

# TEMPERATURE CONTROLLER

**C ←RING**

**RTR 684 Eng. C2**



- Primary control at fixed point with three-wire modulating control or On-Off in two stages
- Auxiliary control at fixed point with On-Off control
- Communication systems :
  - C-Ring for exchange of data of common interest between local controllers
- Power supply 230 V ~ ; DIN rail mounting

## 1. APPLICATION

RTR 684 controller has been designed for fixed point temperature control in plants for :

- DHW production
- heating swimming pool water
- heating underfloor panels
- heating greenhouse beds
- heating by fan coils

## 2. FUNCTIONS

The principal functions of RTR 684 are :

- Control of a primary temperature with minimum and/or maximum limit of flow temperature with :
  - three-wire modulating control or On-Off control in one or two stages;
  - timed On-Off control of circulation pump ;
  - timed events programmes : four 24-hour and one 7-day;
  - modification current timed events programme by remote control;
  - anticondensing and priority functions.
- Control of an auxiliary temperature at fixed point with :
  - On-Off control of circulation pump ;
  - timed events programmes : three 24-hour and one 7-day;
  - Priority function.
- Automatic switching GMT / BST period
- Alarms for abnormal operation of plant and control devices.
- Connection to C-Ring for local exchange of data with other controllers.

## 3. DETECTORS & REMOTE CONTROLS

No.	Description	Type	Sensing element	Code	Data sheet
1	<b>Essential :</b> Primary temperature detector immersion or ambient or ambient with set point adjuster or air duct	<b>SIH 010</b>	NTC 10 kΩ	B1 o B3	–
		<b>SAB 010</b>	NTC 10 kΩ	B3	–
		<b>SCB 110</b>	NTC 10 kΩ	B3 + Rt°	–
		<b>STA 010</b>	NTC 10 kΩ	B3	–
1	<b>Optional :</b> Flow temperature detector (primary) immersion or air duct	<b>SIH 010</b> <b>STA 010</b>	NTC 10 kΩ NTC 10 kΩ	B2 B2	– –
1	Auxiliary temperature detector immersion	<b>SIH 010</b>	NTC 10 kΩ	B5	–
1	Anticondensing temperature detector immersion	<b>SIH 010</b>	NTC 10 kΩ	B4	–
1	Remote control for modifying current programme	<b>CDB 384</b>	–	R	–
1	Set point adjuster (with ambient detector incorporated)	<b>SCB 110</b>	–	Rt°	–

#### 4. TECHNICAL DATA

##### • Electrical

Power supply	230 V ~ ± 10%
Frequency	50...60 Hz
Consumption	5 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)
Storage data in memory	5 years

##### • Mechanical

Case	DIN 6E module
Mounting	DIN 35 rail
Materials:	
operating	NYLON
storage	ABS
Ambient temperature:	
operating	0...45 °C
storage	- 25...+ 60 °C
Ambient temperature	Class F DIN 40040
Dimensions	105 x 115 x 71.5
Weight	1.0 kg

##### • Measurement ranges

Primary temperature	0...99 °C or 0...40 °C
Limit temperature (min. and max.)	0...99 °C
Anticondensig temperature	0...99 °C
Auxiliary temperature	0...99 °C

##### • Setting ranges : primary control

Desired temperatures :	
with detector B1	0...99 °C
with detector B3	0...40 °C

Adjuster desired temperature:

with detector B1 (0 ... 40 °C)	± 5 °C
with detector B3 (0 ... 99 °C)	± 10 °C

Limit temperature detector	1...99 °C
Anticondensing temperature	10... <b>50</b> ...99 °C

24-hour programmes	1...4
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7-day programmes	0... <b>1</b>
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Delay switching off pump	0...60 min
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Control output :	
- <b>3-wire modulating</b>	
- On-Off (1 or 2 stages)	

Modulating :

actuator run time	30... <b>630</b> ...1,800 sec.
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proportional band	0.5... <b>10</b> ...50 °C
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integral time	0,5... <b>10</b> ...99,5 min.
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On-Off :

On-Off differential	0.5... <b>10</b> ...50 °C
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minimum start time	0... <b>60</b> ...990 sec.
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minimum stop time	0... <b>60</b> ...990 sec.
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##### • Setting ranges : auxiliary control

Desired temperature	0... <b>20</b> ...99 °C
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24-hour programmes	1...3
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7-day programmes	0... <b>1</b>
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Delay switching off heating pump	0...60 min
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Control output :	
- <b>On-Off differential</b>	
- On-Off proportional	

Data output On-Off differential :

differential	0.5... <b>10</b> ...50 °C
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minimum start time	0... <b>60</b> ...990 sec.
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minimum stop time	0... <b>60</b> ...990 sec.
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Data output On-Off proportional :

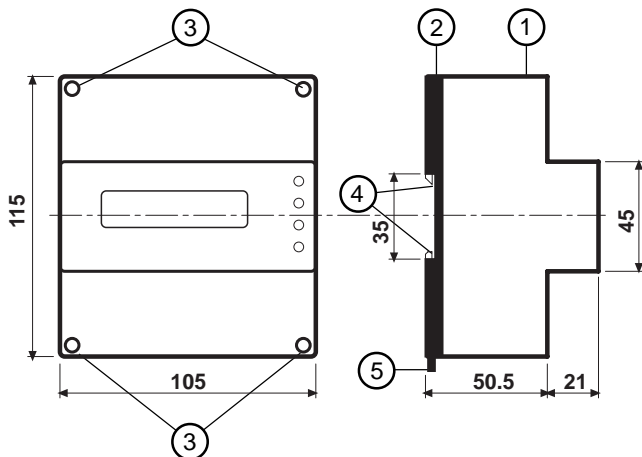
proportional band	0.5... <b>10</b> ...50 °C
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integral time	0,5... <b>10</b> ...99,5 min.
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half-cycle time	60... <b>120</b> ...990 sec.
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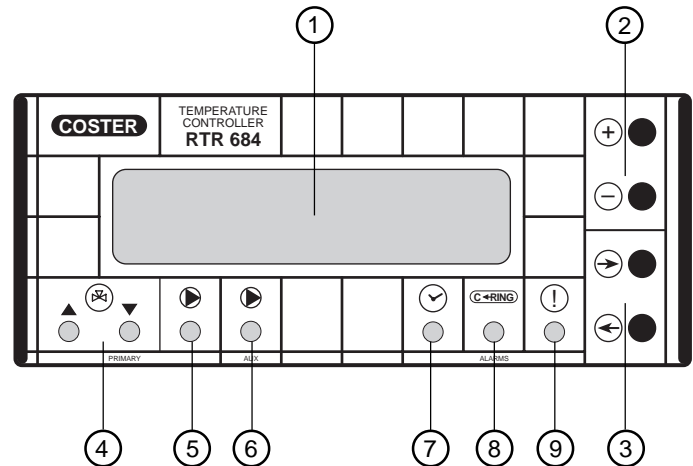
*In presence of electrical disturbances the output controls of controller may change status but this will be restored automatically.*

#### 5. OVERALL DIMENSIONS



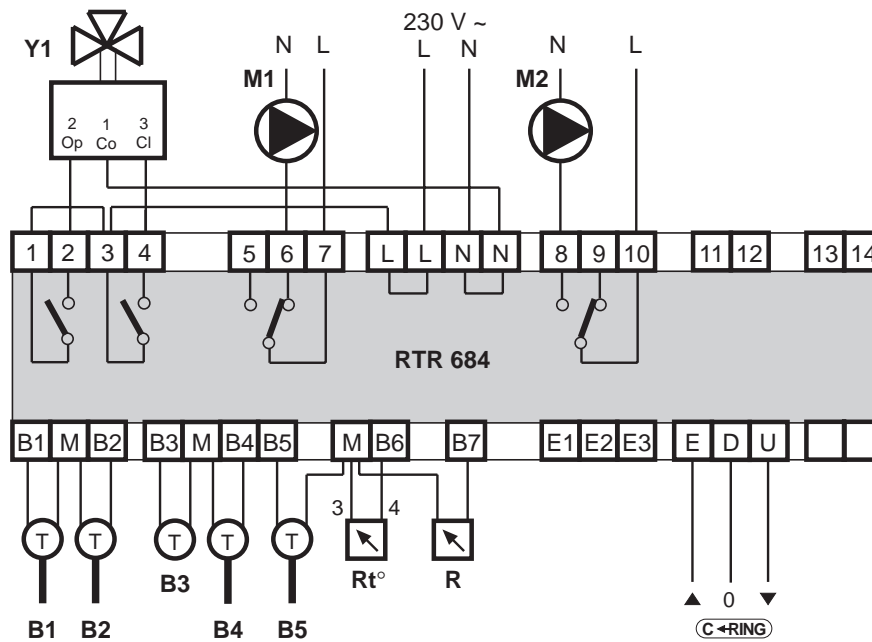
- 1 - Protective cover for electronic components
- 2 - Base with transformer, relay & terminal blocks
- 3 - Screws for fixing cover and base
- 4 - DIN rail securing elements
- 5 - DIN rail release lever

#### 6. FACIA



- 1 - Backlit two-line alphanumeric display
- 2 - + and - operating keys
- 3 - ← and → operating keys
- 4 - LEDs for Opens-Closes primary valve or 1<sup>st</sup> and 2<sup>nd</sup> stage
- 5 - Primary pump LED
- 6 - Auxiliary pump LED
- 7 - Real time clock alarm LED
- 8 - C-Ring alarm LED
- 9 - Fault LED

**7. WIRING DIAGRAM**



B1 – Primary t° detector (0 ... 99 °C)  
 B2 – Primary flow limit t° detector  
 B3 – Primary t° detector (0 ... 40 °C)  
 B4 – Boiler anticondensing t° detector  
 B5 – Auxiliary t° detector

R – Remote control for modifying programmes  
 Rt° – Primary temperature set point adjuster  
 M1 – Primary circuit pump  
 M2 – Auxiliary circuit pump  
 Y1 – Primary control valve

**8. SITING CONTROLLER**

The controller must be sited in a dry space which meets the relevant ambiantal limits shown under 4. TECHNICAL DATA. If sited in a space classified as "Dangerous" it must be installed in a cabinet for electrical devices constructed according to the regulations in force for the danger class involved. The controller can be installed on a DIN rail or in a DIN modular enclosure.

**9. WIRING**

Proceed as follows:

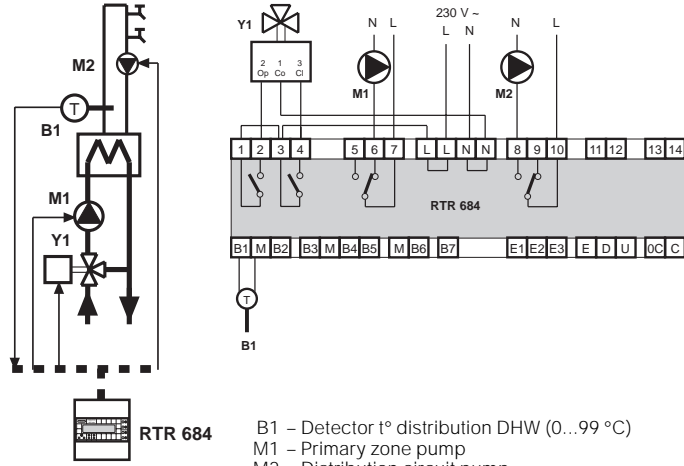
- Separate base and cover
- Mount base on DIN rail and check that securing elements (5.4) hold it firmly in place.
- Carry out wiring according to the diagram and in observance of the regulations in force, using cables of :
  - 1.5 mm<sup>2</sup> for power and relay control outputs
  - 1 mm<sup>2</sup> for detectors and remote control
  - 1 mm<sup>2</sup> for C-Ring. For limits of cable length please see technical data sheet T 022
- 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.*

**10. EXAMPLES OF INSTALLATIONS**

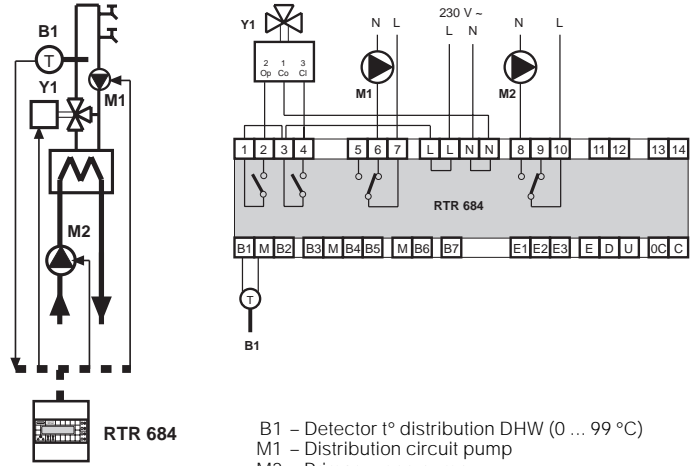
**10.1 Production of DHW by rapid heat exchanger :**

- Control of distribution temperature by modulating control of primary zone valve Y1.
- Timed control of primary pump M1 and distribution pump M2.



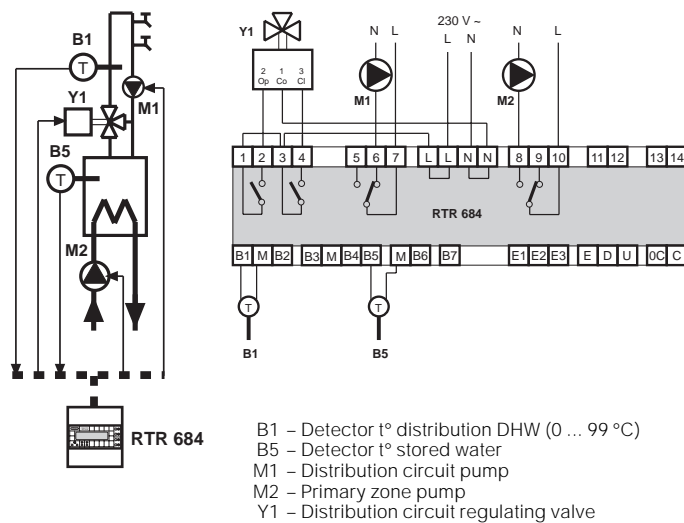
**10.2 Production of DHW by rapid heat exchanger :**

- Control of distribution temperature by modulating control of primary zone valve Y1.
- Timed control of distribution pump M1 and primary pump M2.



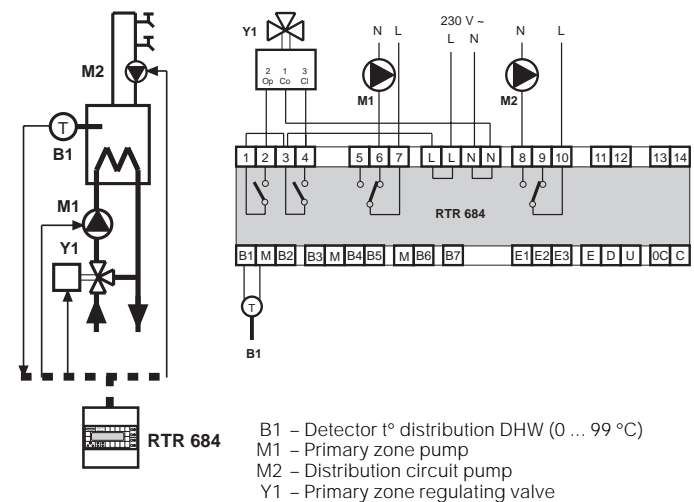
**10.3 Production of DHW with storage calorifier :**

- Control of distribution temperature by modulating control of primary zone valve Y1.
- Control stored water temp. by On-Off control of primary pump M2
- Timed control of distribution pump M1



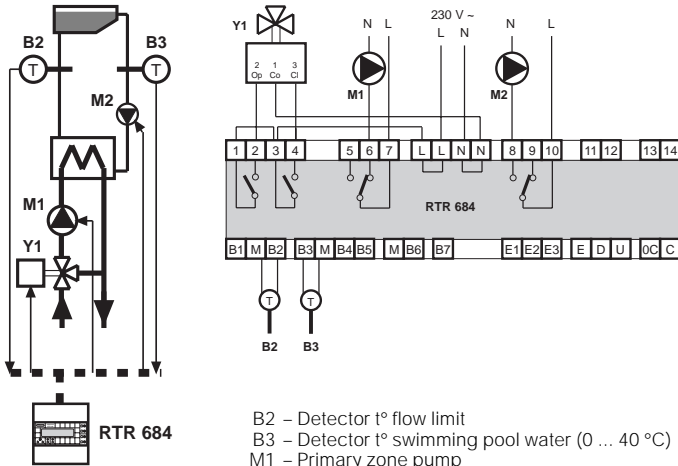
**10.4 Production of DHW with storage calorifier :**

- Control of distribution & storage temp. by modulating control of primary zone valve Y1.
- Timed control of primary pump M1 and distribution pump M2



**10.5 Heating swimming pool water :**

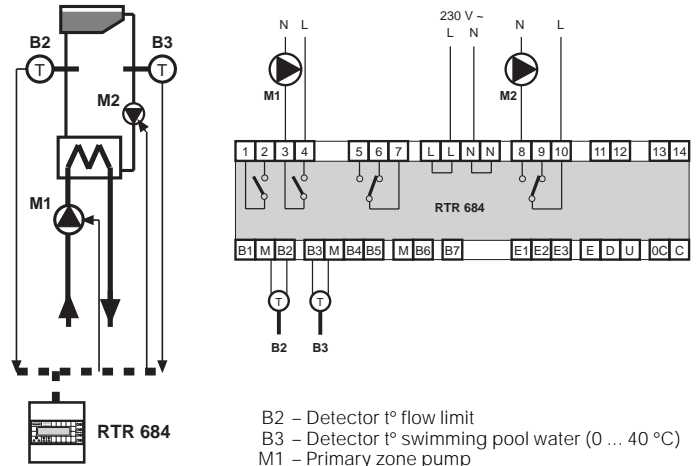
- Control of return to pool temp. and maximum limit flow by modulating control of primary zone valve Y1.
- Timed control of primary pump M1 and swimming pool pump M2



B2 - Detector t° flow limit  
 B3 - Detector t° swimming pool water (0 ... 40 °C)  
 M1 - Primary zone pump  
 M2 - Swimming pool circuit pump  
 Y1 - Primary zone regulating valve

**10.6 Heating swimming pool water :**

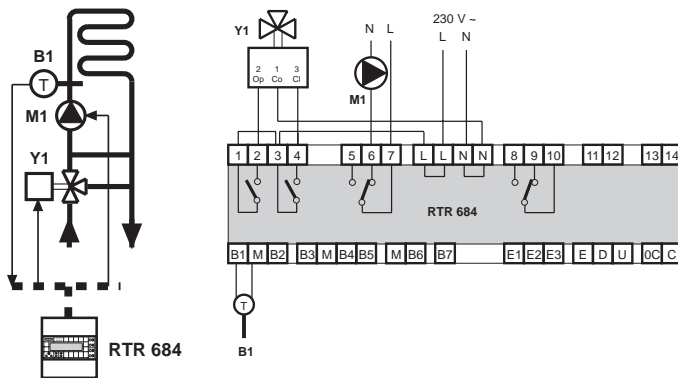
- Control of return to pool temp. and maximum limit flow by On-Off control of primary pump Y1.
- Timed control of swimming pool pump M2



B2 - Detector t° flow limit  
 B3 - Detector t° swimming pool water (0 ... 40 °C)  
 M1 - Primary zone pump  
 M2 - Swimming pool circuit pump

**10.7 Heating by underfloor panels :**

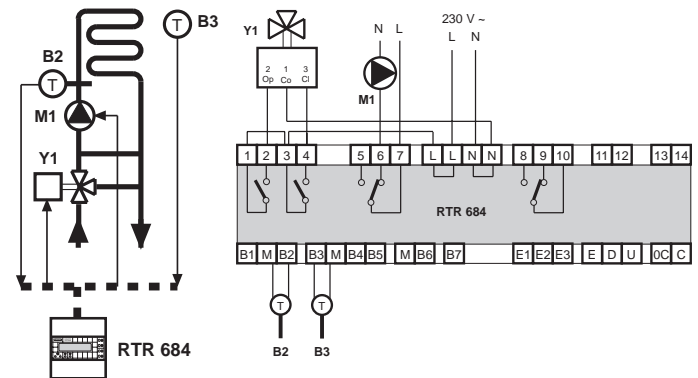
- Control flow temp. by modulating control of valve Y1.
- Timed control pump M1.



B1 - Detector t° flow (0 ... 99 °C)  
 M1 - Panels circuit pump  
 Y1 - Panels circuit regulating valve

**10.8 Heating by underfloor panels :**

- Control ambient temp. and maximum limit flow by modulating control of valve Y1.
- Timed control of pump M1



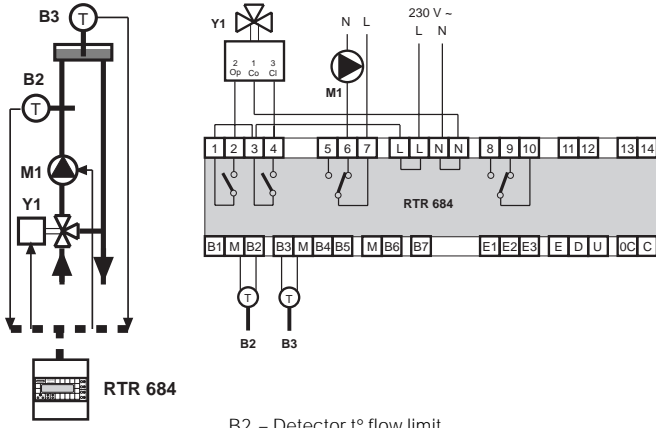
B2 - Detector t° flow limit  
 B3 - Detector t° ambient (0 ... 40 °C)  
 M1 - Panels circuit pump  
 Y1 - Panels circuit regulating valve

**10.9 Heating greenhouse beds :**

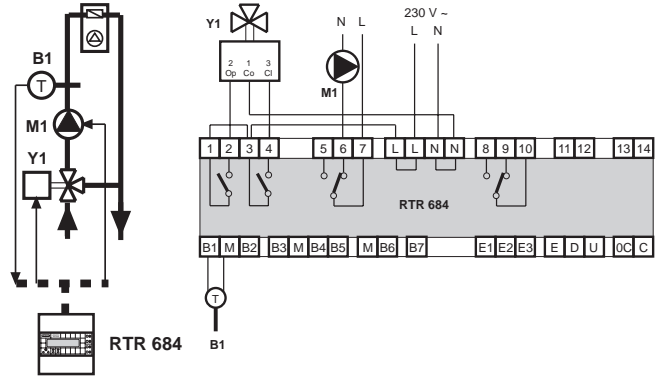
- Control temp. beds and maximum limit flow by modulating control of valve Y1.
- Timed control of pump M1

**10.10 Heating by fan coils :**

- Control flow temp. by modulating control of valve Y1.
- Timed control of pump M1



B2 - Detector t° flow limit  
 B3 - Detector t° greenhouse beds (0 ... 40 °C)  
 M1 - Greenhouse beds circuit pump  
 Y1 - Greenhouse beds circuit regulating valve



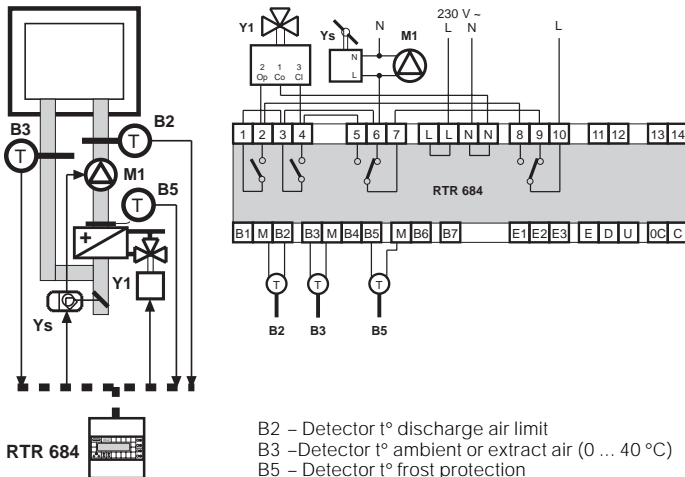
B1 -Detector t° flow (0 ... 99 °C)  
 M1 - Fan coils circuit pump  
 Y1 - Fan coils circuit regulating valve

**10.11 Ambient heating by air handling units :**

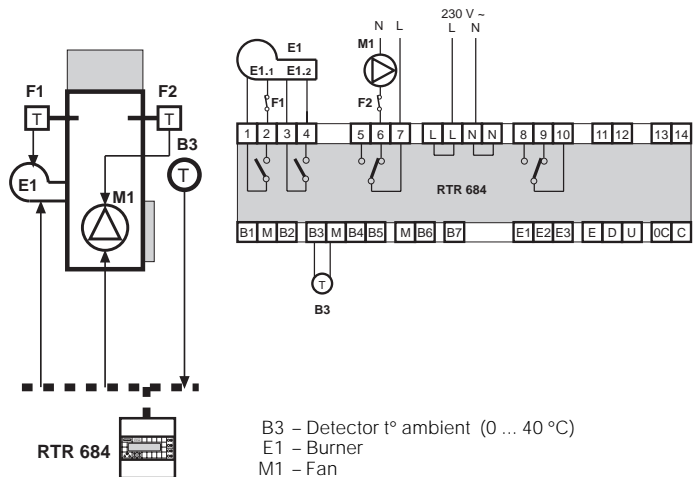
- Control ambient temp. and minimum discharge air limit by modulating control of valve Y1.
- Timed control of fan M1 and outside air damper Ys with frost protection

**10.12 Ambient heating by hot air generator :**

- Control of ambient temp. by On-Off control burner in 1 or 2 stages
- Timed control of fan M1



B2 - Detector t° discharge air limit  
 B3 -Detector t° ambient or extract air (0 ... 40 °C)  
 B5 - Detector t° frost protection  
 M1 - Fan  
 Y1 - Air handling unit regulating valve  
 Ys - Outside air damper



B3 - Detector t° ambient (0 ... 40 °C)  
 E1 - Burner  
 M1 - Fan

**11. COMMUNICATION**

**11.1 C-Ring : communication between controllers** (for detailed information please see technical data sheet T 022)

RTR 684 controller can be **“Primary”** or **“Secondary”**.

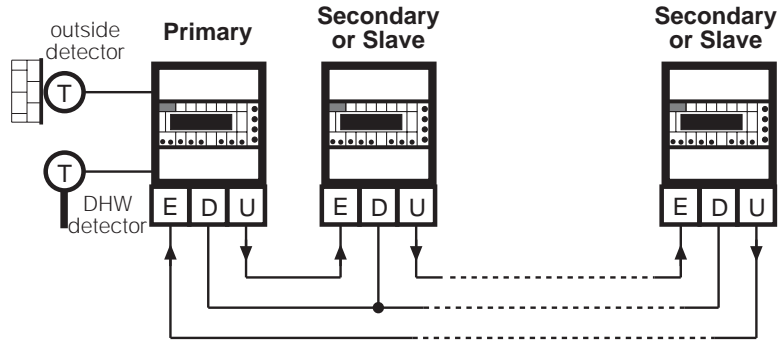
In C-Ring the following signals are transmitted :

- permission to operate as **Slave** controllers
- value of the **outside temperature** (use of a single detector for several controllers)
- value of **flow temperature** requested by controllers heating zones, used by “PRIMARY” controller for control of temperature boilers (if scheduled).
- **DHW priority** and / or **anticondensing** = closure valves heating zones by modulating control action.

24.2  
**CRing connection**  
**NO**

*NO* = connection to C-Ring not scheduled  
*PRIMARY* = connected to C-Ring and configured as “Primary”  
*SECONDARY* = connected to C-Ring and configured as “Secondary”

**11.2 C-Ring wiring diagram**



**12. OPERATION**

RTR 684 is a digital controller with microprocessor which can control temperature in two zones each with independent settings and programmes of timed events :

- Primary control
- Auxiliary control

24.1  
**Config detectors**  
**1 - - - - -**

*It is indispensable to configure the controller according to the detectors and controls connected.*

**13. PRIMARY CONTROL**

RTR 684 can operate with two different and independent **measurement ranges** :

- 0...99 °C (hot water) : detector **B1**, terminals B1-M 24.1  
Config detectors  
1 -
- 0...40 °C (cold water or ambient) : detector **B3**, terminals B3-M 24.1  
Config detectors  
- 3

*Note*

*It is not possible to configure both the detectors (B1 and B3).*

RTR 684 can control by two different systems :

- With only the primary detector (B1 or B3)
- With the primary detector (B1 or B3) and the flow detector (B2)

**13.1 Control with primary detector only (B1 or B3)**

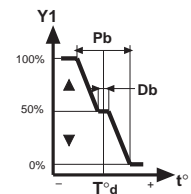
RTR 684 compares desired temp. **T°d** from current programme chosen in with temperature measured by detector B1 or B3 and adopts control action **Y1** or **E1** according to temperature difference and parameters set :

19.2  
**Pri:-----**  
**24HOUR 1 PRIMARY**

22.3  
**Prop band : 10.0c**  
**Integ time: 10m**

if 22.1  
Control:  
MODULATING

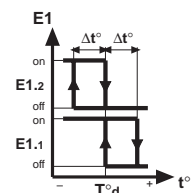
- *Prop Band* : - - - - c = proportional band **Pb** in ± °C
- *Integ time* : - - m = integral time in minutes



22.5  
**Diff : 10.0c**  
**Integ time: 10m**

if 22.1  
Control:  
ON-OFF DIFF

- *Diff* : - - - - c = On-Off differential of stage  $\Delta t^\circ$
- *Integ time* : - - m = integral time in minutes



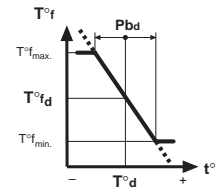
**13.2 Control with primary detector (B1 or B3) & flow detector (B2)**

RTR 684 compares temperature measured by detector B1 or B3 with desired temperature of current programme  $T^{\circ d}$  and calculates *desired flow temperature*  $T^{\circ fd}$  in relation to difference measured and parameters set. :

22.9 - 22.13

**Prop band : 10.0c**  
**Integ time : 10m**

- *Prop band* : -- . - c = proportional band **Pb** in  $\pm$  °C of primary control
- *Integ time* : -- - m = integral time in minutes of primary control.



22.11 - 22.15

**Control flow**  
**Min: 1c Max: 99c**

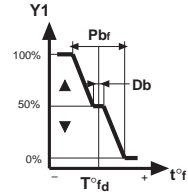
- *Min* : -- c *Max* : -- C = minimum and maximum limits of flow temp.: establish range of proportional band of primary control (22.9 - 22.13).

The controller compares temperature measured by flow detector B2 with value calculated  $T^{\circ fd}$  and adopts control action **Y1** or **E1** in relation to difference measured and parameters set.

22.1

if **Control : MODULATING**

- *Prop band* : -- . - c = proportional band **Pbf** in  $\pm$  °C of flow control



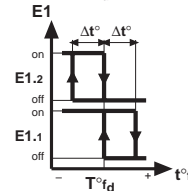
22.10

**Flow temp**  
**Prop band : 10.0c**

22.1

if **Control : ON-OFF DIFF**

- *Diff* : -- . - c = On-Off differential of stage  $\Delta t^{\circ}$  of flow control



22.14

**Flow temp**  
**Diff : 10.0c**

**13.3 Control output Y1**

22.1

**Control : MODULATING**

The control output of the primary control Y1 (1-2 ; 3-4) can be :

- Control : *MODULATING* = control valve by three-wire modulating actuator
- ON-OFF DIFF* = On-Off control in two stages

22.2 - 22.8

**Actuator runtime**  
**630sec**

If *MODULATING*, enter :

- complete run time (open/closed) of valve actuator ; indispensable for correct control operation.

22.4 - 22.12

**Dead band**  
**NARROW**

- dead band **Db** of modulating action : NARROW ; MEDIUM ; WIDE.

22.6 - 22.16

**Minimum start time : 60s**

If ON-OFF DIFF, enter if necessary for electric device controlled :

- minimum start time of On-Off control
- minimum stop time of On-Off control

22.7 - 22.17

**Minimum stop time : 60s**

**13.4 Operating mode**

20.1 - 20.5

**Desired Primary temp 1 : 20.0c**

You can set five temperatures *Desired Primary temp 1 ... 5* to be used in creating the four programmes of timed events 24HOUR 1 ... 4 *PRI*. which in turn are used for creating the 7-day programme 7DAY *PRI*.

It is possible to programme the operation of the primary control according to the requirements of the zones :

- 7DAY *PRI* = operation with timed events using 7-day prog.
- 24HOUR 1 ... 4 *PRI* = operation with timed events using one of four 24-hour progs.
- TEMP 1...5 = continuous operation using one of five desired temperatures.
- OFF = always Off

when in place of programme appears :

- REMOTE TEMP 1...4 = remote control R is in "Temperature 1 ... 4" position.
- REMOTE OFF = remote control R is in "Off" position.

The current *operational mode* depends on the programme set.

19.2

**Pri : - - - - -**  
**24HOUR 1 PRIMARY**



19.3

Pri mode : TEMP 1  
Td 20.0c Var + 0.0c

- Pri mode : TEMP 1 = mode set by programme :
  - TEMP 1...5 = control with one of Desired Primary temp
  - OFF = control Off
- Td 20.0 c = value of desired temp. for current mode.
- Var + 0.0 c = manual variation of desired temp. (use + or - keys), with B1 max ± 10 °C, with B3 max ± 5 °C.

**13.5 Temperature set point adjuster**

If setpoint adjuster Rt° is connected and configured, it is possible to adjust from a distance

value of current desired temp. within the limits set :

22.18 Setpoint adjust min limit : - 0.0c  
22.19 Setpoint adjust max limit : + 0.0c

19.4

Setpoint adjust  
Td : + 0.0c

The value of the adjustment made is shown on the display.

**13.6 Variation programmes by remote control**

If the remote control R is connected and configured in

24.1 Config detectors  
- - - - - 7

it is possible to modify from a distance the current operating programme :

- 1 - OFF = plant excluded
- 2 - TEMP 4 = continuous operation at desired temperature 4
- 3 - TEMP 3 = continuous operation at desired temperature 3
- 4 - TEMP 2 = continuous operation at desired temperature 2
- 5 - TEMP 1 = continuous operation at desired temperature 1
- 6 - AUTOMATIC = operation with programme chosen on controller.

**13.7 Primary zone priority function**

22.21

Primary zone  
priority : NO

- Primary zone priority: NO = function excluded  
YES = function enabled

When RTR 684 is connected in C-Ring with other controllers and the Priority function has been enabled :

- Primary control sends via C-Ring the differential value between its own desired temperature and the actual one;
- the C-Ring controllers with the Anticondensing function enabled reduce their own desired flow temperature by 4 °C for each °C difference so as to give precedence to the primary control of DTR 684.

Note

When Priority function is used and plant boiler requests the presence of anticondensing detector it is indispensable to connect it to the first RTR 684 in the C-Ring.

**13.8 Control pump plant M1**

22.22

Pri pump : AUT  
Delay Off : 0m

The plant pump can be controlled in two ways :

- Pri Pump: MAN = pump always in operation  
AUT = pump controlled by event times of current programme
- Delay Off: - - m = delay time in switching Off

**14. AUXILIARY CONTROL**

If detector B5 is not connected and not configured, output M2 can be used as a **time switch** with programme chosen in

19.5  
Aux:-----  
24HOUR 1 AUX

If detector B5 is connected but not configured it functions only as a **temperature monitor**

19.10  
Des Aux T :--.-c  
Act Aux T :50.0c

If detector B5 is connected and configured in

24.1  
Config detectors  
5

the **auxiliary control**, according to programme chosen in

19.5  
Aux:-----  
24 HOUR 1 AUX

compares the temperature measured with desired temperature set in

20.6  
Desired Aux  
temp: 50.0c

and produces the On-Off control action of output M2 according to temperature difference and parameters set :

23.1  
if Control:ON-OFF  
DIFFERENTIAL

- Diff :--.-c = On-Off stage differential

23.1  
if Control:ON-OFF  
PROPORTIONAL

- Prop band :--.-c = proportional band in ± °C
- Integ time :--m = integral time in minutes

- Half cycle time --- sec = start and stop time when actual temp. is equal to desired temp.

23.2  
Diff : 10.0c

23.2  
Prop band :10.0c  
Integ time: 10m

23.3  
Half cycle time  
120sec

**14.1 Control output M2**

The start and stop controls of output M2 depend not only on the control parameters set but also on :

- Minimum start time :-- sec = minimum start time
- Minimum stop time :-- sec = minimum stop time
- Delay Off :-- min = delay time in switching off : when output controls pump of a primary zone and boiler is controlled, via C- Ring, by maximum temperature requested by zone controllers, this permits dissipating residual heat in combustion chamber.

23.4  
Minimum start  
time : 60s

23.5  
Minimum stop  
time : 60s

23.7  
Auxiliary pump  
Delay Off: 0 min

**14.2 Operating mode**

20.6  
Desired Aux  
temp 20.0c

The *Desired Aux temp* is used in establishing the three programmes of timed events 24 HOUR 1 ... 3 AUX which, in turn, are used to establish the 7-day programme 7DAY AUX.

It is possible to programme the operation of the auxiliary control according to the requirements of the zones :

- 7 DAY AUX = in operation 7-day programme with timed events
- 24 HOUR 1 ... 3 AUX = in operation one of three 24-hour progs. with timed events
- ON = continuous operation at *Desired Aux temp*
- OFF = always Off

The current *operational mode* depends on programme set.

- Pri mode : ON = mode set by programme
  - ON = control by *Desired Aux temp*
  - OFF = control Off
- Td 20.0 c = temperature desired by current mode
- Var + 0.0c = manual adjustment of desired temperature (use + or - keys) max ± 10 °C.

19.5  
Aux:-----  
24HOUR 1 AUX

19.6  
Aux mode:ON  
Td20.0cVar+ 0.0c

**14.3 Auxiliary control priority function**

23.6

**Auxiliary zone priority : NO**

- *Auxiliary zone priority* : NO = function disabled  
YES= function enabled

When RTR 684 is connected in C-Ring with other controllers and the priority function has been enabled :

- auxiliary control sends via C-Ring the differential value between its own desired temperature and the actual one ;
- the controllers in C-Ring, with the anticondensing function enabled, decrease their own desired flow temp. by 4 °C for each °C of difference so as to give precedence to the auxiliary control of RTR 684.

*Note*

*When the priority function is used and the boiler asks for the presence of the anticondensing detector it is indispensable to connect it to the first RTR 684 controller in the C-Ring.*

**15. PROGRAMMES**

*There are separate programmes of timed events for primary control and for auxiliary control.*

**15.1 24-hour programmes**

21.1 - 21.8

**--- -Number 24hr programmes ? 1**

Set the number of 24-hour programmes you wish to use for the primary zone (1 ... 4) and for the auxiliary zone (1 ... 3) so as to avoid scrolling unnecessary pages.

In each 24-hour programme you can set a maximum of six event start times (**h1 ... h6**) assigning to each one of following modes :

21.2 - 21.7

**P1 Event 1 6.00  
TEMP 3 21.0c**

for *primary* zone :

- TEMP 1...5 : control with Desired Pri temp 1 ... 5 set in
- OFF : plant Off, valve closed and pump idle

20.1 - 20.5

**Desired Primary temp 20.0c**

21.9 - 21.14

**P1 Event 1 6.00  
ON 50.0c**

for *auxiliary* zone :

- ON : control with Desired Aux temp set in
- OFF : plant Off, valve closed and pump idle

20.6

**Desired Aux temp 20.0c**

*The event start times must be entered in increasing order.*

*Events not used must be excluded by pressing + and - keys at the same time.*

*Unused events must not be left between programmed events.*

**15.2 7-day programmes**

21.15 - 21.23

**--- Number 7day programmes ? 1**

Set the number of 7-day programmes you wish to use for the primary zone (0 ... 1) and for the auxiliary zone (0 ... 1) so as to avoid scrolling unnecessary display pages.

In each 7-day programme you can assign to each day of the week one of following programmes :

21.16 - 21.22

**7day 1: MONDAY  
24HOUR 1 PRIMARY**

*primary* control :

- 24 HOUR 1 ... 4 PRI ; TEMP1...5 ; OFF.

21.24 - 21.30

**7day 1: MONDAY  
24HOUR 1 AUX**

for *auxiliary* control :

- 24 HOUR 1 ... 3 AUX ; ON ; OFF.

**15.3 BST period**

21.31

**BST period  
Fr - - - - to - - - -**

The controller is able to change automatically the time according to the time period (GMT or BST) in force.

- Fr - - - - = the night of the last Saturday in March the clock is put forward automatically one hour.

- to - - - - = the night of the last Saturday in October the clock is put back automatically one hour.

To cancel the period keep pressed + and - keys at the same time.

## 16. COMPLEMENTARY FUNCTIONS

### 16.1 Control of boiler anticondensing temperature

22.20

Anticondens : NO  
Desired T: 50.0c

The anticondensing function prevents the formation of condensation in the boiler combustion chamber. It imposes a decrease of 4 °C in the desired flow temperature for each °C decrease in the actual return to boiler temperature (detector B4) in respect of the value set, thereby bringing about the progressive closure of the regulating valve.

- *Anticondens* : NO = function disabled  
YES = function enabled
- *Desired T* : - - . - °C = minimum limit value of return to boiler temperature

If controller is in C-Ring the differential value is transmitted to all the controllers connected, so that these are able to perform the anticondensing function with a single detector. The value of the desired anticondensing temp. is that set on the controller to which the anticondensing detector is connected.

### 16.2 Access keynumber

24.3

Choice keynumber  
- - - -

To enable the access keynumber enter the number (1900 ... 1999) using + and – keys. The keynumber prevents use of + and - keys for changing data. To cancel keynumber, press + and – at the same time until the dashes reappear.

When keynumber is enabled if + and – keys pressed on display appears Access keynumber  
- - - -  
Only after having entered the exact keynumber can + and – keys be used.  
If for 15 minutes no key is pressed the keynumber is automatically re-enabled.

### 16.3 Denomination zones

22.23

Name Pri zone  
- - - - -

23.8

Name Aux zone  
- - - - -

Entering names of primary and auxiliary zones which appear on relative pages of of programme choices.

Using + and – keys, each dash can be replaced by a letter of the alphabet (A ... Z) or by a number (0...9). The → key serves to position the cursor.

### 16.4 Display measurements

19.8

Des Pri T: 20.0c  
Act Pri T: 20.0c

- temperature *desired* by current mode for primary control.
- *actual* temperature measured by detector **B1** or **B3**.

19.9

Des flow T: 20.0c  
Act flow T: 20.0c

- Appears only if detector **B2** is connected and configured.
- flow temperature *desired* by primary control.
- *actual* flow temperature measured by detector B2.

19.10

Des Aux T : 20.0c  
Act Aux T : 20.0c

- Appears only if detector **B5** is connected and configured.
- temperature *desired* by current mode for auxiliary control.
- *actual* temperature measured by detector B5.

19.11

Des anticT: 20.0c  
Act anticT: 20.0c

- Appears only if detector **B4** is connected and configured.
- *desired* anticondensing temperature.
- *actual* temperature measured by detector B4.

### 16.5 Alarms

The controller is able to indicate, by means of the three LEDs situated on the facia, certain operational disfunctions :

- fault in internal real time clock (LED 6.7)
- fault in C-Ring (led 6.8)
- fault in microprocessor (LED 6.9)

**17. COMMISSIONING PLANT**

Testing to be carried out at conclusion of installation and when wiring and configuration completed and tested.

**17.1 Testing C-Ring**

25.1

CRing: ??

24.2

CRing connection  
PRIMARY

CRing connection  
SECONDARY

The C-Ring testing page appears only if it has been configured in

Ensure that all the other controllers wired in C-Ring are :

- correctly powered by 230 V ~

- Slave controllers or configured as SECONDARIES in

CRing connection  
SECONDARY

- selected on testing page CRing: ??

The PRIMARY controller sends via C-Ring a signal every five seconds : on all the displays appears "??". If the wiring is correct the word "YES" replaces "??" on all the displays. If on one or more displays "YES" does not appear, this means that there is a wiring or controller fault between the last controller displaying "YES" and the first displaying "??".

Examples of testing a C-Ring with four controllers :

- Cont1 "YES" - Cont2 "YES" - Cont3 "YES" - Cont4 "YES" : C-Ring OK
- Cont1 "??" - Cont2 "YES" - Cont3 "YES" - Cont4 "YES" : C-Ring faulty between 4 and 1
- Cont1 "??" - Cont2 "YES" - Cont3 "??" - Cont4 "??" : C-Ring faulty between 2 and 3
- Cont1 "??" - Cont2 "??" - Cont3 "??" - Cont4 "??" : C-Ring faulty between 1 and 2

**17.2 Testing outputs**

25.2

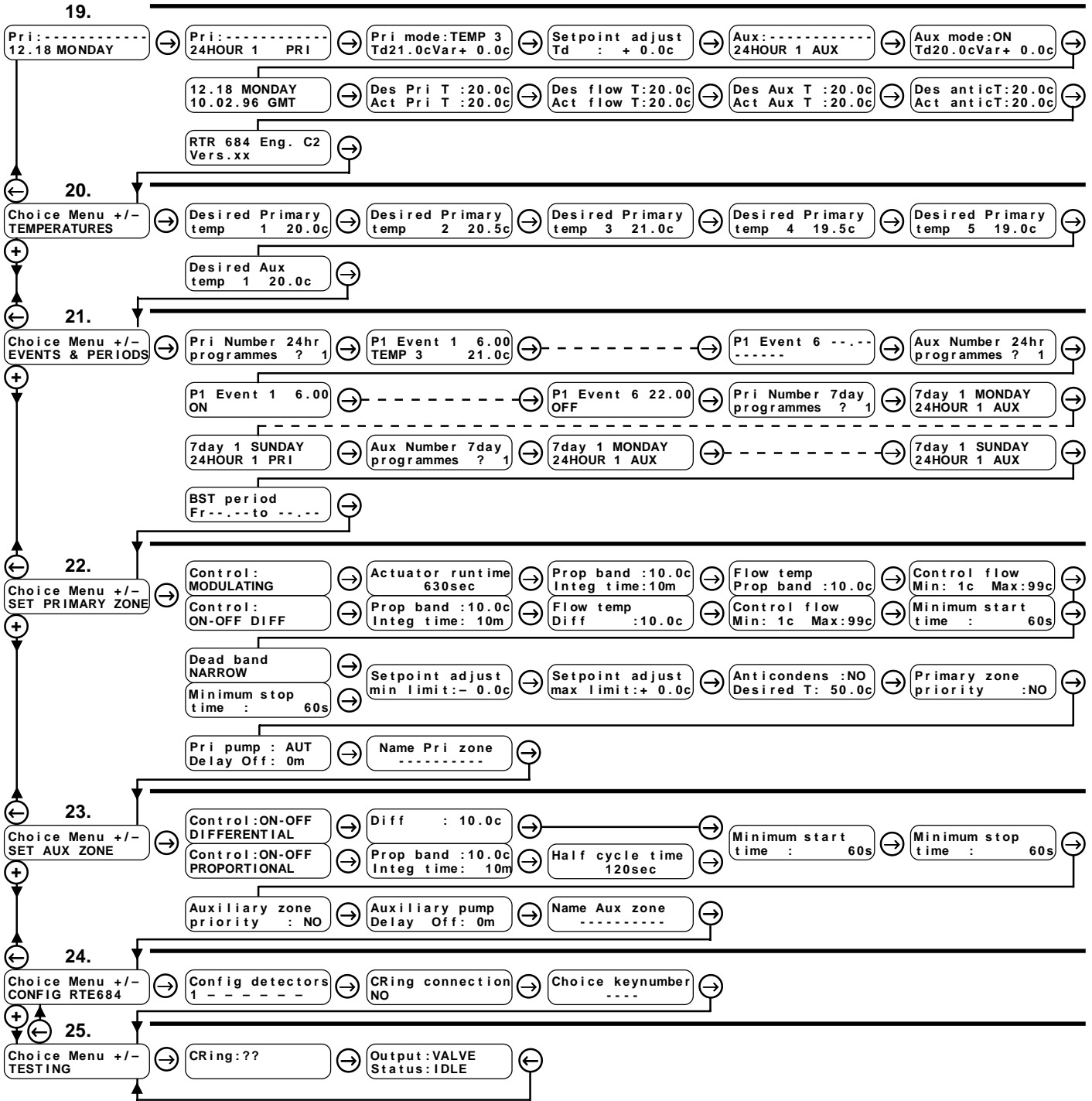
Output : VALVE  
Status : IDLE

Using + and - keys select :

- output to be tested :
  - VALVE ;
  - PUMP ;
  - AUXILIARY ;
- status :
  - with VALVE : IDLE ; CLOSES ; OPENS
  - PUMP & AUXILIARIES : ON ; OFF.

Check the results.

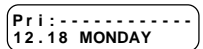
**18. SEQUENCE OF DISPLAY PAGES** (the data and the functions are those in memory at time of delivery)



← → Keys for scrolling the pages on the display and positioning the cursor █ on the data which can be changed.

The data which can be changed, in the following descriptive list of display pages, are highlighted thus █

By pressing these keys at the same time (or in any event after 15 minutes) the first page appears on the display.



⊖ ⊕ Keys for : - changing the values highlighted by the cursor █

- viewing the configuration options of a function, for example :



or



- passing directly from one menu (series of pages) to another.

19. NORMAL USE				
Ref	Display	Description	Notes	Sect.
19.1	Pri :----- 12.18 MONDAY	Name primary zone Current time and day	Set in <b>22.23</b> Set in <b>19.7</b>	
19.2	Pri :----- 24HOUR 1 PRIMARY	Name primary zone Choice programme : 24 HOUR 1...4 PRI ; 7DAY PRI ; TEMP 1...5 ; OFF.	Instead of programme may appear : REMOTE TEMP 1...4 ; REMOTE OFF.	13.4
19.3	Pri mode:TEMP 3 Td21.0cVar+ 0.0c	Current operating mode : Td : Desired temp. for mode Var : Variation of desired temp.	Pri mode : TEMP 1...5 ; OFF. Var : use + or - keys (with B1 max ± 10 °C ; with B3 max ± 5 °C)	13.4
19.4	Setpoint adjust Td : + 0.0c	Variation of temperature set on set-point adjuster	Appears only if set-point adjuster <b>Rt<sup>9</sup></b> has been configured in <b>24.1</b> .	13.5
19.5	Aux :----- 24HOUR 1 AUX	Name auxiliary zone Choice programme: 24HOUR 1...3 AUX ; 7DAY AUX ; ON ; OFF.	Set in <b>23.8</b>	14.2
19.6	Aux mode: ON Td20.0cVar+ 0.0c	Current operating mode : Td : Desired temp. for mode Var : Variation of desired temp.	Aux mode : ON ; OFF. Var : use + or - keys (max ± 10 °C).	14.2
19.7	12.18 MONDAY 10.02.96 GMT	Setting : time, day of week & date Current time period : GMT or BST	Accordinging dates BST period set in <b>21.31</b>	
19.8	Des Pri T :21.0c Act Pri T :20.0c	Temperature desired for primary control. Temperature measured by detector B1 or B3.		16.4
19.9	Des flow T:50.0c Act flow T:50.0c	Desired flow temp. for primary control. Temperature measured by detector B2.	Appears only if detector <b>B2</b> configured in <b>24.1</b> .	16.4
19.10	Des Aux T :20.0c Act Aux T :20.0c	Desired flow temp. for auxiliary control. Temperature measured by detector B5.	Appears only if detector <b>B5</b> configured in <b>24.1</b> .	16.4
19.11	Des anticT:50.0c Act anticT:50.0c	Desired anticondensing temperature. Temperature measured by detector B4.	Appears only if detector <b>B4</b> configured in <b>24.1</b> .	16.4
19.12	RTR 684 Eng. C2 Vers.xx	Identifying data of controller.		

20. TEMPERATURES				
Ref.	Display	Description	Notes	Sect.
20.1	Desired Primary temp 1 20.0c	Value of desired temp. 1 for primary zone		13.4
20.2	Desired Primary temp 2 20.5c	Value of desired temp. 2 for primary zone		13.4
20.3	Desired Primary temp 3 21.0c	Value of desired temp. 3 for primary zone		13.4
20.4	Desired Primary temp 4 19.5c	Value of desired temp. 4 for primary zone		13.4
20.5	Desired Primary temp 5 19.0c	Value of desired temp. 5 for primary zone		13.4
20.6	Desired Aux temp 20.0c	Value of desired temp. for auxiliary zone		14.2

## 21. EVENTS &amp; PERIODS

Ref.	Display	Description	Notes	Sect.
21.1	Pri Number 24hr programmes ? 1	Choice of number of 24-hour programmes to be used (1 ... 4) for primary zone	Avoids scrolling unnecessary display pages.	15.1
21.2	P1 Event 1 6.00 TEMP 3 21.0c	Number of programme, number of event and start time programmed. Choice type of mode to assign to period : <i>TEMP 1...5 ; OFF</i> . <b>Further groups of 6 pages according to figure entered in 21.1</b>	Max 6 periods. To eliminate an unused period press + and - together : - - . - - will appear. Events must be in increasing order. Do not leave - - . - - between programmed events. Modes set are winter ones.	15.1
21.7	P1 Event 2 22.00 OFF			
21.8	Aux Number 24hr programmes ? 1			
21.9	P1 Event 1 6.00 ON	Number of programme, number of event and start time programmed. Choice type of mode to assign to period : <i>ON ; OFF</i> . <b>Further groups of 6 pages according to figure entered in 21.1</b>	Max 6 periods. To eliminate an unused period press + and - together : - - . - - will appear. The events must be in increasing order. Do not leave - - . - - between programmed events. Modes set are winter ones.	15.1
21.14	P1 Event 2 22.00 OFF			
21.15	Pri Number 7day programmes ? 1	Choice of number of 7-day programmes to be used (0 ... 1) for primary zone.	Avoids scrolling unnecessary display pages	15.2
21.16	7day 1: MONDAY 24HOUR 1 PRIMARY	Choice of programme for each day of week : <i>24HOUR 1...4 PRI ; TEMP 1...5 ; OFF</i> .		15.2
21.22	7day 1: SUNDAY 24HOUR 1 PRIMARY			
21.23	Aux Number 7day programmes ? 1	Choice of number of 7-day programmes to be used (0 ... 1) for auxiliary zone.	Avoids scrolling unnecessary display pages	15.2
21.24	7day 1: MONDAY 24HOUR 1 AUX	Choice of programme for each day of week : <i>24HOUR 1...3 AUX ; ON ; OFF</i> .		15.2
21.30	7day 1: SUNDAY 24HOUR 1 AUX			
21.31	BST period Fr : 29.03 to : 26.10	Dates of start and end of BST period.		15.3

## 22. SETTING PRIMARY ZONE

Ref.	Display	Description	Notes	Sect.
22.1	Control : MODULATING	Choice of type of control <i>MODULATING ; ON-OFF DIFF</i>	<i>MODULATING</i> : three-wire modulating control. <i>ON-OFF DIFF</i> : On-Off control in two stages	13.1.2.3
		Pages 22.2, 22.3, and 22.4 appear if detector <b>B2 is not connected</b> and if in 22.1 <i>MODULATING</i> entered.		
22.2	Actuator runtime 630sec	Valve actuator run time in seconds.		13.3
22.3	Prop band : 10.0c Integ time : 10m	Proportional band in $\pm$ °C. Integral time in minutes.		13.1
22.4	Dead band NARROW	Dead band of modulating output : <i>NARROW ; MEDIUM ; WIDE</i> .		13.3
		Pages 22.5, 22.6 and 22.7 appear if detector <b>B2 is not connected</b> and if in 22.1 <i>ON-OFF DIFF</i> entered.		
22.5	Diff : 10.0c Integ time : 10m	Temperature differential On-Off per stage. Integral time in minutes.		13.1
22.6	Minimum start time : 60s	Minimum start time for On-Off control.		13.3
22.7	Minimum stop time : 60s	Minimum stop time for On-Off control.		13.3
		Pages 22.8, 22.9, 22.10, 22.11 and 22.12 appear if detector <b>B2 connected</b> and if in 22.1 <i>MODULATING</i> entered.		
22.8	Actuator runtime 630sec	Valve actuator run time in seconds.		13.3
22.9	Prop band : 10.0c Integ time : 10m	Proportional band in $\pm$ °C of primary temperature. Integral time of primary temperature.		13.2
22.10	Flow temp Prop band : 10.0c	Proportional band of flow temperature.		13.2
22.11	Control flow Min : 1c Max : 99c	Minimum & maximum limits of flow temperature. Establish range of Proportional band for primary temperature (22.9).		13.2
22.12	Dead band NARROW	Dead band of modulating output : <i>NARROW ; MEDIUM ; LARGE</i> .		13.3



22. SETTING PRIMARY ZONE				
Ref.	Display	Description	Notes	Sect.
	Pages <b>22.13, 22.14, 22.15, 22.16, and 22.17</b> appear if detector <b>B2</b> connected and if in <b>22.1 ON-OFF DIFF</b> entered.			
22.13	<b>Prop band :10.0c</b> <b>Integ time: 10m</b>	Proportional band in $\pm$ °C of primary temperature. Integral time of primary temperature.		13.2
22.14	<b>Flow temp</b> <b>Diff :10.0c</b>	Flow temperature differential.		13.2
22.15	<b>Control flow</b> <b>Min: 1c Max:99c</b>	Minimum & maximum flow temp. limits. Establish range of Proportional band of primary temperature ( <b>22.13</b> ).		13.2
22.16	<b>Minimum start</b> <b>time : 60s</b>	Minimum start time for On-Off control.		13.3
22.17	<b>Minimum stop</b> <b>time : 60s</b>	Minimum stop time for On-Off control.		13.3
22.18	<b>Setpoint adjust</b> <b>min limit:- 0.0c</b>	Minimum limit of variation permitted to set point adjuster Rt°. With B1 : 0...- 10 °C; with B3 : 0...- 5 °C.	Appears only if in <b>24.1</b> set point adjuster Rt° has been configured	13.5
22.19	<b>Setpoint adjust</b> <b>max limit:+ 0.0c</b>	Maximum limit of variation permitted to set point adjuster Rt°. With B1 : 0...+ 10 °C; with B3 : 0...+ 5 °C.	Appears only if in <b>24.1</b> set point adjuster Rt° has been configured	13.5
22.20	<b>Anticondens : NO</b> <b>Desired T: 50.0c</b>	Anticondensing function : YES; NO. Value of desired boiler anticondensing temp.	If in <b>24.1</b> detector <b>B4</b> not configured & value comes via C-Ring --- will appear.	16.1
22.21	<b>Primary zone</b> <b>priority : NO</b>	Priority function of primary zone : YES; NO.		13.7
22.22	<b>Pri pump :AUT</b> <b>Delay Off : 0m</b>	Control of plant pump : MAN; AUT. Delay in switching off pump.	MAN : always On; AUT: On according to current programme of timed events.	13.8
22.23	<b>Name Pri zone</b> -----	Entering name primary zone.	Use + and - to enter letters or numbers. Use ← and → to position cursor.	16.3
23. SETTING AUXILIARY ZONE				
Rif.	Display	Description	Notes	Sect.
23.1	<b>Control:ON-OFF</b> <b>DIFFERENTIAL</b>	Choice type On-Off control : DIFFERENTIAL ; PROPORTIONAL	DIFFERENTIAL : with pure differential. PROPORTIONAL : with Proportional control action (ambient).	14.
23.2	<b>Diff :10.0c</b>	On-Off temperature differential	Appears if in <b>23.1 DIFFERENTIAL</b> entered.	14.
	<b>Prop band :10.0c</b> <b>Integ time: 10m</b>	Proportional band in $\pm$ °C. Integral time in minutes	Appears if in <b>23.1</b> è PROPORTIONAL entered.	14.
23.3	<b>Half cycle time</b> <b>120sec</b>	Time of half cycle at half load : this is time of On or Off when actual temp. is equal to desired temp.	Appears if in <b>23.1</b> è PROPORTIONAL entered.	14.
23.4	<b>Minimum start</b> <b>time : 60s</b>	Minimum start time for On-Off control.		14.1
23.5	<b>Mimimum stop</b> <b>time: 60s</b>	Minimum stop time for On-Off control.		14.1
23.6	<b>Auxiliary zone</b> <b>priority : NO</b>	Priority function of auxiliary control : YES; NO.		14.3
23.7	<b>Auxiliary pump</b> <b>Delay Off: 0min</b>	Delay in switching off auxiliary zone pump		14.1
23.8	<b>Name Aux zone</b> -----	Entering name auxiliary zone.	Use + and - to enter letters or numbers. Use ← and → to position cursor.	16.3

### 24. CONFIGURATION CONTROLLER

Ref.	Display	Description	Notes	Sect.
24.1	<b>Config detectors</b> 1 - - - - -	Configuration detectors connected (inputs B - M) - = detector not connected number = detector connected. Factory setting : only B1 configured. B1 and B3 are alternatives.	1 : Primary zone detector <b>B1</b> (0 ... 99 °C) 2 : Primary zone flow detector <b>B2</b> 3 : Primary zone detector <b>B3</b> (0 ... 40 °C). 4 : Anticondensing detector <b>B4</b> . 5 : Auxiliary zone detector <b>B5</b> (0 ... 99 °C). 6 : Set point adjuster primary temperature <b>Rt°</b> . 7 : Remote programme selector <b>R</b> .	<b>12.</b>
24.2	<b>CRing connection</b> NO	<i>NO</i> : Controller not connected in C- Ring. <i>PRIMARY</i> : Connected as Primary. <i>SECONDARY</i> : Connected as Secondary.		<b>11.1</b>
24.3	<b>Choice keynumber</b> - - - -	Choice keynumber for preventing use + and - keys : 1901 ... 1999	To eliminate keynumber press + and - together.	<b>16.2</b>

### 25. TESTING

Ref.	Display	Description	Notes	Sect.
25.1	<b>CRing: ??</b>	?? = C- Ring test in progress or test failed YES = test OK	Appears if in <b>24.2</b> PRIMARY or SECONDARY entered.	<b>17.1</b>
25.2	<b>Output: VALVE</b> <b>Status: IDLE</b>	Choice outputs to be tested Choice status output.	Choice output : VALVE ; PUMP ; AUXILIARY Choice status : With VALVE : IDLE ; CLOSES ; OPENS With PUMP & AUXILIARY : ON ; OFF.	<b>17.2</b>



