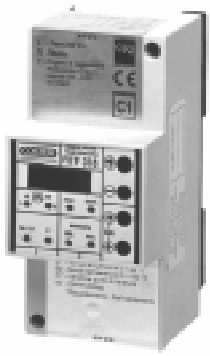
TEMPERATURE CONTROLLER

RTF 318 Eng. C1

DISCONTINUED PRODUCT

TO SEE A SUITABLE REPLACEMENT PRODUCT



- **Control of temperature with configurable features :**
  - Three-point modulating with PI
  - On-Off in one or two stages
  - Proportional On-Off in one stage
- **Power supply 230 V~; DIN rail compatible**

CE

1. APPLICATION

RTF 318 controller is designed for **hot** or **cold** temperature control in following types of plant:
- production DHW
- heating swimmimg pool water
- heating by underfloor panels or fan coils
- heating greenhouse beds
- air handling units

2. FUNCTIONS

The principal functions of RFT 318 are:
- Temperature control by NTC 10k Ω detectors (ambient, air duct or immersion):
  - at constant value: detector B1 (range 0 ... 40 °C)
    or
    detector B2 (range 0 ... 99 °C)
    or
    detector B1 (range 0 ... 40 °C) & detector B2 on flow (range 0...99 °C).
- Control output :
  - Three-wire modulating
  - On-Off in one or two stages
  - Proportional On-Off in one stage
- Adjustment of desired value by means of remote set point adjuster.

3. DETECTORS & TELECONTROL

No.	Description	Type	Sensing element	Code	Data sheet
1 or 2	Temperature detector: hot or cold water immersion	**SIH 010**	NTC 10 kΩ	B1-B2	–
	or ambient	**SAB 010**	NTC 10 kΩ	B1	–
	or air duct	**STA 010**	NTC 10 kΩ	B1-B2	–
	or cable-type	**SAF 010**	NTC 10 kΩ	B1-B2	–
	Options:				
1	Set point adjuster	**CDB 100**	–	Rt°	–

4. TECHNICAL DATA (factory settings in bold type)

• Electrical

Power supply	230V~ ±10%
Frequency	50…60 Hz
Consumption	2 VA
Protection	IP40
Radio disturbances	VDE0875/0871
Vibration test	with 2g(DIN 40 046)
Voltage-free output contacts:	
maximum switching voltage	250 V~
maximum switching current	5 (1) A
Construction standards	Italian Electrotech. Committee (CEI)
Software	Class A

• Mechanical

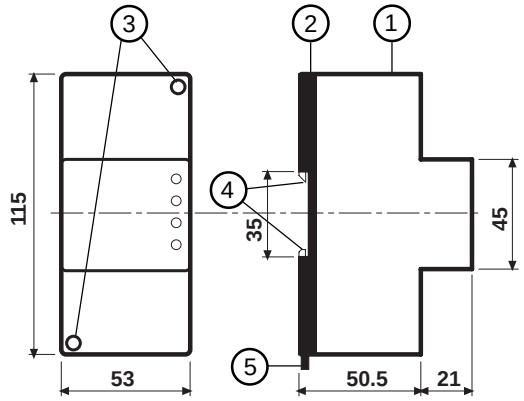
Case	DIN 3E module
Installation	DIN 35 rail
Materials:	
base	NYLON
cover	ABS
Permitted ambient temperature :	
operation	0…45 °C
storage	– 25…+ 60 °C
Permitted ambient humidity	Class F DIN 40040
Weight	0.27 kg

• Setting ranges (..) = cooling

Desired temperature:	
with detector B1 or B1 + B2	0…**20**(**25**)…40 °C
with detector B2 only	0…**20**(**25**)…99 °C
Desired temperature adjuster:	
with detector B1 or B1 + B2 (0 ... 40 °C)	± 5 °C
with detector B2 only (0 ... 99 °C)	± 10 °C
Minimum limit flow temperature	0…**18**(**10**)…99 °C
Maximum limit flow temperature	0…**50**(**30**)…99 °C
Control output :	– Three-wire modulating
	– On-Off in one or two stages
	– On-Off proportional in one stage
Actuator run time	**60** ; 90 ; 120 ; 180 s
Proportional band with only one detector :	± 0.5…**2**(**1**)…40 °C
Proportional band with two detectors:	
for detector B1	± 0.5…**2**(**1**)…40 °C
for detector B2	± 0.5…**20**(**10**)…99 °C
Integral time	0.5…**20**(**20**)…80 min.
On-Off differential	± 0.5…**2**(**1**)…40 °C
On-Off proportional time cycle	**5** ; 10 ; 20 ; 30 min.

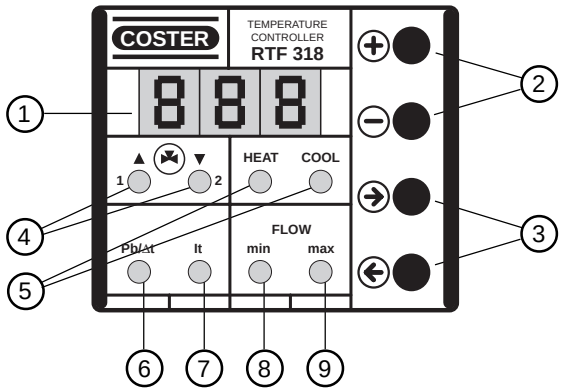
In the presence of electrical disturbances the output controls of the controller may change status but this will be restored automatically.

5. OVERALL DIMENSIONS



1 – Protective cover for electronic components
2 – Base with transformer, relay and terminal block
3 – Screws for securing cover and base
4 – DIN rail securing elements
5 – DIN rail release lever

6. FACIA



1 - Three-digit numerical display
2 - + and – keys for changing parameters
3 - → and ← keys for displaying parameters
4 - Control output LEDs
5 - Heating/Cooling LEDs
LEDs for data shown on display:
6 - Proportional band or differential
7 - Integral time
8 - Minimum limit range flow temperature
9 - Maximum limit range flow temperature

7. SITING

The controller must be sited in a dry space which meets the permitted ambiental conditions shown under *4. Technical Data*. If positioned in a space classified as "Dangerous" it must be enclosed in a cabinet for electrical apparatus constructed according to the regulations in force for the class of danger involved.
It can be installed on a DIN rail or in a DIN modular enclosure.

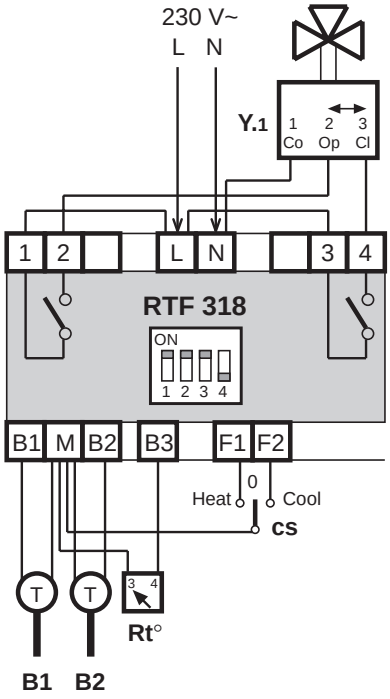
8.WIRING

Proceed as follows:
• Separate base and cover
• Mount base on DIN rail and check that securing elements (5.4) hold it firmly in place.
• Carry out wiring according to the diagram and in observance of the relevant regulations in force, and using cables of :
– 1.5 mm^2 for power and relay control outputs
– 1 mm^2 for detectors and telecontrol
• Switch on power (230 V~) and check voltage across terminals L and N.
• Switch off power, replace cover on base and secure it with the four screws supplied (5.3).

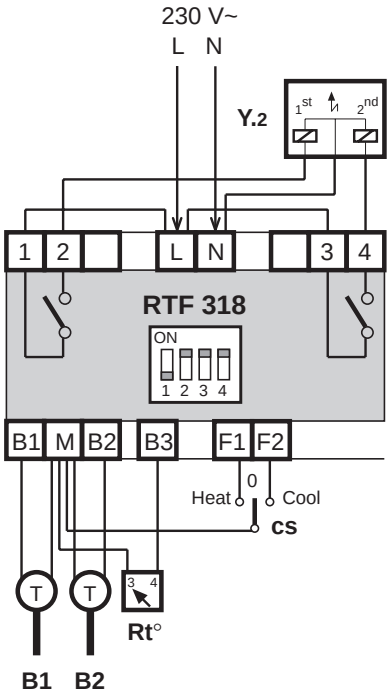
You are advised not to insert more than two cables in a single terminal of the controller and if necessary to use external junction boxes.

9. WIRING DIAGRAMS

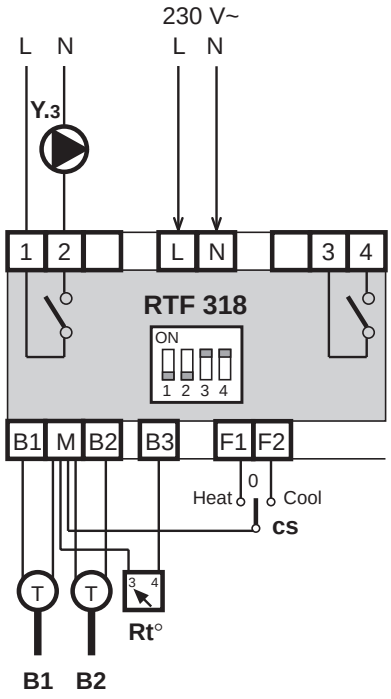
9.1 With three-wire modulating output eg. : with run time of 120 seconds



9.2 With two-stage On-Off output



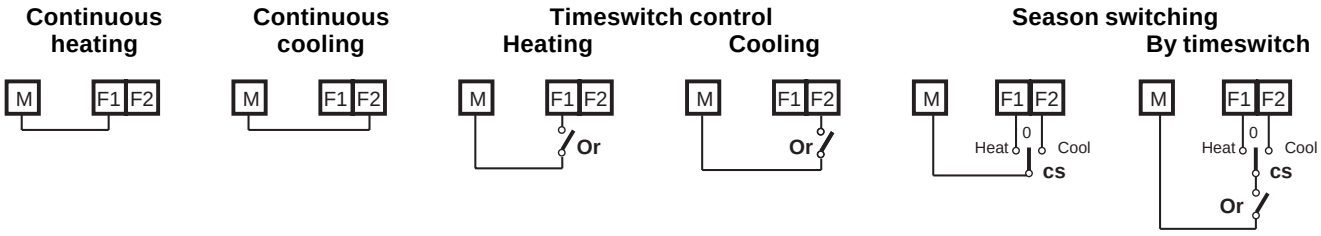
9.3 With proportional On-Off output eg. : with 5-minute time cycle



B1 – NTC 10 kΩ temperature detector with 0 ... 40 °C range
B2 – NTC 10 kΩ temperature detector with 0 ... 99 °C range
Rt° – Temperature setpoint adjuster
cs – Remote season switch
Pos. 0 = control excluded with valve closing

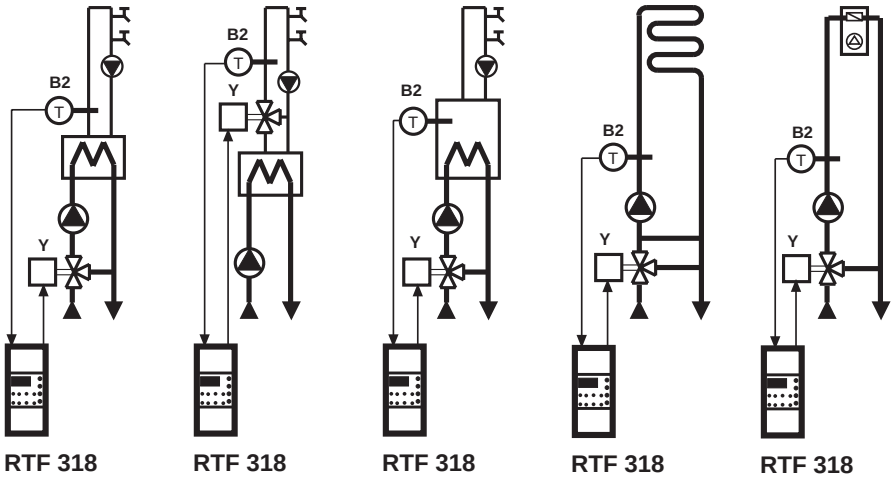
Or – Remote timeswitch contact
Y.1 – Three-wire modulating control
Y.2 – Two-stage On-Off control
Y.3 – On-Off control with proportional cycle

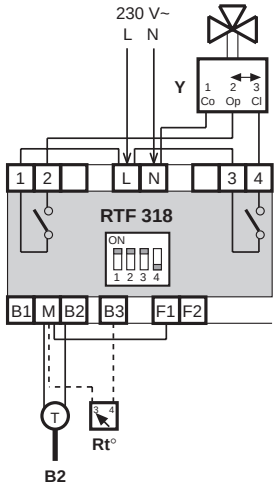
9.4 Telecontrol



10. EXAMPLES OF INSTALLATIONS

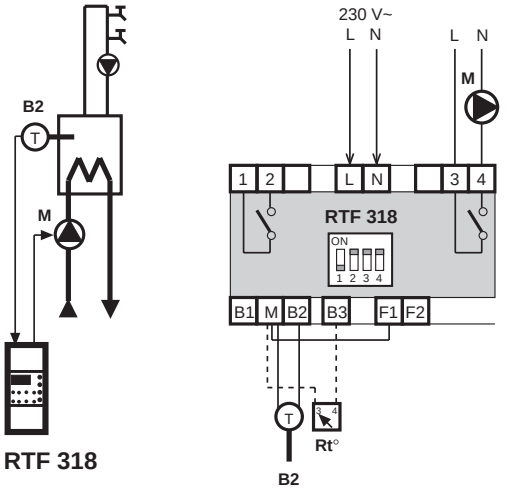
10.1 Temperature control by modulating control valve





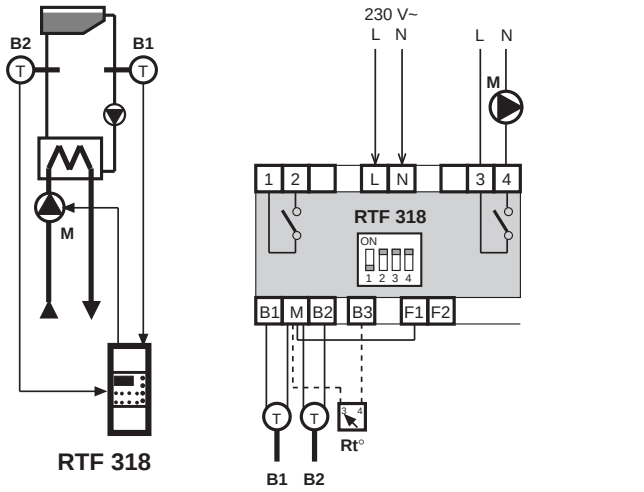
B2 – Water temperature detector (0 ... 99 °C)
Y – Regulating valve
Rt° – Setpoint adjuster (optional)

10.2 Control temperature by On-Off control pump



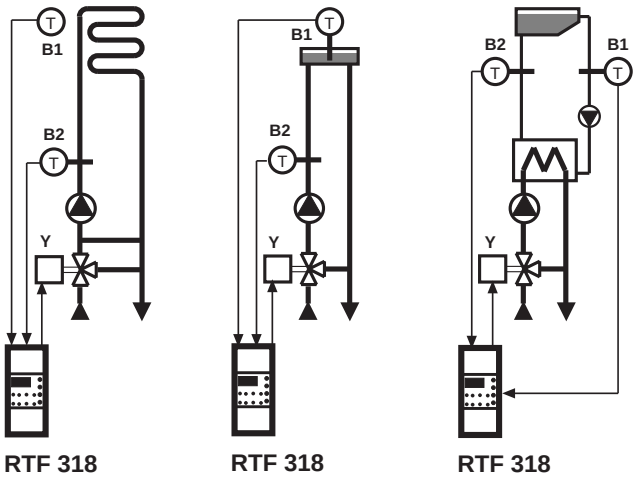
B2 – Water temperature detector (0 ... 99 °C)
M – Primary circuit pump
Rt° – Setpoint adjuster (optional)

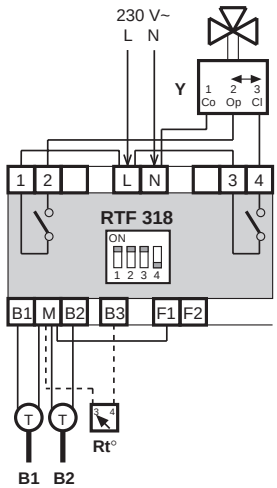
10.3 Control return temperature and flow water limits by On-Off control pump



B1 – Temperature detector return water to swimming pool (0 ... 40 °C)
B2 – Temperature detector swimming pool flow water (0 ... 99 °C)
M – Primary circuit pump
Rt° – Setpoint adjuster (optional)

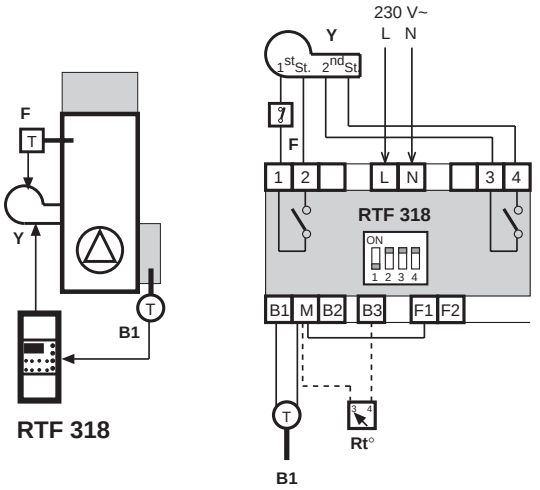
10.4 Control temperature and flow water limits by modulating control valve





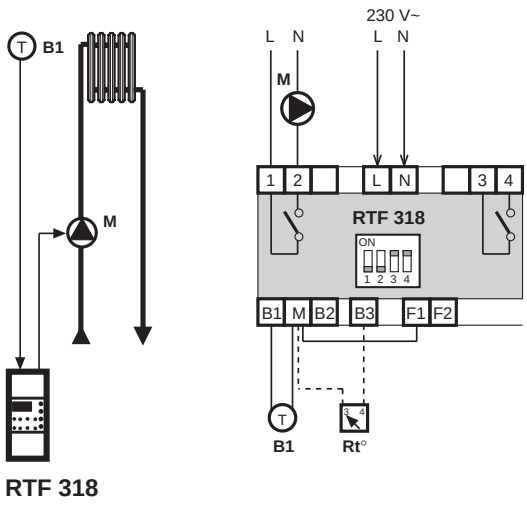
B1 – Principal temperature detector (0 ... 40 °C)
B2 – Flow water temperature detector (0 ... 99 °C)
Y – Regulating valve
Rt° – Setpoint adjuster (optional)

10.5 Control ambient temperature by On-Off control in two stages of heat generator



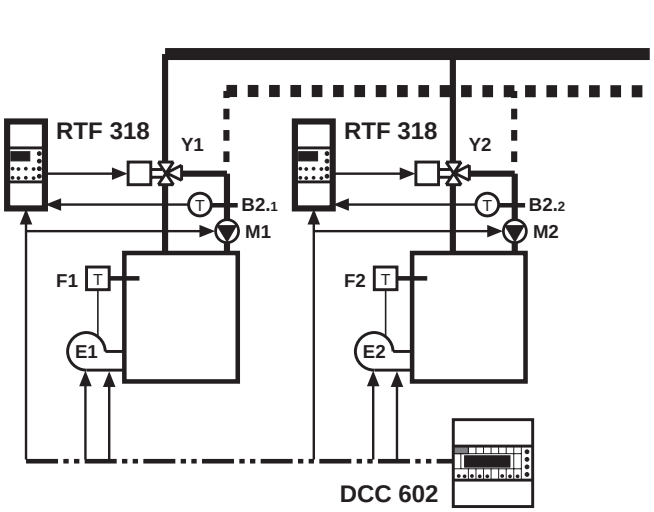
B1 – Ambient temperature detector (0 ... 40 °C)
E – Two-stage burner
F – Safety thermostat
Rt° – Setpoint adjuster (optional)

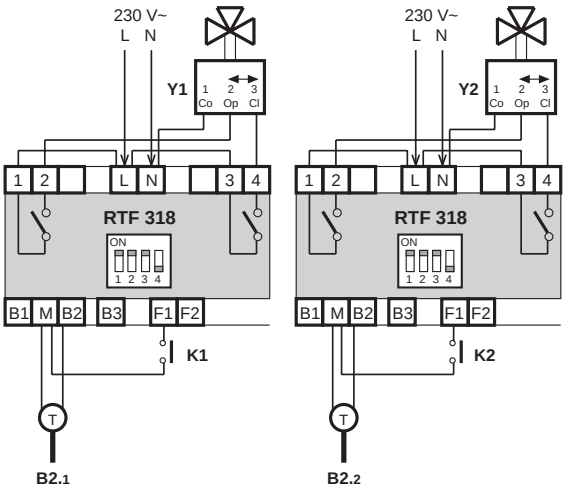
10.6 Ambient temperature control by On-Off proportional control pump

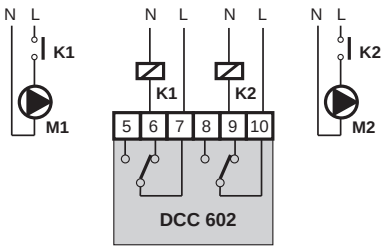


B1 – Ambient temperature detector (0 ... 40 °C)
M – Plant pump
Rt° – Setpoint adjuster (optional)

10.7 Control of minimum boiler temperature for insertion in sequence

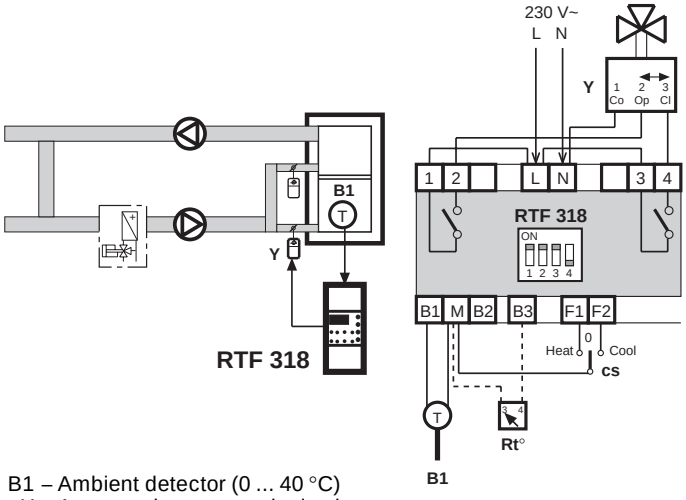






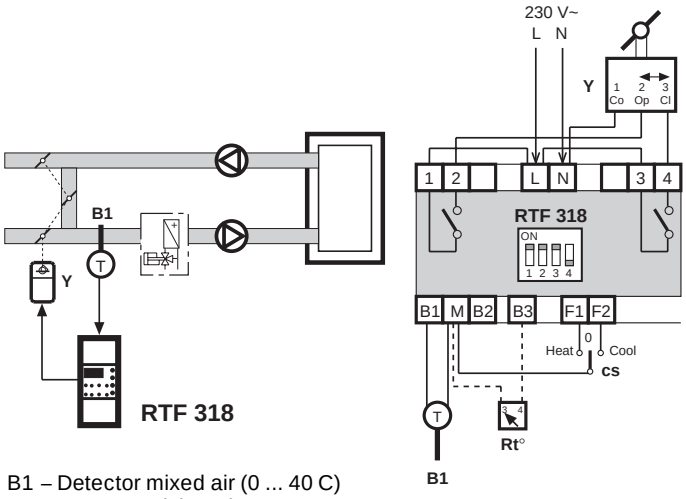
B 2.1 – Boiler 1 temperature detector (0 ...99 °C)
B 2.2 – Boiler 2 temperature detector (0 ...99 °C)
Y1 – Boiler 1 valve
Y2 – Boiler 2 valve
K1 – Boiler 1 relay
K2 – Boiler 2 relay
M1 – Boiler 1 pump
M2 – Boiler 2 pump

10.8 Control ambient heating or cooling temperature by modulating control air handling units



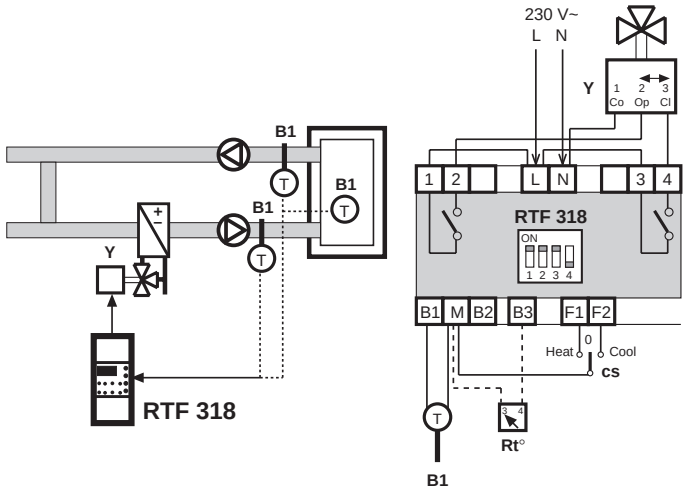
B1 – Ambient detector (0 ... 40 °C)
Y – Actuator damper terminal unit
cs – Season switch
Rt° – Setpoint adjuster (optional)

10.9 Control temperature mixed air by modulating control mixing dampers



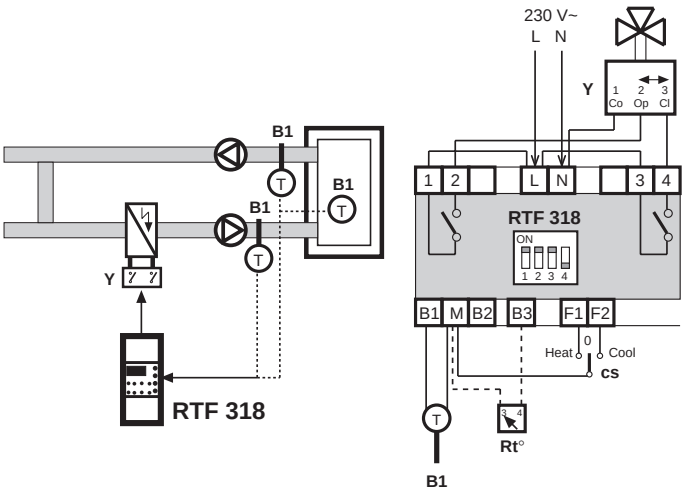
B1 – Detector mixed air (0 ... 40 C)
Y – Actuator miximg dampers
cs – Season switch
Rt° – Setpoint adjuster (optional)

10.10 Control ambient heating or cooling temperature or discharge air by modulating control



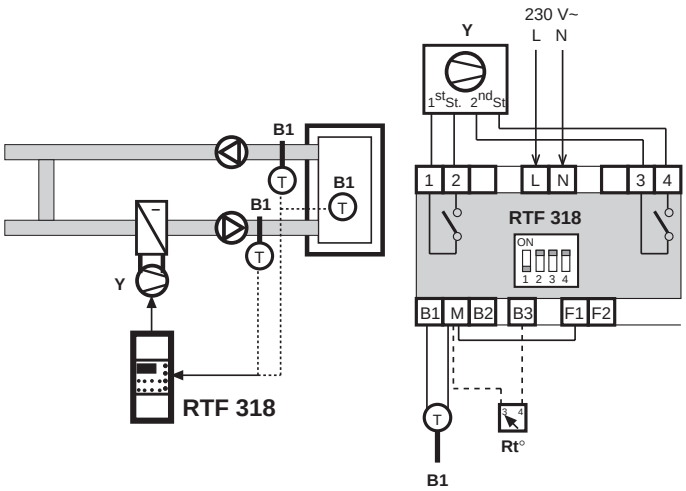
B1 – Detector temp. discharge or extract or ambient air (0 ... 40 °C)
Y – Regulating valve
cs – Season switch
Rt° – Setpoint adjuster (optional)

10.11 Control ambient heating temperature or discharge air by On-Off control in two stages



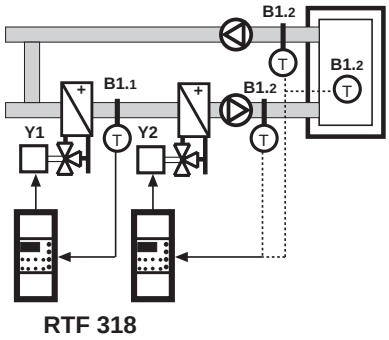
B1 – Detector temp. discharge or extract or ambient air (0 ... 40 °C)
Y – Electric battery
Rt° – Setpoint adjuster (optional)

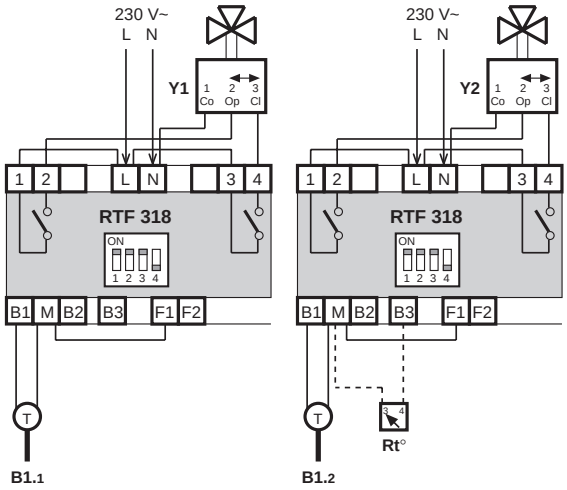
10.12 Control temperature cooling ambient or discharge air by On-Off control in two stages



B1 – Detector discharge or extract or ambient air (0 ... 40 °C)
Y – Refrigerator compressor
Rt° – Setpoint adjuster (optional)

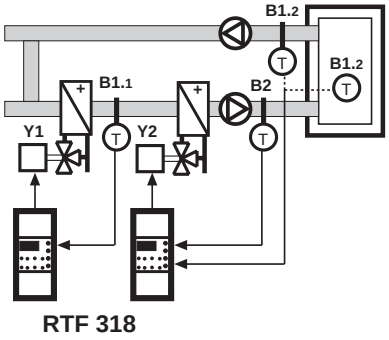
10.13 Control preheating temperature and ambient heating temperature or discharge air by modulating controls

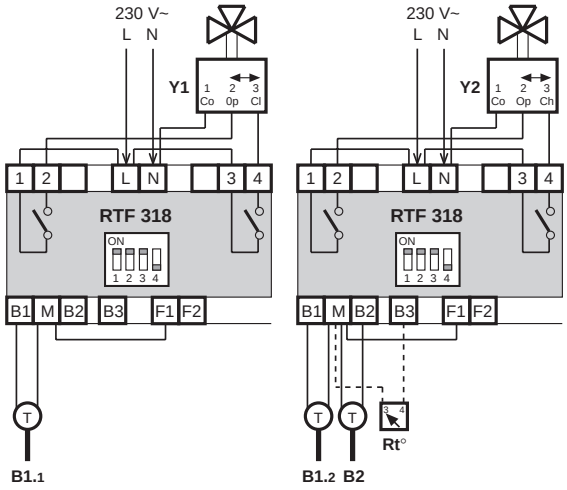




B1.1 – Detector preheating temperature (0 ... 40 °C)
B1.2 – Detector discharge or extract or ambient air temperature (0 ... 40 °C)
Y1 – Preheating regulating valve
Y2 – Postheating regulating valve
Rt° – Setpoint adjuster (optional)

10.14 Control preheating temperature and ambient heating temperature and limits discharge air by modulating controls





B1.1 – Detector preheating temperature (0 ... 40 °C)
B1.2 – Detector ambient or extract air temperature (0 ... 40 °C)
B2 – Detector temperature discharge air (0 ... 99 °C)
Y1 – Preheating regulating valve
Y2 – Postheating regulating valve
Rt° – Setpoint adjuster (optional)

11. OPERATION

RTF 318 is a digital controller incorporating a microprocessor for the control of temperature monitored by:

- detector B1 only (NTC 10 kΩ, range 0 ... 40 °C) : ambient temp., temp. cooled water, etc.
  or
  detector B2 only (NTC 10 kΩ, range 0 ... 99 °C) : temp: hot water, flow temp., etc.
  or
- ambient temp. or principal temp. B1 and detector flow temp. B2.

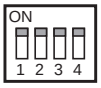
with : **Heating** if : M F1 F2 or **Cooling if** : M F1 F2

with control output :

- **Three-wire modulating**
- **On-Off in one or two stages**
- **On-Off proportional in one stage**

11.1 Configuration

It is indispensable to configure the controller according to its use by means of the microswitches on the base.
Bold type indicates the position of the cursor (actually white) of the microswitches.



*Factory setting: programmed for **three-wire modulating control** with **60 seconds run time**.*

To change type of control position only the microswitches concerned, as shown in table below.

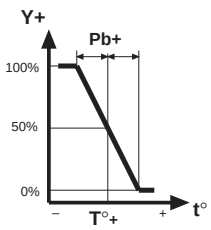
Micro	Function	Description	Position of micro
1	Type control output	Three-point modulating control On-Off control	On Off
2	Type On-Off control (only if 1 is Off)	On-Off in one or two stages On-Off proportional	On Off
3 - 4	Valve run time (only if 1 in On)	60 seconds 90 seconds 120 seconds 180 seconds	3 and 4 On 3 and 4 Off 3 On and 4 Off 3 Off and 4 On
3 - 4	Half-load cycle time (only if 1 and 2 Off)	5 minutes 10 minutes 20 minutes 30 minutes	3 and 4 On 3 and 4 Off 3 On and 4 Off 3 Off and 4 On

11.2 Control by one detector (B1 or B2)

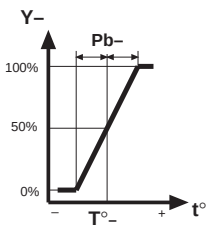
The controller compares the desired temperature **T**°+ (Heating) or **T**°- (Cooling) with the temperature **t**° measured by detector B1 or B2 and calculates the value of the control output **Y** in relation to the difference and to the parameters set.

- **Modulating three-wire output**
  1-2 : valve opening
  3-4 : valve closing

Heating

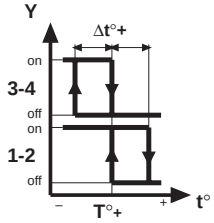


Cooling

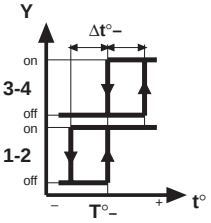


- **On-Off output in one or two stages**
  1-2 : 1st stage
  3-4 : 2nd stage

Heating

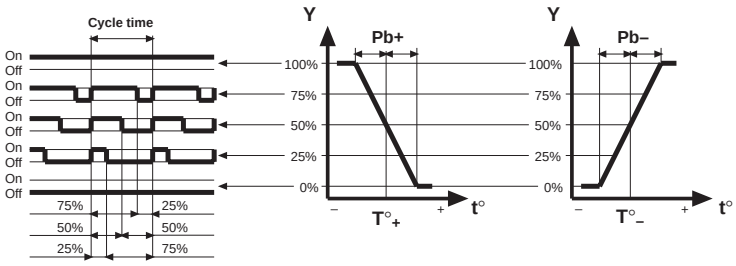


Cooling



• On-Off output with proportional cycle
1-2 : control

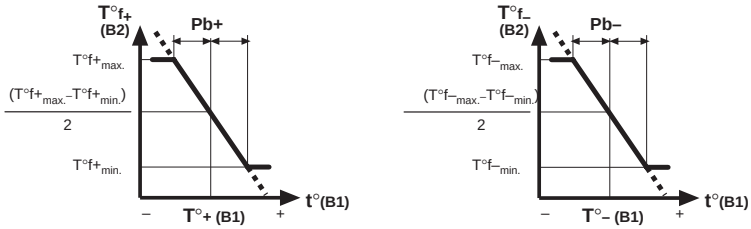
Heating **Cooling**



11.3 Control using two detectors (B1 and B2)

The controller compares the desired temperature **T°+** (Heating) or **T°-** (Cooling) with the temperature **t°** measured by detector B1 and calculates the desired flow temperature **T°f+** (Heating) or **T°f-** (Cooling) in relation to the difference and to the variation range of the flow temperature.

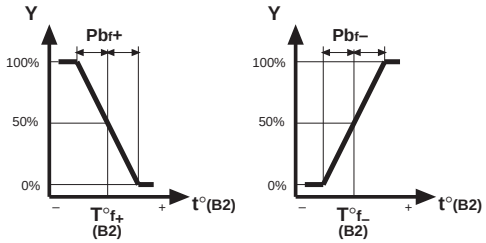
Heating **Cooling**



The controller compares the desired flow temperature **T°f+** (Heating) or **T°f-** (Cooling) with the flow temperature **t°f** measured by the detector B2 and calculates the value of the control output **Y** in relation to the difference and the parameters set.

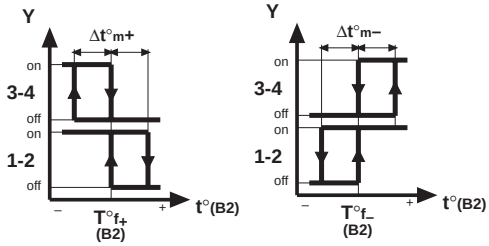
• Three-wire modulating output
1-2 : valve opening
3-4 : valve closing

Heating **Cooling**



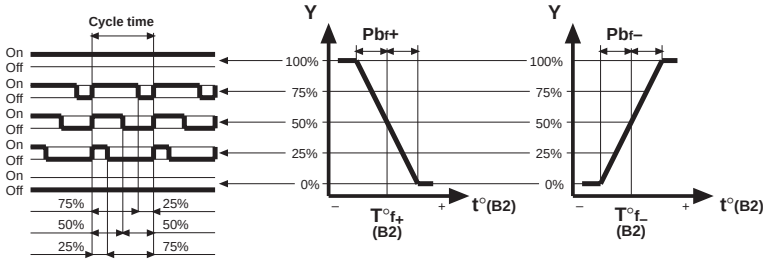
• On-Off output in one or two stages
1-2 : 1st stage
3-4 : 2nd stage

Heating **Cooling**



• On-Off output with proportional cycle
1-2 : control

Heating **Cooling**



12. ENTERING SETTING PARAMETERS

The setting parameters must be entered after having completed the electric wiring and configured the microswitches (**11.1**).
The display normally shows the temperature measured by detector:
– B1 : if connected only B1 or if connected B1 and B2.
– B2 : if connected only B2.

The ⊖ and ⊕ keys permit viewing the setting parameters (*blinking* display)
The ⊕ and ⊖ keys permit changing the parameters shown on the display.

The type of parameter shown on the display is indicated by the lighting or blinking of the relative LED.

If for 60 seconds no key is pressed, the display returns to showing the measured temperature.

12.1 Synchronising valve run

If the controller is configured with *Three-wire modulating* output, each time the controller is powered it carries out the *Synchronisation* of the control output during which the valve actuator is controlled in closing for a period slightly longer than the valve run time set by the configuration microswitches.

During the period of synchronisation (valve closure LED lit) the display shows the letter A and a number from 99 to 0 which indicates as a percentage the passage of time.

Warning! *During synchronisation the keys must not be pressed.*

At the end of synchronisation the display shows the temperature measured by the detector and it is possible to enter the operating parameters according to the procedure described in 12.2 or 12.3.

12.2 Control using only detector B1 or only detector B2

The parameters for **Heating** and **Cooling** are different :

With M F1 F2 "HEAT" LED lit. Enter data for **Heating**.

With M F1 F2 "COOL" LED lit. Enter data for **Cooling**.

Fixed display with temperature measured by B1 or B2.
Press ⊖ : Display *blinking* with desired temperature **T**°.
Adjust using ⊕ and ⊖ (resolution 0.5 °C).
Keep ⊖ pressed until on display appears **– – –** :
Display *blinking* with
– Proportional band **Pb** for detector B1, if modulating or proportional On-Off.
– Differentinal Δ**t** if On-Off in one or two stages
Led "Pb/Δt" lit.
Change using ⊕ or ⊖ (resolution 0.5 °C).
Press ⊖ : Display *blinking* with Integral time **It**, only if Modulating.
"It" LED lit.
Adjust using ⊕ or ⊖ (resolution one minute).
Press ⊖ , (or in any event after 60 seconds),on display returns measured temperature.

12.3 Control using detector B1 and detector B2

The parameters for **Heating** and **Cooling** are independent:

With M F1 F2 "HEAT" LED lit. Enter data for **Heating**.

With M F1 F2 "COOL" LED lit. Enter data for **Cooling**.

Display *fixed* with temperature measured by B1.

Press ⊕ : Display *blinking* with desired temperature **T**°(B1).
Adjust using ⊕ or ⊖ (resolution 0.5 °C).

Press ⊕ : Display *fixed* with flow temperature measured by B2.
"FLOW min and max" LEDs *blinking*.

Keep pressed ⊕ until **– – –** appears on display :
Display *blinking* with Proportional band **Pb** for detector B1.
"Pb/Δt" LED lit.
Adjust using ⊕ or ⊖(resolution 0.5 °C).

Press ⊕ : Display *blinking* with Integral time **It** for detector B1, only if modulating.
Adjust using ⊕ or ⊖ (risoluzione 1 minuto).

Press ⊕ : Display *blinking* with minimum flow temperature $\mathbf{T°f_{min}}$ which establishes minimum limit setting range for flow temperature B2.
"FLOW min" LED lit.
Adjust using ⊕ or ⊖ (resolution 0.5 °C).

Press ⊕ : Display *blinking* with maximum flow temperature $\mathbf{T°f_{max}}$ which establishes maximum limit setting range for flow temperature B2.
"FLOW max" LED lit.
Adjust using ⊕ or ⊖ (resolution 0.5 °C).

Press ⊕ : Display *blinking* with :
– Proportional band **Pb** for detector B2, only if modulating.
– Differential Δ**t** for detector B2, if On-Off in one or two stages.
Pb/Δt" LED lit.
"FLOW min and max" LED blinking.
Adjust using ⊕ or ⊖ (resolution 0.5 °C).

Press ⊕ : Display *blinking* with Integral time **It** for detector B2, only if modulating.
"It" LED lit.
"FLOW min and max" LED blinking.
Adjust using ⊕ or ⊖ (resolution one minute).

Press ⊕ : (or, in any event after 60 seconds), display returns to showing temperature measured by B1.

COSTER
CONTROLLI TEMPERATURA ENERGIA

20132 Milan	Head Office & Sales
Via San G.B. De La Salle, 4/a	Tel. +39.02.2722121 (TI) Tel. +39.02.45476193 (FW) Fax +39.02.2593645
00146 Rome	Reg. Off. Central & Southern
Viale G. Marconi, 437	Tel. +39.06.5573330 Fax +39.06.5566517
25048 Edolo (BS)	Orders and Shipping
Via Gen. Treboldi 190/192	Tel. +39.0364.7732.00/02 Fax +39.0364.770016
Web: www.coster.info	E-mail: info@coster.info

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