible.
- Never wire power cables and temperature sensor cables through the same trunking/conduit. The remote sensor wires must be kept far away from power devices (such as power *relays*). Make sure the route travelled by these cables is as short as possible.
- Never apply loads to outputs, greater than those specified herein.
- Observe *connection diagrams* carefully when connecting up loads.

3.2 Mounting

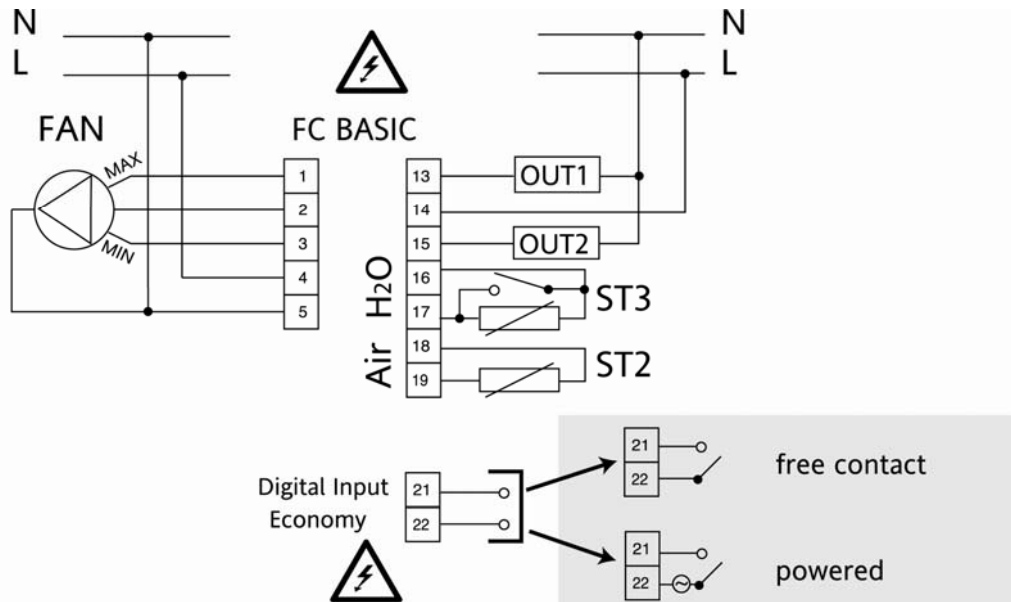
The controller should be mounted in a room at a location which:

- Ensures easy access for operation
- Is free of curtains, cupboards, shelves, etc...
- Ensure free circulation of air
- Is free of direct sunlight
- Is free of draft (e.g. open window or door)
- Is not directly affected by a heating or cooling source
- Is not mounted on an outer wall
- Is mounted on the wall at approx. 1,5 m from the floor [Mounting](#)

3.3 Connection diagrams

Connections

Utilities must be connected up to the FC Basic as shown below:



PLEASE NOTE: terminals 21-22 available on /N models.
Clean contact input or under voltage, depending on model (see label).

PLEASE NOTE: FC Basic U23 N/W

The ECO function, driven by the powered digital input (terminals 21-22), has **to be used only with an external (air) probe** connected to the ST2 input (terminals 18-19) ; the [dip switch](#) 6 has to be set in OFF position.

ST3 = Change Over sensor input ST3 = Ingresso sonda Change Over ST3 = Entrada sonda Change Over ST3 = Change Over Fühlereingang ST3 = Entrée sonde Change Over	ST2 = Air probe input ST2 = Ingresso sonda aria ST2 = Entrada sonda de aire ST2 = Luftfühlereingang ST2 = Entrée sonde d'air
--	--

OUTPUT	APPLICATION		
	2-pipe only	2-pipe with electric heater	4-pipe
OUT1	Not used	Electric heater	Cooling <i>valve</i>
OUT2	Heating/Cooling <i>valve</i>	Heating/Cooling <i>valve</i>	Heating <i>valve</i>

3.4 Analogue inputs

There are three *analogue inputs* available:

index	Description	sensor range	meas. range
ST1	NTC sensor input. room temperature (built-in, always available) This is the temperature control sensor. It is always integrated on the PCB. The selection to use the local or remote sensor is done through <i>dip switch</i> : <ul style="list-style-type: none"> • DIP 6 = universal models • DIP 4 = specific models -->see <i>dip switch table</i>	-50C° 110C°	-10C° 70C°
ST2	NTC sensor input. air temperature: This is the temperature control sensor. It is always integrated on the PCB, but can be an additional remote sensor, positioned in the return air flow. The selection to use the local or remote sensor is done through <i>dip switch</i> : <ul style="list-style-type: none"> • DIP 6 = universal models • DIP 4 = specific models -->see <i>dip switch table</i>	-50C° 110C°	-10C° 70C°
ST3	NTC sensor input water temperature: This is the sensor used to detect water temperature and it should always be mounted downstream of the <i>valve</i> . It is involved in consent and operating <i>functions</i> . This input is also used for models with <i>Remote Heating/Cooling</i> switch and on all other models for the <i>Window contact</i> input (<i>connection diagrams</i>)	-50C° 110C°	-10C° 70C°

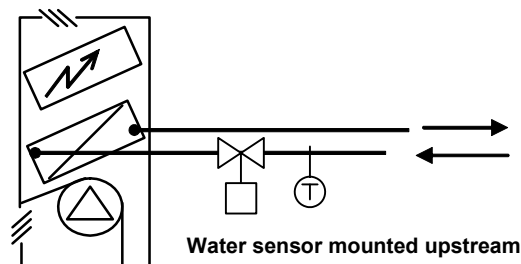
PLEASE NOTE: ST2 & ST3 are NOT included in the product package.

Index	Description	use
(dial knob)	Potentiometer input: Used to set the controller's operating set point, between a minimum of 5 C° up to a maximum of 35 C°.	-105° +105° from average point

Related topics: *Set point dial knob* and *Range limitation*

Note: The presence of the water sensor is automatically detected by the controller during power start-up.

This means that *functions* like temperature driven *Hot start*, centralised On/Off (only 2-pipe models), periodic *valve*



opening (only 2-pipe models) will be activated or not, depending on the presence of the water sensor.

The water sensor (*analogue inputs*) should always be mounted on the water pipe, upstream of the *valve* and as close as possible to the battery. On a 4-pipe system, it must always be mounted on the hot water circuit, never on the cold water circuit.

3.5 Digital outputs

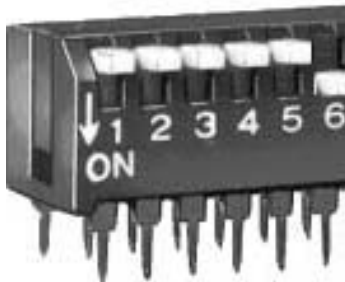
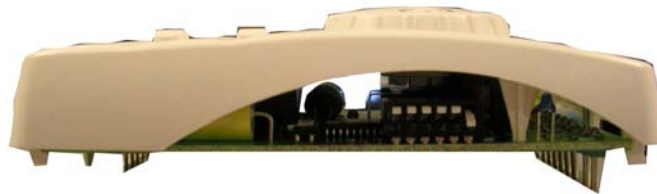
Relays

Digital outputs consist of 3 *relays*

Index	Function	Description
FAN	Delivery <i>fan control</i> (refer to <i>Fan demand operation</i>)	Starts ventilation. The <i>fan control slider</i> can be used to set the phase on three different terminals to permit manual selection of the 3 fan speeds.
OUT1	<i>Valve</i> or electric heater control	If there is a battery of <i>electric heaters</i> , this relay pilots it; if not, it is used as a second <i>valve</i> for a <i>4 pipe installation</i> .
OUT2	<i>Valve</i> control	Permits water to flow into the battery.

3.6 Dip switch

The back of the electronic board (see photo) has 4 (or 6 in case of the universal models) *dip switches*, the *functions* of which are listed below:



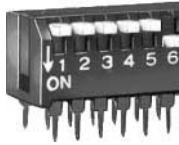
3.6.1 Dip switch – universal models

* In models with INTEGRATED, AUTOMATICALLY ADJUSTING *electric heaters*, the HOT function is not available.

**The Dip-Switch default setting (factory pre-set) is the following:

DIP nr.	Description	On	Off	default (factory pre-set)**
6	Air sensor used	Local	Remote	On
5	Fan status in cooling	Thermostatic demand	Always ON	Off
4	Dead Zone value Hysteresis value	5°K 2°K	2°K 1°K	Off
3	Electric heater control	Regulation	Integrated	Off
	time for <i>Hot Start</i>	HS=0 (not delayed)*	delayed	
2	2- or 4-pipe system	4-pipe	2-pipe	Off
1	Electric Heater presence	Present	Not present	Off

3.6.2 Dip switch –specific models



- In models with INTEGRATED, AUTOMATICALLY ADJUSTING *electric heaters*, the HOT function is not available**
- The Dip-Switch default setting (factory pre-set) is the following:

DIP nr.	Description	On	Off	default (factory pre-set)**
4	Air sensor used	Local	Remote	On
3	Fan status in cooling	Thermostatic demand	Always ON	Off
2	Dead Zone value Hysteresis value	5°K 2°K	2°K 1°K	Off
1	Electric heater control	Regulation	Integrated	Off
	time for <i>Hot Start</i>	HS=0 (not delayed)*	delayed	

To access the *DIP switches*, please proceed as follows:

- First separate the connector base plate from the main interface, by using a tiny screwdriver. Insert the screwdriver into the appropriate holes (at the side of the housing), wrest gently till both parts are separated.
- Turn the back of the main interface towards you and you will see the *DIP switches* mounted onto the PCB.

4 USER INTERFACE

FC Basic has three main controls plus one optional control:

- Dial knob
- 2 sliders
- 1 *economy slider (optional)*



4.1 Set point dial knob

Potentiometer for setting operating set point.

Operating set point is altered on the basis of the angle set, from 5 to 35 Celsius.

Excursion from the potentiometer centre point is an angle of +/- 105°.

4.1.1 Click-stop dial knob turning

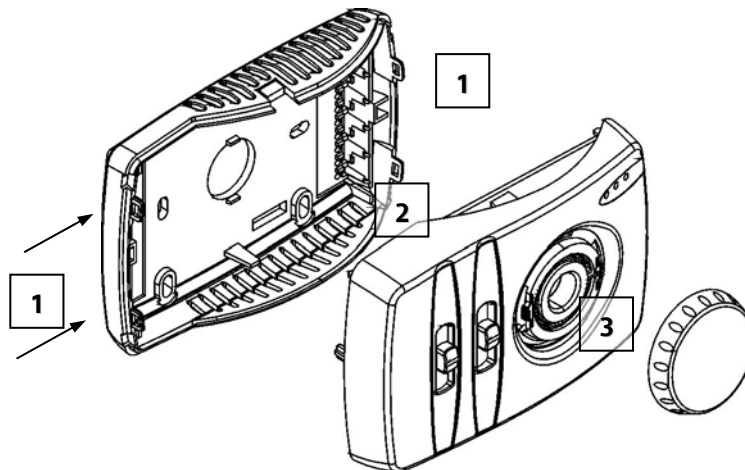
A sensible click-stop mechanism of approx. 0,5° per position gives the user a more accurate feeling during adjustment.

4.1.2 Range limitation

The set point may be limited on all models by positioning 2 pegs, (plugs) which are mounted under the dial knob, at a specific minimum and maximum value. When the 2 pegs are mounted one next to the other, it is even possible to lock the set point at a specific value.

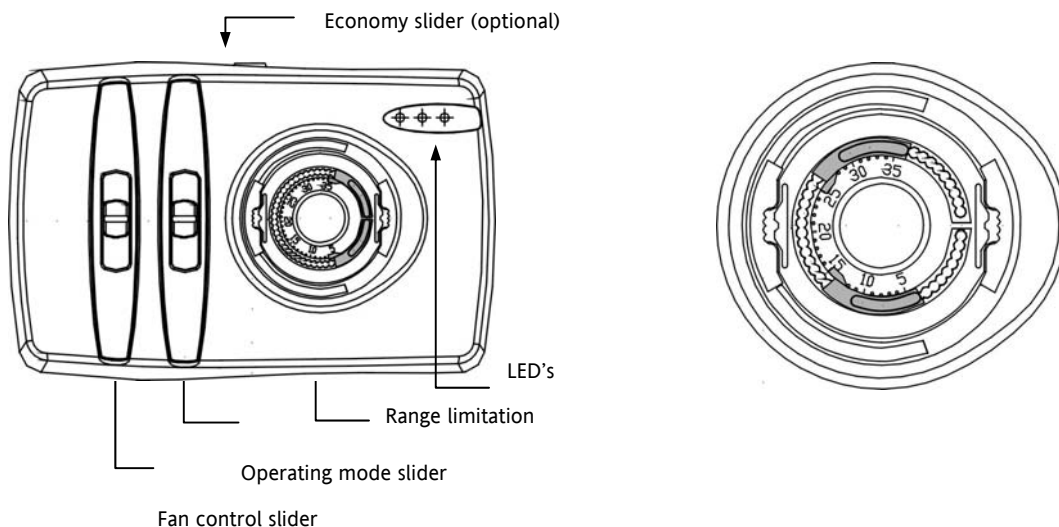
Please proceed as follows:

1. Separate the connector base plate from the main interface, by using a tiny screwdriver. Insert the screwdriver into the appropriate holes (at the side of the housing), wrest gently till both parts are separated.
2. Before proceeding with the next step, first turn the dial knob to the mid-position when you want to limit (min. / max.) the range. When you want to lock the set point, first turn the dial knob in the desired lock position value. Turn the back of the main interface towards you and you will see a hole somewhere in the middle of the electronic board. Push gently on the pin connected with the dial knob till it becomes released from the main interface.
3. You can now remove the dial knob on the front of the main interface and the *range limitation* becomes accessible. After you entered the pegs in the desired limitation position, mount the dial knob back onto the interface in the correct way.



Factory setting of the limitation pegs at 5°C and 35°C:

Example of a range limitation between 15°C and 25°C:



4.2 Fan control slider

Switches the phase sectioned by the fan relay on three motor windings to achieve three different fan speeds: High/Medium/Low.

Low speed:



Medium speed:



High speed:



4.3 Operating mode slider

Depending on the model (refer to [table of models](#)), it is possible to select Heating/off/Cooling operating mode or on/off (0 / I) operating mode.

Heating mode:



Cooling mode:



Off mode:



On mode:



4.4 Economy slider (optional)

Located at the top of the controller and used to operate the [economy](#) function.

4.5 LED's

Three [LED's](#) are used to indicate the actual mode:

- On/[economy](#) LED: (YELLOW)
Stays on during normal operation; Blinks during [economy](#) operation
- Cooling LED: (GREEN)
Illuminates during cooling demand ([cool](#)) and in the Dead zone.
Blinking: indicates that [regulation algorithm](#) has not been satisfied but consent, by the water sensor, is not being given to start the fan.
Stays on: cooling is available (fan and [valve](#) active).
- Heating LED: (RED)
Illuminates during heating demand ([heat](#)) and in the Dead zone.
Blinking: indicates that [regulation algorithm](#) has not been satisfied but consent, by the water sensor (2-pipe models only), is not being given to start the fan. (**refer to [Hot Start](#)**)
Stays on: heating is available (fan, [valve](#) and/or electric heater are active)
- All [LED's](#) Blink for 3 seconds when the controller is turned onto the power supply.

Alarm indication

All [LED's](#) continuously Blink to indicate an alarm status. An alarm will be generated if one of the sensors is damaged, disconnected (some models mandatory need the water sensor), or short circuited, until the problem has been solved. This will also appear when the [window contact](#) has been activated (contact closed).



5 TEMPERATURE CONTROL FUNCTIONS

Depending on the model and available selections, FC Basic may be operated in the following modes:

Operating modes

- **COOL** (summer operation)
- **HEAT** (winter operation)
- **AUTO** (automatic summer – winter selection)

Cool

Cooling: this is “summer” operating mode; the machine is configured for cooling.

Heat

Heating: this is “winter” operating mode; the machine is configured for heating.

Auto

Auto: The machine is configured to switch automatically from **cool** to **heat** mode and vice versa. Depending on the temperature detected by the water sensor (2-pipe system) or air sensor (4-pipe system or 2-pipe with INTEGRATED AND AUTOMATICALLY ADJUSTING **electric heaters**).

The utilities controlled in the various **operating modes** are shown in the table below:

Operating modes table

Mode	Setting	Utilities controlled
HEAT	MANUAL	<ul style="list-style-type: none"> • Valve: water (for 2-pipe fan-coil), hot water (for 4-pipe fan-coil) • Fan (3 manually set speeds) • Electric heater (enabled by dip switch dip 1 – universal models only)
COOL	MANUAL	<ul style="list-style-type: none"> • Valve: water (2 pipes), cold water (4 pipes) • Fan (3 manually set speeds)
AUTO	AUTOMATIC	Dynamic operation in the following modes: <ul style="list-style-type: none"> • HEAT • COOL • “STAND BY” condition (Summer- Winter), on the basis of comparison of water temperature with set point setting • «OFF» (dead zone), depending on the difference between air temperature and set point temperature.

Manual change over

Summer – Winter (**Cool – Heat**) operating mode may be set manually in models with a heating – cooling slider , locally (**operating mode slider**) or remote(**Remote Heating/Cooling**).

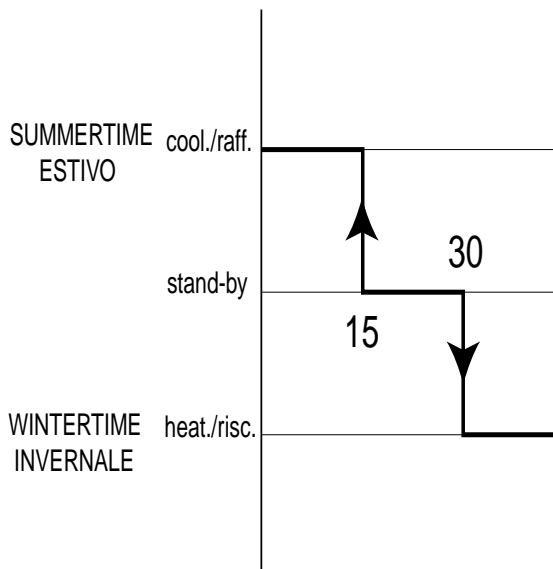
Automatic change over

The following **regulation algorithms** are available, depending on the model:

- Winter/summer (**Heat / Cool**)
- Dead zone with lateral band

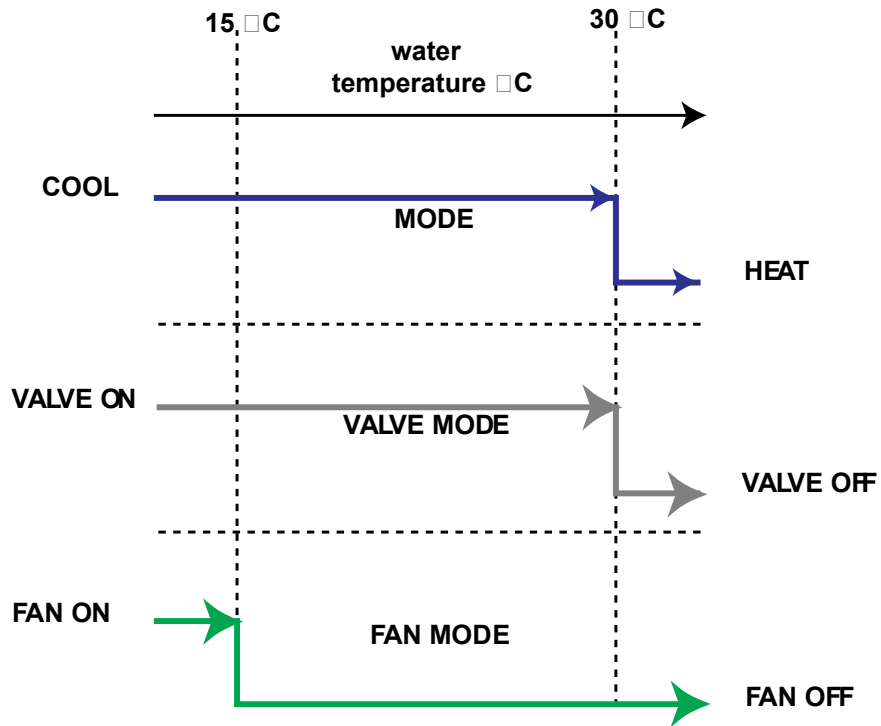
In 2-pipe systems models with water sensor, operating mode is selected automatically in function of the temperature detected by the water sensor:

- **Cool** (Summer) operation for temperatures of less than 15 °C
- **Heat** (Winter) operation for temperatures of more than 30 °C

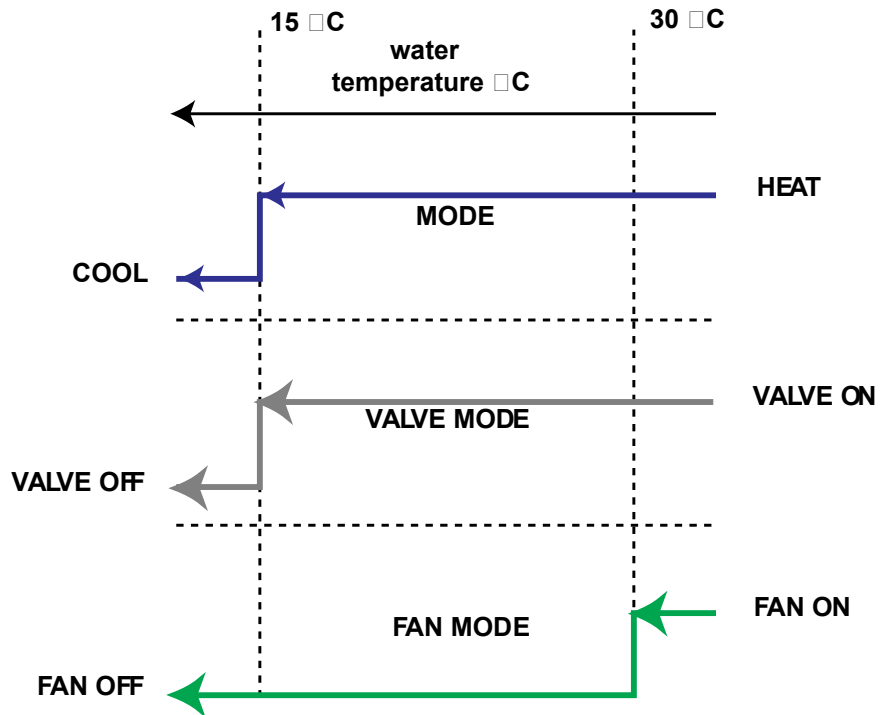


The automatic water temperature based change-over (SUMMER / WINTER) takes place as illustrated in the drawings below and generates consent to the activation of available resources.

- In **COOL** mode (consent to **valve** and fans at water temperatures lower than 15°C), the switch to **HEAT** is explained below (with relative changes to consent):



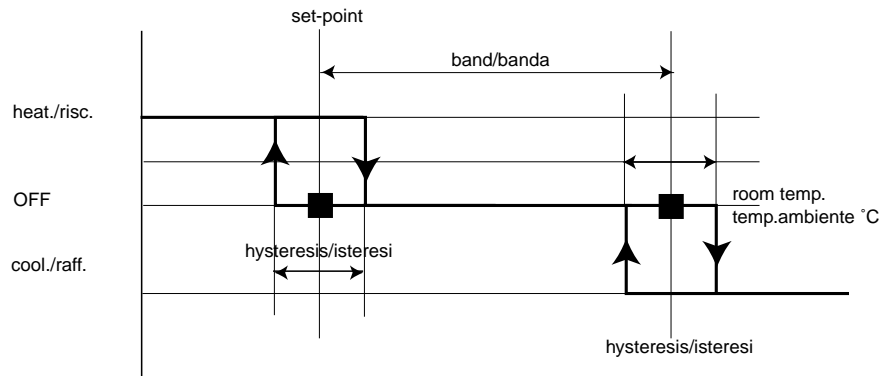
- in **HEAT** mode (consent to **valve** and fans at water temperatures above 30°C), the switch to **COOL** is explained below (with relative changes to consents):



Automatic DEAD ZONE change-over

When the function mode is selected automatically depending on the difference between ambient temperature and the set point temperature, this is referred to as an *automatic DEAD ZONE change-over* with lateral band.

Switching between *heat* and *cool* settings takes place automatically as illustrated below.



5.1 Regulation algorithm

FC Basic controls utilities on the basis of consents (determined as explained above) and the status of the temperature controller. The latter is a set point function that can be set using the scaled knob.

In a two-pipe *installation* the *regulation algorithm* is configured:

- For the Dead zone if there are *electric heaters* in regulation (or INTEGRATED AND AUTOMATICALLY ADJUSTING) and there is no local / *remote heating/cooling* selection.
- For Summer/Winter if there is a water sensor or local / *remote heating/cooling* selection (refer to *operating mode slider* and *Remote Heating/Cooling*)

In a four-pipe *installation* the *regulation algorithm* is configured:

- For Summer/Winter, if there is a local / *remote heating/cooling* selection (refer to *operating mode slider* and *Remote Heating/Cooling*).
- For the Dead zone, in all other cases.



The hysteresis and the Dead zone band, are determined by

- *dip switch* 4 – universal models
- *dip switch* 2 – specific models.

5.1.1 Utility control

- *Operating modes (heat / cool)* are affected by the consent to the water sensor, if present, for 2-pipe system models. If both water heating and supplementary *electric heaters*, set as integrated source, are both available, the *electric heaters* will be added as a second step separated from the first step by a distance equal to the neutral band (operation of **INTEGRATED AND AUTOMATICALLY ADJUSTING electric heaters** is more complex. See the relative section).
- If there are *electric heaters* set as regulation, *heat* is regulated only with *electric heaters* and corresponds to the “heat” step in the diagrams.
- *Dip switch*:
 - *dip switch* 5 – universal models
 - *dip switch* 3 – specific models.may be used to select whether the fan is On or Off once the required temperature has been achieved in cooling mode; in heating mode it will always be off.



If there is a water sensor, and it does not give consent for cooling operation and the *regulation algorithm* is set to cooling operation, the fan the fan is switched off respecting the time of 1 minute for *post-ventilation* in the specified cases (see related paragraph).

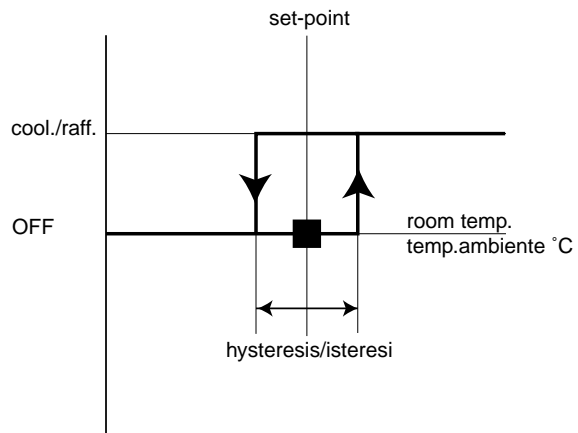


Configurations with no heating/cooling slider (*operating mode slider*) must have four pipes or *electric heaters* set as regulation or a water sensor.

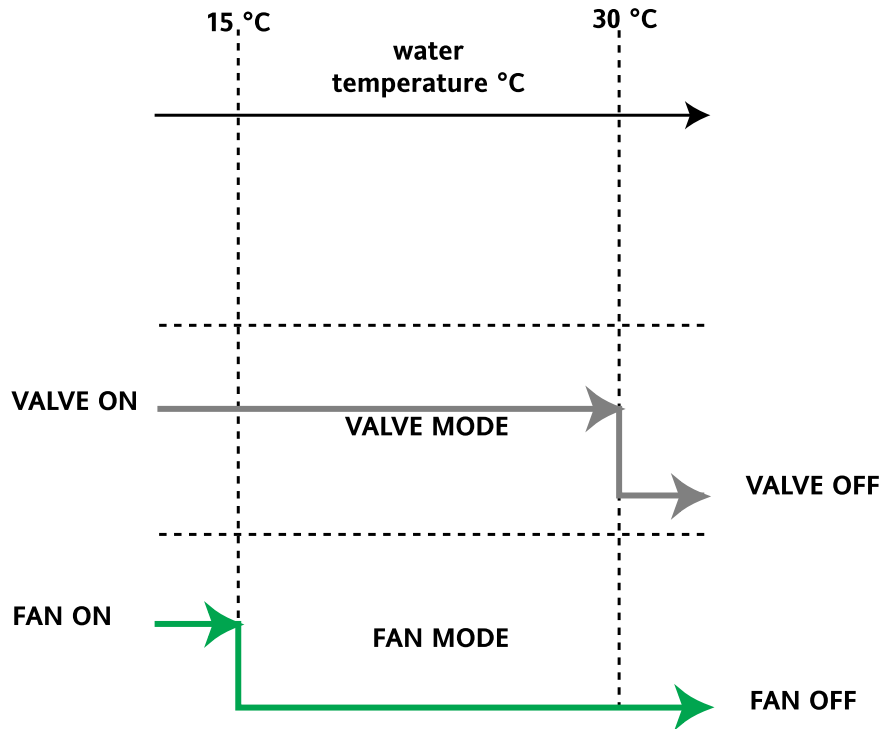
Observe the explanatory diagrams below:

5.2 Regulation algorithm in Heating/Cooling mode

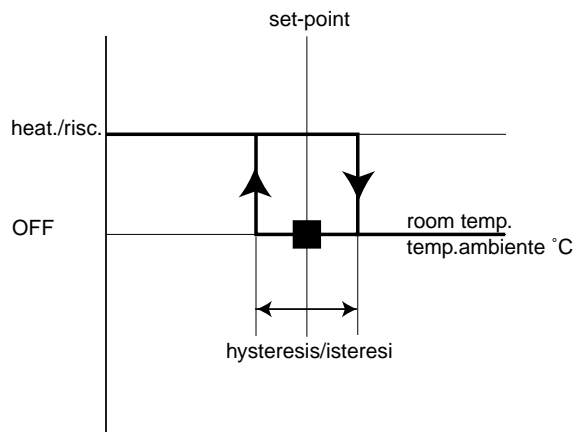
Regulation algorithm in cooling mode



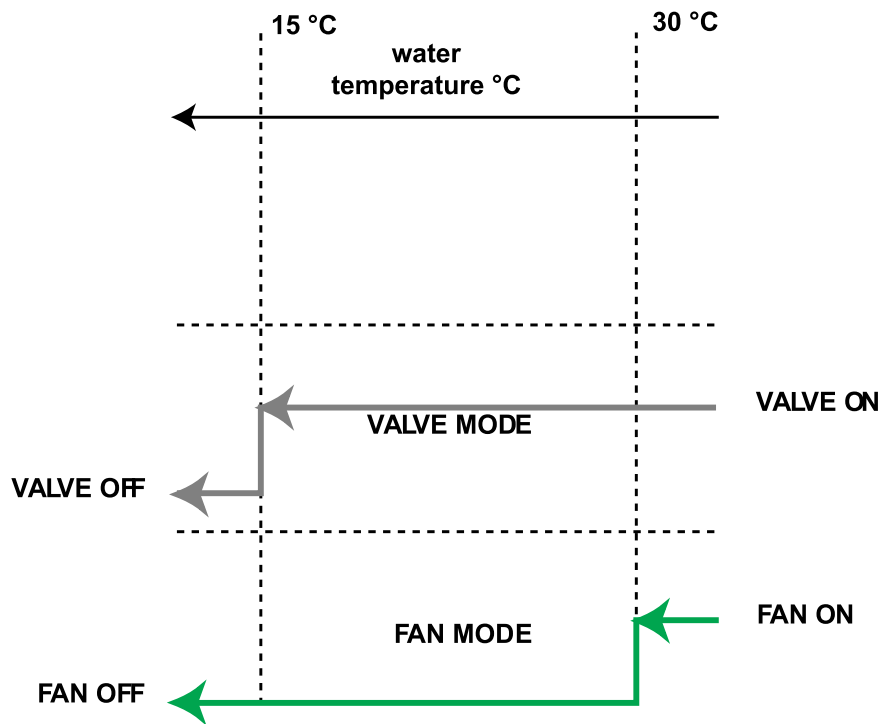
5.2.1 REGULATION ALGORITHM IN COOL MODE



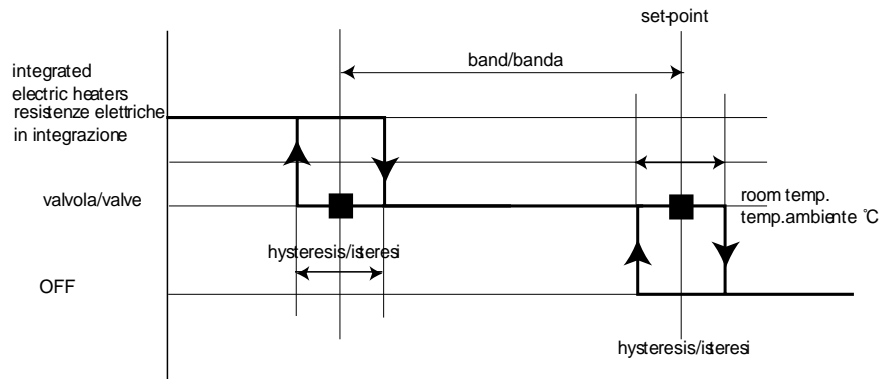
Regulation algorithm in heating mode



5.2.2 REGULATION ALGORITHM IN HEAT MODE

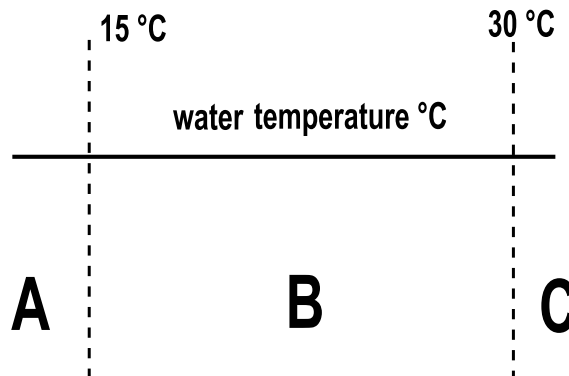


5.2.3 REGULATION ALGORITHM IN HEAT MODE WITH SUPPLEMENTARY ELECTRIC HEATERS as integrated source



5.2.4 REGULATION ALGORITHM IN HEATING MODE WITH SUPPLEMENTARY AUTOMATICALLY ADJUSTING ELECTRIC HEATERS

In models with **INTEGRATED AND AUTOMATICALLY ADJUSTING electric heaters**, heating components are determined by the temperature read by the water probe as well as always being subject to the consents programmed for this sensor. With this configuration, the automatic change-over always takes place at the air probe temperature (Dead Zone). Setting depends on water temperature, as shown in the following three examples:

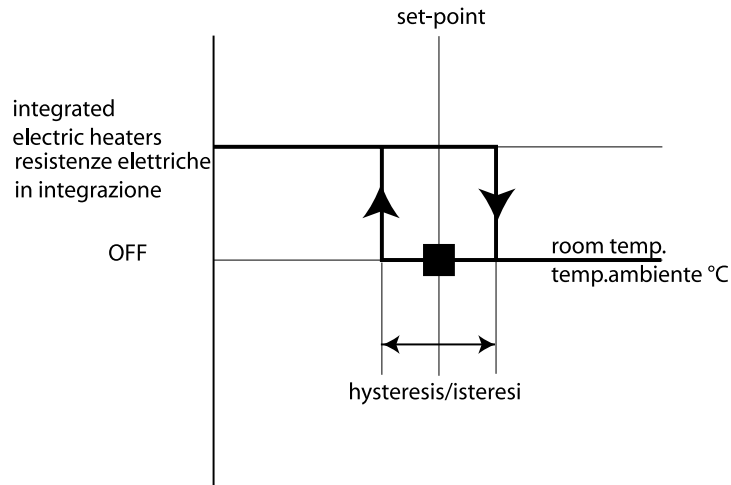


N.B.: There is a fixed hysteresis of 1°C between temperatures of 15°C and 30°C to prevent constant fluctuations between A and B and between B and C.

For example, for rising temperatures, the switch from A to B takes place at 15.5°C whilst for falling temperatures, the switch from B to A takes place at 14.5°C. The same happens at the 30°C threshold (real thresholds of 29.5 and 30.5°C).

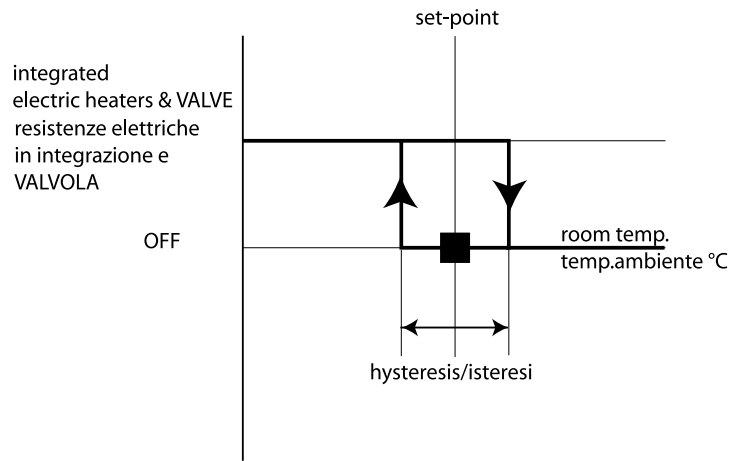
EXAMPLE A

The water temperature is too low to guarantee any transfer of *heat* from the water: the *electric heaters* alone are used (as if in regulation mode):



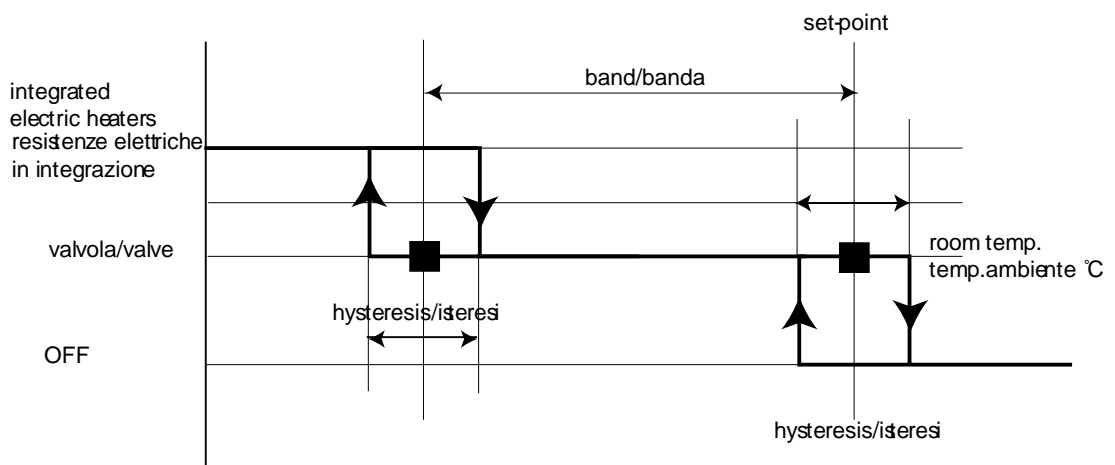
EXAMPLE B

Intermediate situation, *valve* and *electric heaters* are activated together with the temperature controller in **heating mode (winter)**.



EXAMPLE C

The temperature of the water is sufficient to transfer *heat*, the *electric heaters* (more cost-intensive) are a second option: temperature control is the same as the example with *electric heaters* in integration.



6 FUNCTIONS

6.1 Fan demand operation

The fan will only be operated in the manually selected speed, if the regulator has detected a request for Heating or Cooling. During dead zone the fan will be OFF. Through a *DIP switch*:

- *dip switch* 5 – universal models
- *dip switch* 3 – specific models.

you can select if the fan in cooling mode should run or not when the regulator is satisfied.

6.2 Hot Start

The *Hot Start* function prevents blowing a draught of cold air into the room during winter operation. It means preheating of the exchanger (*finned battery*) before ventilation begins.

If a water sensor is present (not possible on remote H/C models) ventilation will only start if the water sensor detects a temperature above 30 degrees. If this is not the case, it waits for consent from the sensor.

If there is no sensor, ventilation will always start after the 150 seconds delay time from *valve* opening.

PLEASE NOTE: if

- *dip switch* 3 = ON (universal models)
- *dip switch* 1 = ON (specific models)

the *Hot Start* delay is equal to zero (HS=0)

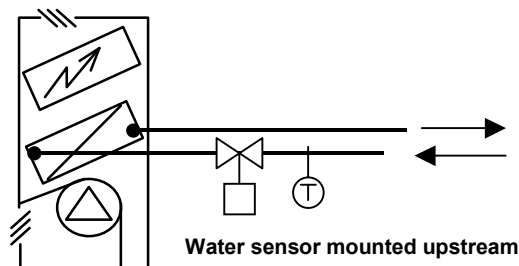
During the *Hot start* delay (through timer or water sensor), the red LED (heating) will Blink. After the delay, when the fan starts, the red LED will illuminate continuously.

This function is only enabled in heating mode.

The “temperature driven” *Hot start* function is only available on models with water sensor present for:

- 2-pipe installations with *electric heaters* set as integrated source (2° heating step)
- 4-pipe installations

The water sensor (*analogue inputs*) should always be mounted on the water pipe, upstream of the *valve* and as close as possible to the battery. On a 4-pipe system, it must always be mounted on the hot water circuit, never on the cold water circuit.



6.3 Periodic ventilation

Ventilation will be started for two (2) minutes at the end of the cycle to recycle air on the room air sensor if there has been no ventilation in the last twenty (20) minutes.

This prevents stratification of the air in the room, which will falsify the room temperature reading.

6.4 Anti-frost

A heating *regulation algorithm* with a set point of 8 C° always remains active, ignoring water sensor consent and operating mode. It always comes on if the temperature drops below 8 C°, even if the controller is switched off.

This prevents equipment inside the room from freezing.

A model with *anti-frost* function disabled is available on demand

6.5 Post-Ventilation

The fan continues to run for 1 minute* after a heating source (heating *valve* or electric heater) is turned off.

This function prevents overheating inside the fan coil unit.

*NB: *Post-ventilation* always lasts 1 minute (it has the priority on all other *functions*). For example, when a change of mode occurs (from *Heat* to *Cool*), the fan does not stop but continues to work for the determined minute.

6.6 Anti valve sticking

This function avoids *valve* sticking after they've remained in the closed position for a long time. Each time a *valve* output has been operated, a timer will be started. When the timer reaches the pre-set value (approximately 1 week), the *valve* output will be forced open for 3 minutes.

6.7 Economy

The *economy* mode can be selected:

- Through an optional switch, on top of the controller,
- Through the *Economy* Function , available on terminals, clean contact or under voltage terminal (depending on models)

This function "shifts" the set point as described below:

- In *HEAT* (winter) mode: the set point is decreased by 6° C
- In *COOL* (summer) mode: the set point is increased by 8° C

This function will save energy, for instance, during the night or a holiday period.

This function is available on all models with product codes having suffix "E" or "N".

The Yellow LED will Blink when the ECO mode is operational

6.8 Window contact

Through a *window contact*, (voltage free) connected onto analogue input ST3 (*connection diagrams*), the controller can be switched in standby mode (*anti-frost* mode active), when the *window contact* is closed. The purpose of this function is to prevent waste of energy when the window is opened by personnel.

This feature only applies to models which do not have the *remote Heating/Cooling* input.

The contact MUST be voltage free.

When the *window contact* is closed, all *LED's* will blink continuously. (*Alarm indication*)

To connect one *window contact* with several FC Basic controller inputs (ST3), you need to use an additional relay contact for each controller. A relay with a single SPST output contact or with multiple SPST contacts can be used.

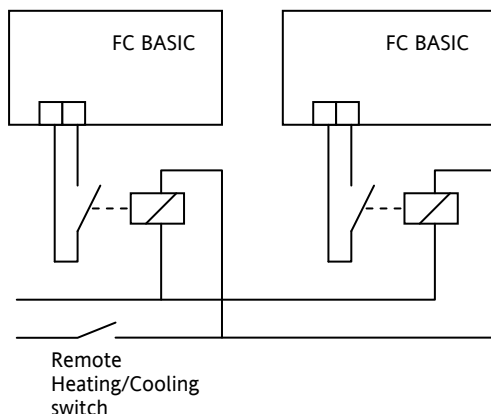
6.9 Remote Heating/Cooling

There are dedicated models (with suffix "/R", refer to *Available models*) which permit you to change the mode through an external switch; connected onto input ST1.

The contact MUST be voltage free.

Contact open = Cooling mode; contact closed = Heating mode.

To connect one remote H/C switch (contact) with several FC Basic controller inputs (ST3), you need to use an additional relay contact for each controller. A relay with a single SPST output contact or with multiple SPST contacts can be used.



7 TECHNICAL FEATURES

7.1 Technical data

TECHNICAL DATA (EN 60730-2-9)

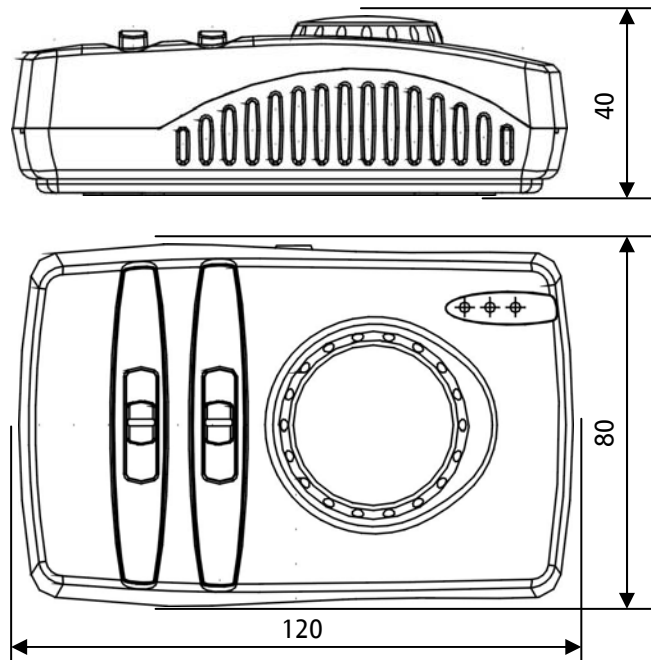
Classification:	automatic electronic temperature controller for built-in orstand-alone <i>installation</i> on a surface
<i>Installation:</i>	wall-mounted using the rear hood as a drilling template
in terms of connection:	device with flexible, external and removable cable with Y connection
Control type:	1.B
Pollution rating:	2
Material class:	IIIa
Overvoltage category grade:	II
Nominal impulsive voltage:	2500V
Operating temperature:	0÷+60 °C
Storage temperature:	-20÷+85 °C
Supply voltage:	230V~ ±10% 50/60 Hz depending on model
Consumption:	3.5W max
Software Class:	A
Ball test temperature:	80°C

FURTHER INFORMATIONS - MECHANICAL CHARACTERISTICS

Maximum admissible current on contacts:	5A 230V~
Protection class:	IP30
Casing:	plastic resin PC+ABS
<i>Dimensions</i> mm (Lxwxh):	120x80x40mm
Operating humidity (non-condensing):	10÷90% RH (non condensing)
Storage humidity (non-condensing):	10÷90% RH (non condensing)
<i>Analogue inputs</i>	: 1 (+1) NTC probes;
<i>Connections</i>	: screw terminals – SAURO connector for wires
	▪ max 2.5 mm ² rigid cable;
	▪ max 1.5 mm ² flexible cable.

7.2 Dimensions

120x80x40 mm



7.3 Allowed use

For safety reasons, the device should always be used in accordance with the manufacturer's instructions. All the electrical parts of the instrument are subjected to dangerous voltage levels and shall not be accessible directly: reinforced insulated devices must be used. The device should always be protected from water and dust.

7.4 Restricted uses

Uses other than allowed are forbidden. The relay contacts supplied are functional-type and are consequently liable to faults: any protection measure envisaged by the applicable regulations or suggested by common sense as regards obvious safety needs, must be carried out outside the implement.

7.5 Responsibility and residual risks

Eliwell shall not be held liable for any damage incurred as a result of:

- *installation*/use other than those intended, and, in particular, failure to comply with the safety instructions specified by applicable regulations and/or provided in this document;
- use with equipment which does not provide adequate protection against electric shocks, water and dust under the effective conditions of *installation*;
- use with equipment which permits access to hazardous parts without the use of tools;
- *installation*/use with equipment which does not comply with current regulations and legislation.

7.6 Disclaimer

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