

TEMPERATURE CONTROLLER
(C<-BUS) (C<-RING)

DTR 684 C2

- ° Principal control at fixed point with 3-wire modulating control or On-Off in two stages.
- ° Auxiliary control at fixed point with On-Off.
- ° C-Bus compatible.
- ° C-Ring compatible.
- ° DIN rail compatible.

1. APPLICATION

DTR 684 can be used for the control of temperature at fixed point in plants for :

- Production DHW.
- Heating swimming pools.
- Underfloor panels.
- Soil heating in greenhouses.
- Fan coil heating.

By means of C-Bus connection it can be inserted in a telemanagement system.

By means of C-Ring connection it can exchange data of common interest with other controllers.

In the C-Ring setup it can be configured as a "Primary" or "Secondary" controller.

2. FUNCTIONS

The main functions of DTR 684 are :

- ° Control of a principal temperature with minimum and/or maximum limits of flow temperature with :
 - Modulating control of regulating valve or On-Off in one or two stages of boiler ;
 - Timed On-Off control of circulation pump ;
 - Timed programmes : four 24-hour and one 7-day ;
 - Modify current programme by remote control ;
 - Anticondensing and priority functions.
- ° Control of auxiliary temp. at fixed point with :
 - On-Off of circulation pump ;
 - Timed programmes : three 24-hour and one 7-day;
 - Priority function.
- ° Programming of periods with dates :
 - 25 holiday periods ;
 - Summer time period.
- ° Three On-Off inputs for signalling alarm.
- ° Alarm signals for short or open detector circuits and for anomalous operation of plant and electronic units.

No.	Description	Type	Sensing Element	Code	Data sheet
1	Essential :				
	Principal temp. detector immersion		SIH 010	NTC 10k_	B1 or B3
	or ambient		SAB 010	NTC 10 k_	B3
	or ambient with set point adjuster		SCB 110	NTC 10 k_	B3 + Rt°
1	Optional :				
	Flow (principal) temp. detector immersion		SIH 010	NTC 10k_	B2
1	or	air duct	STA 010	NTC 10 k_	B2
	Auxiliary temp. detector immersion		SIH 010	NTC 10k_	B5
1	Anticondensing temp. detect. immersion		SIH 010	NTC 10k_	B4
1	Remote control for modifying current prog.		CDB 384	-	R
1	Temp. set point adjuster (with amb.detector incorporated)		SCB 110	-	Rt°

We reserve the right to make changes without notice

4. TECHNICAL DATA

°Electrical			
Power supply	230 V ac ± 10%		
	Frequency		50 to 60 Hz
Consumption	5 VA		
Protection	IP 40		
Radio disturbances	VDE0875/0871		
Vibration test	with 2g (DIN 40 046)		
Voltage-free output contacts:			
- maximum switched voltage	250 V ac		
- maximum switched current	5 (1) A		
Construction standards	Italian Electrotechnical Committee (CEI)		
Storage data	5 years		
° Mechanical			
Case	DIN 6E module		
Mounting	on DIN 35 rail		
	Materials:		
- base	NYLON		
- cover	ABS		
Ambient temperature:			
- operation	0 to 45 °C		-
storage	-25 to +60 °C		
Ambient humidity	Class F DIN 40040		
Dimensions	105 x 115 x 71.5 mm		
Weight	1.0 kg		o
Measurement ranges			
Principal temperature	0 to 99 °C or 0 to 40 °C		
Limit temperature (min. & max.)	0 to 99 °C		
Anticondensing temperature	0 to 99 °C		
Auxiliary temperature	0 to 99 °C		
° Setting ranges principal control			
Desired temperatures.	0 to 99 °C or 0 to 40 °C		
Set point adjuster desired temperature :			
- with 0 to 40 °C detector	± 5 °C		
- with 0 to 99 °C detector	± 10 °C		
Limit temp. detector	1 to 99 °C		
Anticondensing temperature	1 to 99 °C		
24-hour programmes	1 to 4		
7-day programmes	1		
Holiday periods	0 to 25		
Delay switching off pump	0 to 60 min.		
Control output :	- Three-wire modulating		
	- On-Off (1 or 2 stage)		
Modulating :			
- valve actuator run time	30 to 1,800 s		
- proportional band	0.5 to 50 °C		
- integral time	0 to 1,275 min.		
On-Off :			
- On-Off differential	0.5 to 50 °C		
- minimum time On	0 to 990 s		
- minimum time Off	0 to 990 s		
° Setting ranges auxiliary control			
Desired temperature	0 to 99 °C		
24-hour programmes	1 to 3		
7-day programmes	1		
Holiday periods	0 to 25		
Delay switching off heating pump	0 to 60 min.		
Control output	- On-Off differential		

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Data output On-Off differential :	- On-Off proportional
- differential	0.5 to 50 °C
- minimum time On	0 to 990 s
- minimum time Off	0 to 990 s
Data output On-Off proportional :	
- proportional band	0.5 to 50 °C
- integral time	0 to 1,275 min.
- half cycle time	60 to 990 s

5. OVERALL DIMENSIONS

(diagram)

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

6. FACIA

(diagram)

- 1 - Two-line backlighted alphanumeric display
- 2 - + and - keys for entering data
- 3 - <- and -> page-scrolling keys
- 4 - Valve principal or 1st and 2nd stage Opens-Closes LEDs
- 5 - Principal pump LED
- 6 - Auxiliary pump LED
- 7 - On-Off alarms LED
- 8 - Measurement alarms LED
- 9 - Fault LED

7. WIRING

It is recommended not to insert more than two cables in a single terminal of DTR 684 and if necessary to use external terminals.

- ° Power supply 230 V ac : Cables of 1.5 mm².
- ° Power supply valve actuator : Cables of 1.5 mm².
- ° Connections detectors and remote controls : Cables of 1 mm² min.
- ° Connections C-Bus : Telephone cables having two wires of different colours. Maximum wiring length 2 km or 4 km if closed ring.
Warning ! Pay careful attention to polarities.
- ° Connections C-Ring : Telephone cables having maximum wiring length between individual controllers of about 15 meters.

8. WIRING DIAGRAM

(Diagram)

- B1 - Principal t° detector (0 to 99 °C)
- B2 - Principal flow limit t° detector
- B3 - Principal t° detector (0 to 40 °C)
- B4 - Anticondensing boiler t° detector
- B5 - Auxiliary t° detector
- R - Remote control for modifying programmes
- Rt° - Set point adjuster of principal temperature

We reserve the right to make changes without notice

- M1 - Principal circuit pump
- M2 - Auxiliary circuit pump
- Y1 - Principal control valve
- k1 to 3 - Alarm contacts

9. EXAMPLES OF PLANT SETUPS

9.1 Production of DHW with rapid heat exchanger :

- Control of distribution temp. with modulating control primary circuit valve Y1.
- Timed control of primary pump M1 and distribution pump M2.

(diagrams)

- B1 - Detector t° distribution DHW (0 to 99 °C)
- R - Remote control for modifying programmes
- Rt° - Set point adjuster temp. distribution DHW
- M1 - Primary circuit pump
- M2 - Distribution circuit pump
- Y1 - Primary circuit regulating valve

9.2 Production DHW with rapid heat exchanger :

- Control distribution temp. with modulating control of auxiliary circuit valve Y1.
- Timed control primary pump M1 and distribution pump M2.

(diagrams)

- B1 - Detector t° distribution DHW (0 to 99 °C)
- R - Remote control for modifying programmes
- Rt° - Set point adjuster temp. distribution DHW
- M1 - Distribution circuit pump
- M2 - Primary circuit pump
- Y1 - Distribution circuit regulating valve

9.3 Production DHW with storage calorifier :

- Control temp. distribution with modulating control valve distribution circuit Y1.
- Control temp. storage with On-Off control primary pump M2.
- Timed control distribution pump M1.

(diagrams)

- B1 - Detector t° distribution DHW (0 to 99 °C)
- B5 - Detector t° storage
- R - Remote control for modifying programmes
- Rt° - Set point adjuster temp. distribution DHW
- M1 - Distribution circuit pump
- M2 - Primary circuit pump
- Y1 - Distribution circuit regulating valve

9.4 Production DHW with storage calorifier :

- Control temp. distribution & storage with modulating control valve primary circuit Y1.
- Timed control primary pump M1 & distribution pump M2.

(diagrams)

We reserve the right to make changes without notice

B1 - Detector t° distribution DHW (0 to 99 °C)
R - Remote control for modifying programmes
Rt° - Set point adjuster temp. distribution DHW
M1 - Primary circuit pump
M2 - Distribution circuit pump
Y1 - Primary circuit regulating valve

9.5 Heating swimming pool :

- Control temp. return to pool and maximum limit flow with modulating control primary circuit valve Y1.
- Timed control primary pump M1 & pool pump M2.

(diagrams)

B2 - Detector flow limit t°
B3 - Detector pool water t° (0 to 40 °C)
R - Remote control for modifying programmes
Rt° - Set point adjuster temp. pool water
M1 - Primary circuit pump
M2 - Primary circuit regulating valve

9.6 Heating swimming pool :

- Control temp. return pool and maximum limit flow with On-Off control primary pump M1.
- Timed control pool pump M2.

(diagrams)

B2 - Detector flow limit t°
B3 - Detector pool water t° (0 to 40 °C)
R - Remote control for modifying programmes
Rt° - Set point adjuster temp. pool water
M1 - Primary circuit pump
M2 - Pool circuit pump

9.7 Heating underfloor panels :

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

(diagrams)

B1 - Detector flow t° (0 to 99 °C)
R - Remote control for modifying programmes
Rt° - Set point adjuster flow temp.
M1 - Panels circuit pump
Y1 - Panels circuit regulating valve

9.8 Heating underfloor panels :

- Control ambient temp. & maximum limit flow with modulating control valve Y1.
- Timed control pump M1.

(diagrams)

B2 - Detector limit flow t°
B3 - Detector ambient t° (0 to 40 °C)
R - Remote control for modifying programmes
Rt° - Set point adjuster ambient temp.
M1 - Panels circuit pump
Y1 - Panels circuit regulating valve

We reserve the right to make changes without notice

9.9 Soil heating in greenhouses :

- Control temp. soil & maximum limit flow with modulating control valve Y1.
- Timed control pump M1.

(diagrams)

- B2 - Detector limit flow t°
- B3 - Detector soil t° (0 to 40 °C)
- R - Remote control for modifying programmes
- Rt° - Set point adjuster soil temp.
- M1 - Soil circuit pump
- Y1 - Soil circuit regulating valve

9.10 Fan coils heating :

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

(diagrams)

- B1 - Detector flow t° (0 to 99 °C)
- R - Remote control for modifying programmes
- Rt° - Set point adjuster flow temp.
- M1 - Fan coil circuit pump
- Y1 - Fan coil circuit regulating valve

9.11 Ambient heating with air-handling units:

- Control ambient temp. & minimum limit discharge air with modulating control valve Y1.
- Timed control fan M1 & external dampers Ys with frost protection control.

(diagrams)

- B2 - Detector flow t° limit
- B3 - Detector ambient or extract air t° (0 to 40 °C)
- B5 - Detector frost protection t°
- R - Remote control for modifying programmes
- Rt° - Set point adjuster ambient temp.
- M1 - Fan
- Y1 - Battery regulating valve
- Ys - Outside air damper

9.12 Ambient heating with hot air generator :

- Control ambient temp. with one- or two-stage On-Off control burners.
- Timed control fan M1.

(diagrams)

- B3 - Detector ambient t° (0 to 40 °C)
- R - Remote control for modifying programmes
- Rt° - Set point adjuster ambienttemp.
- E1 - Burner
- M1 - Fan

10. C-RING : COMMUNICATION BETWEEN CONTROLLERS

We reserve the right to make changes without notice

DTR 684 is provided with a C-Ring serial output (common D - output U - input E) which allows connecting in a ring the various controllers present in the same heating plant so they can exchange data of common interest. Wiring must be carried out with telephone cable (low capacity) and the maximum wiring length permitted between individual controllers is about 15 meters.

The system must always consist of:

- 1 "PRIMARY" controller (DCC602, DTE611) or one configured as "PRIMARY" (DTE600, DTE602, DTR 684).
- 1 to 15 controllers configured as "SECONDARY" (DTE600, DTE602, DTR 684) or "SLAVE" (DSE600, DSE602).

The data transmitted are:

1 - Signal enabling "SLAVE" controllers.

The "SLAVE" controllers (DSE600 and DSE602) can function only if connected via C-Ring to a controller configured as "PRIMARY" (DCC602, DTE600, DTE611, DTE602, DTR 684). The latter sends a signal via C-Ring which allows the "SLAVES" to operate. If the "PRIMARY" controller is faulty or there is a break in the C-Ring the "SLAVE" will not function.

2 - Outside temperature.

It is possible to use a single outside detector for all the controllers. The controller with the outside detector connected transmits the value measured to all the controllers which follow it in the C-Ring.

If another controller has its own outside detector, this controller does not take into account the value transmitted via C-Ring but only the value measured by its own detector and it transmits this value to the controllers which follow it.

3 - Anticondensing temperature & DHW priority temp.

The concept is similar to that of the outside temperature, the only difference being that the controller having the anticondensing detector transmits via C-Ring the differential between the value "Desired Anticondensing Temperature" set on the controller itself and the value measured by the detector.

If one of the controllers has the DHW detector and "DHW priority" function enabled, this controller sends via C-Ring the maximum differential between its own DHW differential and the Anticondensing value received via C-Ring.

The other controllers with the Anticondensing function enabled calculate the reduction in their flow temperature in relation to the differential (Anticondensing - DHW) they receive via C-Ring.

4 - Maximum flow temperature

Each controller receives from the one preceding it in the C-Ring the value of the maximum flow temperature requested by that controller's heating plants, it compares it with the maximum flow temperature requested by its own heating plants and sends the higher value to the next controller.

The "Primary" controller receives the highest of the flow temperature values requested by all the heating plants and, if it is a controller controlling boilers, it is able to set the boiler temperature necessary to satisfy the heating plants concerned.

10.1 C-Ring wiring diagram

(diagram)

10.2 Example of C-Ring setup

(diagram)

11.C-BUS: TELEMAGEMENT COMMUNICATION

DTR 684 is provided with a C-Bus parallel output which allows two-way communication with one or more Local computers and/or a Telemagement central computer.

It is possible to transmit :

- Programming and setting data shown on the displays of the controllers;
- Programming and setting data inherent to the telemagement system;
- Alarm status;
- Operational status of all electrical devices controlled;
- Values of parameters measured by detectors.

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It is possible to connect up to a maximum of 239 Coster controllers bearing the C-Bus badge; so that they can be identified by the computer they must be individually addressed (1 to 239) in menu CONFIG DTR 684 21.3 .

11.1 C-Bus connections

The parallel electrical connection between all the controllers must be carried out using twin-wire telephone cable (low capacity) and observing strictly the polarity 0C - C.

The wiring can be:

- closed ring having a maximum wiring length of 4 km
 - in line or with stubs having a maximum wiring length of 2 km.
- For greater distances signal amplifiers can be used.

Connection to local computers must be carried out using C-Bus-RS232 convertors and connection to the telemanagement central computer using a Coster modem with C-Bus input.

11.2 C-Bus wiring diagram

(diagram)

12. INSTALLATION & TESTING

DTR 684 must be installed in dry premises having a temperature not above 35 °C and as far as possible from water drips or sprays.

DTR 684 can be wall-mounted on a DIN rail or in standard DIN control panels.

If located in premises classified as "Dangerous" it must be installed inside electrical cabinets constructed according to current regulations on the basis of the danger involved.

- ° Loosen the four screws (5.3) which secure the cover (5.1) to the base (5.2) and separate the two parts.
- ° Mount the base on the DIN rail and ensure that the securing elements (5.4) block it correctly.
- ° Carry out the electrical wiring in strict accordance with the wiring diagram (8), current regulations and the suggestions made under 7. WIRING.
- ° Using a multitester, check that there are no short or open circuits in the power supply, C-Bus, C-Ring and the control outputs.
- ° Apply power (230 V ac) and check with a multitester across terminals L - N that voltage is correct.
- ° Remove power, replace cover on base and tighten up the four screws.
- ° Apply power again and carry out electrical testing of DTR 684:
 - Use pages of menu 18. MEAS&COUNT&CALC to check that detectors connected measure the value controlled correctly.
 - Use pages of menu 22.TESTING to check electrical operation of valves & pumps.

13. SETTING

Read carefully 14. ORGANISATION DISPLAY PAGES in order to understand the use of the operating keys and the arrangement of the display pages.

- ° In menu 21. CONFIG DTR 684, enter all the data to configure the controller according to the characteristics of the plant.

Data useful in any situation :

- 21.1 : Decide uses of detectors B1 to 5 actually connected.
- 21.6 : Enable detector alarms. Indispensable even without telemanagement because a short or open detector circuit is indicated on facia (fig. 6.8) and it is possible to identify it on display (21.6).
- 21.8 : Choice access keynumber.
Only if you wish to prevent use of + and - keys by unauthorised persons.
- 21.9-10 : Enter names of plants.

Data for controller connected via C-Bus to telemanagement.

- 21.2 : Enable Send Alarms to telemanagement PC :
Enable telemanagement keyword. Not indispensable.
- 21.3 : Enter telemanagement address. Indispensable for C-Bus communication.
Enter group to which controller belongs. Not indispensable.
- 21.5 : Enable functional alarms. Not indispensable.
- 21.7 : Enable On-Off alarms (E1-2-3).

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Indispensable only if connected. Do not enable if used for signalling status.

Data for controller connected to C-Ring :

- 21.4 : Definition of controller in C-Ring : Primary or Secondary. Indispensable.
- ° In menu 19. SETTING PRINCIPAL CONTROL enter setting data for principal control :
 - 19.1 : Choice type of control : Modulating or On-Off.
 - 19.2-6 : If in 19.1 modulating has been chosen : Run time of valve actuator; Proportional band & Integral time of principal temp ; Proportional band & minimum & maximum values of flow temp., if detector B2 configured; Neutral zone of modulating output.
 - 19.2-6 : If in 19.1 On-Off has been chosen :Differential and Integral time of principal temp.;; Minimum start and stop times.
 - 19.7-8 : If set point adjuster Rt° has been configured : Minimum & maximum limits of variation permitted. Not indispensable.
 - 19.9 : Enable anticondensing function & enter desired value.
 - 19.10 : Enable priority function.
 - 19.11 : Choose type of operation & enter delay switching off pump.
- ° In menu 20. SETTING AUXILIARY CONTROL enter setting data for auxiliary control:
 - 20.1 : Choose type of control : Differential On-Off or Proportional On-Off (ambient).
 - 20.2 : If in 20.1 Differential has been chosen : temp. differential.
 - 20.2-3 : If in 20.1 Proportional has been chosen : Proportional band, Integral temp. & half-cycle time.
 - 20.4-5 : Minimum start & stop times.
 - 20.6 : Enable priority function.
 - 20.7 : Enter delay in switching off pump.
- ° In menu 16. TEMPERATURES :
 - 16.1-5 : Enter desired temperatures for principal control (Desired Pri temp 1 to 5). Indispensable.
 - 16.6 : If detector B5 configured : Enter desired temp. for auxiliary control (Desired Aux temp).
- ° In menu 17. EVENTS & PERIODS :
 - 17.1 : Enter number of 24-hour programmes to be used for principal control (max 4).
 - 17.2 : Enter PRI 24-hour programmes with start & stop times and with desired temperatures for each period.
 - 17.3 : Enter number of 24-hour programmes to be used for auxiliary control (max 3).
 - 17.4 : Enter AUX 24-hour programmes with start & stop times and with desired temperatures to be used in each period.
 - 17.5 : Enter number of 7-day programmes to be used for principal control (0-1).
 - 17.6 : Enter PRI 7-day programme and assign desired 24-hour programme to each day of week.
 - 17.7 : Enter number of 7-day programmes to be used for auxiliary control (0-1).
 - 17.8 : Enter AUX 7-day programme and assign desired 24-hour programme to each day of week.
 - 17.9 : Enter number of holiday periods you intend using (max 25).
 - 17.10 : Assign programme to be used in all holiday programmes for principal control.
 - 17.11 : Assign programme to be used in all holiday periods for auxiliary control.
 - 17.12 : Enter dates of start and end of each holiday period.
 - 17.13 : Enter dates of start and end of summer time period.
- ° In 15. NORMAL USE :
 - 15.2 : Enter programme for principal control
 - 15.5 : Enter programme for auxiliary control..
 - 15.7 : Enter correct time of day, day of week and current date.

14. ORGANISATION DISPLAY PAGES

14.1 Use of keys

All the programming and setting data for the controller are organised in pages which appear on the alphanumeric two-line display (fig. 6.1). The <- and -> keys (fig. 6.3) allow scrolling the pages on the display and moving the cursor for entering data on the pages. The + and - keys (fig. 6.2) permit adjusting the data under the flashing rectangular cursor. To return quickly to the 1st page, press <- and -> keys at the same time.

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14.2 Access Keynumber

The use of the + and - keys can be prevented by introducing a four-figure access keynumber in 21.8 CONFIG D 684.

Choice keynumber

If the access keynumber has been entered, when + or - keys are pressed there will appear on display:

Access keynumber

---(1)

(1) Use + and - keys to enter access keynumber.

If keynumber is correct, the + and - keys will be enabled and it will be possible to display all the pages and to make any adjustments to the data.

If no key is pressed for 15 minutes the keynumber is re-enabled automatically.

14.3 Display pages

The pages dedicated to the running of the boiler plant (15. NORMAL USE) are easily and immediately accessible even to non-experts.

Even without entering the access keynumber the pages can always be displayed; it is not, however, possible to adjust the data if the keynumber has not been entered.

The display pages permit:

- Viewing and choosing the operating programme.
- Viewing the current operating mode.
- Viewing the desired temperature in use.

The pages dedicated to entering the programmes and to the technical setting of the controller have been divided into MENUS according to subject matter:

- TEMPERATURES (16.): Entering desired temperatures.
- EVENTS & PERIODS (17.): Entering events and times for 24-hour and 7-day programmes, holiday periods, and summer time.
- MEAS&COUNT&CALC (18.) : Display of actual values measured by temperature detectors.
- SET PRI CONTROL (19.) : Entering technical setting data regarding principal control.
- SET AUX CONTROL (20.): Entering technical setting data regarding auxiliary control.
- CONFIG DTR 684 (21.) : Entering configuration data to adapt controller to actual conditions of boiler plant and entering data required for telemanagement.
- TESTING (22.) :Permits testing electrical connections between control outputs of controller and external devices (valves, pumps,etc).
- Press -> key until there appears:

TECHNICAL PAGES!

PRESS + KEY

- Press + key and release it ; there will appear:

Choice Menu + / -

XXXXXXXXXXXXXXXXXX (1)

(1) Title of MENU. Use + and - keys to choose MENU desired.

- ° If choice is : TEMP & CONTROLS or
 EVENTS & PERIODS or
 MEAS&COUNT&CALC or
 TESTING

- Press -> key and first page of chosen MENU will appear.

- ° If choice is : SET PRI CONTROL or
 SET AUX CONTROL or
 CONFIG DTR 684

- Press -> key ; there will appear:
 TECHNICAL PAGES!

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PRESS + KEY

-Press + key and release it ; the first page of chosen MENU will appear.

15. NORMAL USE

If the access keynumber has been enabled in 21.8 CONFIG DTR 684, by pressing the + or - keys for the first tin on the display will appear :

Access keynumber

----(1)

(1) Use + or - keys to enter keynumber.

15.1 Pri : _____(1)

(2)12.18 MONDAY(3)

(1) Name of principal plant, entered in 21.9.

(2) Current time, entered in 15.7.

(3) Current day of week, entered in 15.7.

15.2 Pri : _____(1)

24HOUR 1(2) PRI

(1) Name principal plant.

(2) Choice programme (use + or - keys) :

- 24HOUR 1 to 4 PRI : 24-hour programmes.

- 7DAY PRI : 7-day programmes.

- TEMPERATURE 1to 5 : Always temperature 1 to 5.

- OFF : Always switched off.

When there appears :

- HOLIDAY : It is a holiday period.

- REMOTE TEMP 1 to 4 : R is in one of positions "Temperature 1 to 4".

- REMOTE OFF : R is in position "Off".

15.3 Pri mode: TEMP 3(1)

(2)Td 21.0cVar + 0.0c(3)

(1) Current operating mode :

- TEMP 1 to 5 : One of temp. 1 to 5 in use.

- OFF : Off period.

(2) Desired ambient temp. for current mode.

(3) To adjust desired temp. use + or - key.

- With B1 : max ± 10 °C

- With B3 : max ± 5 °C.

15.4 Setpoint adjust

T desired : + 0.0c(1)

Appears only if in CONFIG DRT 684 21.1 the set point adjuster has been configured.

(1) Desired variation by set point adjuster.

15.5 Aux : _____(1)

24HOUR 1(2) AUX

(1) Name of auxiliary plant.

(2) Choice programme (use + or - keys) :

- 24HOUR 1 to 3 AUX: 24-hour programmes.

- 7-DAY AUX : 7-day programmes.

- ON : Always switched on.

- OFF : Always switched off.

When there appears :

- HOLIDAY : It is a holiday period.

15.6 Aux mode: ON(1)

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(2)Td 20.0c Var + 0.0c(3)

(1) Current operating mode :

- ON : One of desired Aux. temperatures in use.
- OFF : Period switched off.

(2) Desired ambient temp. for current mode.

(3) To adjust desired temp. use + or - key.

15.7 (1) 12.18 MONDAY(2)
(3)10.02.96 GMT(4)

(1) Correct time : Use + or - to adjust.

(2) Day of week : Use + or - to change.

(3) Current date : Use + or - to change.

(4) Current time period : - GMT; SUMMER, in relation to dates of "Summer time" entered in EVENTS & PERIODS 17.13.

15.8 DTR 684 c2 Eng.
Vers. xx

Identity data of controller.

16. TEMPERATURES

Choice Menu + / -
TEMPERATURES

16.1 Desired Pri
temp 1 : 20.0c

16.2 Desired Pri
temp 2 : 20.5c

16.3 Desired Pri
temp 3 : 21.0c

16.4 Desired Pri
temp 4 : 19.5c

16.5 Desired Pri
temp 5 : 19.0c

16. 1-5 : Enter desired temperatures to be used in 24-hour programmes in EVENTS & PERIODS 17.2.

16.6 Desired Aux
temp : 20.0c

Enter desired temperature for Auxiliary control.

17. EVENTS & PERIODS

Choice Menu + / -
EVENTS & PERIODS

17.1 Pri Number 24hr
programmes ? 1(1)

(1) Number of 24-hour programmes to be used for Principal control (1 to 4).

17.2 (1) P1 Event 1(2) 6.00(3)
(4) TEMP 3 21.0c(4)

We reserve the right to make changes without notice

18.2 Des flow T : 70.0c(1)
Act flow T : 70.0c(2)
Appears only if in CONFIG DTR 684 21.1 the presence of detector B2 has been configured.

- (1) Flow temperature requested by Principal control.
- (2) Temperature measured by detector B5.

18.3 Des Aux T : 20.0c(1)
Act Aux T : 20.0c(2)

- (1) Desired temp. for Auxiliary control.
- (2) Temperature measured by detector B5.

18.4 Des anticT : 50.0c(1)
Act anticT : 58.0c(2)

Appears only if in CONFIG DTR 684 21.1 the presence of detector B4 has been configured.

- (1) Desired anticondensing temperature.
- (2) Temperature measured by anticondensing detector B4.

19. SETTING PRINCIPAL CONTROL

Choice Menu + / -
SET PRI CONTROL

19.1 Control :
MODULATING(1)

- (1) Type of control :
 - MODULATING : 3-wire modulating control (valve).
 - ON-OFF DIFFERENT : On-Off control in one or two stages (burner, pump, etc).

Without flow detector B2

° If in 19.1 has been chosen MODULATING there will appear :

19.2 Actuat run time
630 s(1)

- (1) Run time of valve actuator in seconds.

19.3 Prop band : 10.0c(1)
Integ time : 10 m(2)

- (1) Proportional band in \pm °C.
- (2) Integral time in minutes.

19.4 Neutral zone
NARROW(1)

- (1) Neutral (dead) zone of modulating output :
 - NARROW ; - MEDIUM ; - WIDE

° If in 19.1 has been chosen ON-OFF DIFFERENT there will appear :

19.2 Different : 10.0c(1)
Integ time : 10m(2)

- (1) Differential temp. On-Off stage.
- (2) Integral time in minutes.

19.3 Minimum start
time : 60s(1)

We reserve the right to make changes without notice

(1) Minimum switching on time of On-Off control.

- 19.4 Minimum stop
time : 60s(1)
(1) Minimum switching off time of On-Off control.

With flow detector B2

° If in 19.1 has been chosen MODULATING there will appear :

- 19.2 Actuat run time
630 s(1)
(1) Run time of valve actuator in seconds.

- 19.3 Prop band : 10.0c(1)
Integ time : 10 m(2)
Setting data of Principal temperature.
(1) Proportional band in \pm °C.
(2) Integral time in minutes.

- 19.4 Flow Temp
Prop band : 10.0c(1)
(1) Proportional band in \pm °C of flow temperature.

- 19.5 Control flow
Min : 1c(1) Max : 99c(2)
(1) Minimum value ; (2) Maximum value.

- 19.6 Neutral zone
NARROW(1)
(1) Neutral (dead) zone of modulating output :
- NARROW ; - MEDIUM ; - WIDE

° If in 19.1 has been chosen ON-OFF DIFFERENT there will appear :

- 19.2 Prop band : 10.0c(1)
Integ time : 10 m(2)
Setting data of Principal temperature.
(1) Proportional band in \pm °C
(2) Integral time in minutes.

- 19.3 Flow Temp
Different : 10.0c(1)
(1) Differential flow temperature.

- 19.4 Control flow
Min : 1c(1) Max : 99c(2)
(1) Minimum value ; (2) Maximum value.

- 19.5 Minimum start
time : 60s(1)
(1) Minimum switching on time of On-Off control.

- 19.6 Minimum stop
time : 60s(1)
(1) Minimum switching off time of On-Off control.

° If in 20.1 connection of set point adjuster has been configured pages 19.7-8 will

We reserve the right to make changes without notice

appear.

- 19.7 Set point adjust
min limit : - 0.0c(1)
(1) Minimum limit of desired temp. permitted to set point adjuster.
- With B1 : 0 to - 10 °C.
- With B3 : 0 to - 5 °C.
- 19.8 Set point adjust
max limit : - 0.0c(1)
(1) Maximum limit of desired temp. permitted to set point adjuster.
- With B1 : 0 to + 10 °C.
- With B3 : 0 to + 5 °C.
- 19.9 Anticondens : NO(1)
Desired T : 50.0c(2)
(1) - YES : ANTICONDENSING enabled.
- NO : ANTICONDENSING disabled.
(2) Setting of desired anticondensing temperature ; if B4 not configured and if value comes from C-Ring there will appear - - - - .
- 19.10 Pri control
priority : NO(1)
Principal control priority.
(1) -YES -NO
- 19.11 Pri pump : AUT(1)
Delay Off : 0m(2)
(1) - AUT : Controlled by Principal programme.
- MAN : Always in operation.
(2) Delay in switching off pump.

20. SETTING AUXILIARY CONTROL

Choice Menu + / -
SET AUX CONTROL

- 20.1 Control : ON-OFF
DIFFERENTIAL(1)
(1) Type of control :
- DIFFERENTIAL On-Off control with pure differential.
- PROPORTIONAL On-Off control with proportional control action (ambient).

° If in 20.1 has been chosen DIFFERENTIAL there will appear :

- 20.2 Different : 10.0c(1)
Integ time : - - m
(1) Differential On-Off temperature.

° If in 20.1 has been chosen PROPORTIONAL there will appear :

- 20.2 Prop band : 10.0c(1)
Integ time : 10 m(2)
(1) Proportional band in \pm °C
(2) Integral time in minutes.

- 20.3 Half-cycle time
120 s(1)

We reserve the right to make changes without notice

(1) Half-cycle time at half load : time of On or of Off when actual temp. is equal to desired temperature.

20.4 Minimum start
time : 60s(1)
(1) Minimum switching on time of On-Off control.

20.5 Minimum stop
time : 60s(1)
(1) Minimum switching off time of On-Off control.

20.6 Aux control
priority : NO(1)
Auxiliary control priority.
(1) -YES -NO

20.7 Auxiliary pump
delay Off : 0m(1)
(1) Delay in switching off pump.

21. CONFIGURATION DTR 684

Choice Menu + / -
CONFIG DTR 684

21.1 Config detectors
1 2 3 4 5 6 7

Configuration detectors.

Use + or - to establish which detectors are connected.

- Number = detector connected.

- Dash = detector not connected.

The detectors B1 and B3 cannot both be configured; should this occur, the controller recognises only B1.

1 : Principal control detector B1 (0 to 99 °C).

2 : Principal control limit detector B2.

3 : Principal control detector B3 (0 to 40 °C).

4 : Anticondensing detector B4.

5 : Auxiliary control detector B5.

6 : Principal temperature set point adjuster.

7 : Principal control remote control.

The controller is supplied from the factory with only detector B1 configured.

21.2 Send alarms : NO(1)
PassWTeleman : NO(2)

(1) - YES : Alarms sent to central PC.

- NO : Alarms not sent to central PC.

(2) - YES : Telemangement password enabled.

- NO : Telemangement password disabled.

21.3 Address : -(1)
Group : -(2)

(1) Telemangement address of controller (1 to 239). Indispensable for C-Bus connection.

(2) Group to which controller belongs.

21.4 CRing connection
NO(1)

(1) - NO : Controller not connected to C-Ring.

- PRIMARY : Primary controller.

We reserve the right to make changes without notice

- SECONDARY : secondary controller.

21.5 Functional Alarms
1 2 5 8

Enabling functional alarms.

Use + or - to enable or disable alarm.

- Number = alarm enabled.

- Dash = alarm disabled.

When alarm has been triggered, the number flashes alternating with the letter "A" and the "Measurement alarms" LED (fig. 6.8) flashes.

1 : Principal temp. alarm (B1 or B3).

2 : Limit temp. alarm (B2).

5 : Auxiliary temp. alarm (B5).

8 : Internal timeswitch alarm (cannot be disabled).

The controller is supplied from the factory with the functional alarms disabled.

21.6 Detector alarms
1 2 3 4 5 8

Enabling alarms for short or open detector circuits.

Use + or - to enable or disable alarm.

- Number = alarm enabled.

- Dash = alarm disabled.

When alarm has been triggered, the number flashes alternating with the letter "A" and the "Measurement alarms" LED (fig. 6.8) flashes.

1 : Principal detector B1 (0 to 99 °C).

2 : Limit detector B2.

3 : Principal detector B3 (0 to 40 °C)

4 : Anticondensing detector B4.

5 : Auxiliary detector B5.

8 : C-Ring alarm.

The controller is supplied from the factory with the detector alarms disabled.

21.7 K alarms
1 2 3

Enabling On-Off alarms.

Use + or - to enable or disable alarm.

- Number = alarm enabled.

- Dash = alarm disabled.

When alarm has been triggered, the number flashes alternating with the letter "A" and the "On-Off alarms" LED (fig. 6.7) flashes.

1 to 3 : Inputs E1 to E2 to E3, alarm with k1, k2, k3 closed.

The controller is supplied from the factory with the On-Off alarms disabled.

21.8 Choice keynumber
----(1)

(1) If you wish to prevent use of + and - keys, set, using + and - keys, the access keynumber (1901 to 1999).

21.9 Name Pri plant
------(1)

(1) Identifying name of Principal plant.

Use + or - to enter letters or digits in place of dashes.

21.10 Name Aux plant
------(1)

(1) Identifying name of Auxiliary plant.

We reserve the right to make changes without notice

Use + or - to enter letters or digits in place of dashes.

22. TESTING

Choice Menu + / -
TESTING

22.1 CRing : ??(1)

Page of testing C-Ring wiring.

Does not appear if in 21.4 NO has been chosen.

(1) While controller tests efficiency of C-Ring communication ?? appears.

If test result is positive, YES will appear for 2-3 seconds and then the test is repeated. If test result is negative ?? remains.

22.2 Output : VALVE(1)
Status : IDLE(2)

Page of testing electrical connections of outputs.

(1) Choice output : - VALVE - PUMP- AUXIL

(2) Choice status :

With VALVE : - IDLE - CLOSES - OPENS

With PUMP or AUXIL : - OFF - ON

Note

In the event of strong electromagnetic disturbances it may happen that the relays change status for a very short time ; the relays will immediately return to their correct position in accordance with EN, IEC and ENV standards.

23. PROGRAMMES

23.1 Programmes Principal control

It is possible to assign to the Principal control (15.2) one of the operating programmes chosen from :

- 4 24-hour programmes : 24HOUR PRI 1 to 4;

- 1 7-day programme : 7DAY PRI ;

- 5 programmes always : TEMPERATURE 1 to 5

- 1 programme always : OFF.

° 24-hour programmes Pri 1 to 4 :

Each can contain up to a maximum of 6 start times (17.4).

For each period it is possible to assign :

- TEMPERATURE 1 to 5 (16.1-5)

- OFF

° 7-day programme Pri :

Assigns to each day of week (17.6) one of following programmes :

- 24HOUR PRI 1 to 4 : 24-hour programmes ;

- TEMPERATURE 1 to 5 : Always temp. TEMPERATURE 1 to 5;

- OFF.

23.2 Programmes Auxiliary control

It is possible to assign to the Auxiliary control (15.5) one of the operating programmes chosen from :

- 3 24-hour programmes : 24HOUR AUX 1 to 3 ;

- 1 7-day programme : 7DAY AUX ;

- 1 programmes always : ON ;

- 1 programme always : OFF.

° 24-hour programmes Aux 1 to 3 :

Each can contain up to a maximum of 6 start times (17.4).

For each period it is possible to assign :

- ON : Always desired Aux temperature ;

- OFF.

° 7-day programme Aux :

We reserve the right to make changes without notice

Assigns to each day of week (17.8) one of following programmes :

- 24HOUR AUX 1 to 3 : 24-hour programmes ;
- ON : Always desired Aux temperature;
- OFF.

24. PERIODS WITH DATES

It is possible to set several periods with dates during which the two controls have to meet particular circumstances

- 25 holiday periods ;
- 1 Summer time period.

24.1 Holiday periods

The holiday periods impose a pre-set programme for each single control, equal for all periods, which replaces the normally in use.

At the end of the holiday period the controller returns to its normal programming.

You can use up to a maximum of 25 holiday periods and for each period it is possible to :

- Set the programmes to be used in all the periods for the Principal (17.10) and for the Aux (17.11) control.
- Assign the period to one of the two plants, or to both, and set the dates of start and end of the period (17.12).

24.2 Summer time period

Period in which the controller must pass from the use of GMT to the use of Summer time (17.13).

25. PRINCIPAL CONTROL

The Principal control can operate with two different measurement ranges :

- 0 to 99 °C : detector B1 (NTC 10k_) connected to terminals B1-M for control heating water- 0 to 40 °C : detector B3 (NTC 10k_) connected to terminals B3-M to control chilling water or ambient temp. control.

To differentiate the measurement ranges, besides connecting the detector to different terminals, you must configure in 21.1 detector 1 (0 to 99 °C) or detector 3 (0 to 40 °C).

25.1 Control without flow detector

DTR 684 compares the temperature measured by detector B1 or B3 with the temperature desired by the current programme. In event of a difference, it produces a modulating signal with PI control action for control of regulating valve Y1, if in 19.1 has been chosen :

Control : MODULATING ;

or produces an On-Off signal in two stages if in 19.1 has been chosen :

Control : ON-OFF DIFFERENTIAL.

Modulating

On-Off differential

(diagram)

(diagram)

25.2 Control with flow detector B2

DTR 684 compares the temperature measured by detector B1 or B3 with the temperature desired by the current programme. In relation to the difference measured, to the Proportional band, to the Integral temperature and to the minimum and maximum values, the controller calculates the value of the flow temperature necessary for the plant.

(diagram)

In the event of a difference between the flow temperature measured by detector B2 and that calculated, the controller produces a modulating signal with P control action for the control of regulating valve Y1, if in 19.1 has been chosen :

Control : MODULATING ;

or produces an On-Off signal in two stages if in 19.1 has been chosen:

We reserve the right to make changes without notice

Control : On-Off DIFFERENTIAL.

Modulating
(diagram)

On-Off differential
(diagram)

25.3 Desired temperatures

You can set, in 16.1-5, the five desired temperatures "Pri temperatures 1 to 5" to be used in making up the time programmes "24HOUR 1 to 4 PRI".

25.4 Temperature set point adjuster

If the set point adjuster SCB 110 is connected to terminals B6-M and configured in 21.1, it is possible to adjust from a distance the value of the current desired temperature within the limits set in 19.7-8.

25.5 Anticondensing function

The anticondensing function permits controlling the minimum return to boiler temperature so as to avoid the formation of condensation in the combustion chamber.

The function can be enabled or disabled in 19.9.

If detector B4 is connected and has been configured in 21.1, the controller reduces by 4 °C the value of the principal desired temperature for each degree of reduction of the actual temperature in respect of the value set in 19.9, thereby bringing about the progressive closure of the regulating valve.

If the controller is connected, via C-Ring, to other controllers and does not have its own detector B4 connected, receives the differential value directly from the controller which has the anticondensing detector and does not take into account its own value set in 19.9.

25.6 Priority Principal control function

When the controller is connected in C-Ring with other controllers and the function is enabled in 19.10, the principal control sends via C-Ring the value of the difference between its own desired temperature and the actual temperature, thereby instructing the controllers with the anticondensing function enabled to reduce their desired flow temperature so as to give precedence to the principal control of DTR 684.

When you use the priority function and the plant boiler requests the presence of the anticondensing detector it is indispensable to connect it to the first DTR 684 controller in the C-Ring.

25.7 Control principal pump

The principal pump circuit M1, connected to output 6-7, can be controlled in two ways (19.11) :

- MAN : Manual - the pump is always in operation.
- AUT : Automatic - the pump is controlled by the current timed programme; with Off mode the pump is switched off with a delay time set in 19.11.

25.8 Remote control

It is possible to connect remote control CDB 384 in order to change the operating programme in use from a distance :

- OFF : sets "Off" mode.
- TEMPERATURE 4 : sets use of desired temperature 4.
- TEMPERATURE 3 : sets use of desired temperature 3.
- TEMPERATURE 2 : sets use of desired temperature 2.
- TEMPERATURE 1 : sets use of desired temperature 1.
- AUTOMATIC : programme chosen on DTR 684 in use.

26. AUXILIARY CONTROL

If detector B5 is connected to terminals B5-M and its presence has been configured in 21.1, the controller, according to the choice made in 20.1, controls the pump M2 with DIFFERENTIAL ON-OFF or PROPORTIONAL ON-OFF.

The controller, in relation to the programme chosen in 15.3, compares the temperature measured by detector E with the desired Aux temperature set in 16.6. In the event of a difference, the controller produces an On-Off signal for the control of pump M2 with minimum times of switching on and off programmable in 20.4-5. The temperature differential of the On-Off differential control is programmable in 20.2.

The parameters of the proportional On-Off control are programmable in 20.2-3.

- Half-cycle time : Time of On and of Off when actual temperature is equal to desired temperature.

We reserve the right to make changes without notice

- Proportional band.
- Integral time.

26.1 Control auxiliary pump

The auxiliary pump M2 can be switched off after a delay, programmable in 20.7, according to the control requirement, so as to enable the boiler to dissipate the heat accumulated in the combustion chamber. This function can be useful when the auxiliary control regulates a primary circuit and the boiler is controlled, via C-Ring by the maximum temperature requested by the plant controls.

26.2 Auxiliary control priority function

When the controller is connected in C-Ring with other controllers and this function is enabled in 20.6, the auxiliary control sends via C-Ring the value of the difference between its own desired temperature and the actual temperature thereby obliging the controllers with the anticondensing function enabled to reduce their desired flow temperature so as to give precedence to the auxiliary control by DTR 684.

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

26.3 Timed control

If in 21.1 the presence of detector B5 has not been configured, DTR 684 controls pump M2 with timed On-Off action in accordance with the programme chosen in 15.3. In this case, if detector B5 is connected, this serves only to measure temperature and does not have any control function

(Diagram)

27. ALARMS

DTR 684 is able to manage three types of alarm which, besides being indicated on the fascia (fig. 6.7-8-9), can be transmitted to the telemanagement PC :

- Functional alarms ;
- Detector alarms ;
- On-Off alarms.

27.1 Functional alarms

These are alarms, which can be enabled in 21.5, regarding the operation of the controller and of the plants controlled :

Principal temperature alarm (1)

Enabled only when the principal control is in the "TEMP 1 to 5" operating mode. Triggered when the principal temperature remains below, by a programmable value(1) and for a programmable time(1), the temperature desired by the controller.

Flow limit temperature alarm (2)

Enabled only when the principal control is in the "TEMP 1 to 5" operating mode. Triggered when the flow temp. remains below the minimum limit or above the maximum limit, by a programmable value(1) and for a programmable time(1).

Auxiliary temperature alarm(5)

Enabled only when Auxiliary control is in "ON" mode. Triggered when actual auxiliary temp. remains below, by a programmable value(1) and for a programmable time(1) the desired auxiliary temperature.

Internal timeswitch alarm (8)

Triggered when the controller timeswitch assumes incoherent values.

27.2 Detector alarms

These regard short or open detector circuits. It is indispensable, in 21.1, to establish which detectors are actually connected and, in 21.6, to establish which alarms must be signalled.

Principal temp. detector B1 (as alternative to B3) (1)

In event of fault valve Y remains in position in which it finds itself.

Limit temp. detector B2 (2)

In event of fault valve Y remains in position in which it finds itself.

Principal temp. detector B3 (as alternative to B1) (3)

In event of fault valve Y remains in position in which it finds itself.

Anticondensing temp. detector B4 (4)

We reserve the right to make changes without notice

In event of fault anticondensing function is Off and in C-Ring sends a differential value equal to 0.

Auxiliary temp. detector B5 (5)

In event of fault pump M2 stops.

C-Ring alarm (8)

Triggered when data communication ring does not function correctly because of a break in the electrical connections or of a fault in one of the controllers.

27.3 On-Off (k) alarms

These are alarms triggered by the closure of electrical contacts (k) connected to inputs E1-D, E2-D and E3-D. If in 21.7 the alarms have been disabled, they can be used for control of status by telemanagement PC.

(1) Data which can be set only by means of the telemanagement programme.

28. RECORDING DATA

DTR 684 is able to memorise a series of data indicating the operational status of the plants controlled.

At each change of mode, and every two hours, the controller records the following data :

Current time, current day, type of recording (change of mode or end two hours), desired principal temperature, actual principal temperature, calculated flow temperature, actual flow temperature, desired auxiliary temperature, actual auxiliary temperature, desired anticondensing temperature, actual anticondensing temperature, status output relays, principal and auxiliary control modes.

It is able to memorise 22 complete recordings and the last recording will bring about the cancellation of the older. If the first page is not shown on the display the controller makes the recording at the end of two hours, but not at the change of mode because it presumes changes to the setting data are in progress.

The recordings can be displayed only by the telemanagement computer.

RECORD OF TEMPERATURES, PROGRAMMES & PERIODS

PRINCIPAL CONTROL

° PRI TEMPERATURES : - 1 ____ °C - 2 ____ °C - 3 ____ °C - 4 ____ °C - 5 ____ °C

° PRI 24HOUR PROGRAMMES :

P1 : 1 : Fr ____ T ____ 2 : Fr ____ T ____ 3 : Fr ____ T ____ 4 : Fr ____ T ____ 5 : Fr ____ T ____ 6 : Fr ____ T ____
P2 : 1 : Fr ____ T ____ 2 : Fr ____ T ____ 3 : Fr ____ T ____ 4 : Fr ____ T ____ 5 : Fr ____ T ____ 6 : Fr ____ T ____
P3 : 1 : Fr ____ T ____ 2 : Fr ____ T ____ 3 : Fr ____ T ____ 4 : Fr ____ T ____ 5 : Fr ____ T ____ 6 : Fr ____ T ____
P4 : 1 : Fr ____ T ____ 2 : Fr ____ T ____ 3 : Fr ____ T ____ 4 : Fr ____ T ____ 5 : Fr ____ T ____ 6 : Fr ____ T ____

° PRI 7DAY PROGRAMMES :

MON : ____ TUE : ____ WED : ____ THU : ____ FRI : ____ SAT : ____ SUN : ____

AUXILIARY CONTROL

° AUX TEMPERATURE : ____ °C

° AUX 24HOUR PROGRAMMES :

P1 : 1 : Fr ____ T ____ 2 : Fr ____ T ____ 3 : Fr ____ T ____ 4 : Fr ____ T ____ 5 : Fr ____ T ____ 6 : Fr ____ T ____
P2 : 1 : Fr ____ T ____ 2 : Fr ____ T ____ 3 : Fr ____ T ____ 4 : Fr ____ T ____ 5 : Fr ____ T ____ 6 : Fr ____ T ____
P3 : 1 : Fr ____ T ____ 2 : Fr ____ T ____ 3 : Fr ____ T ____ 4 : Fr ____ T ____ 5 : Fr ____ T ____ 6 : Fr ____ T ____

° AUX 7DAY PROGRAMMES :

MON : ____ TUE : ____ WED : ____ THU : ____ FRI : ____ SAT : ____ SUN : ____

° HOLIDAY PERIODS :

H1 : Fr ____ to ____ Plant : ____ H2 : Fr ____ to ____ Plant : ____

We reserve the right to make changes without notice

H3	:	Fr	__.	__	to	__.	__	Plant	:	__		H4	:	Fr	__.	__	to	__.	__	Plant	:	__	
H5	:	Fr	__.	__	to	__.	__	Plant	:	__		H6	:	Fr	__.	__	to	__.	__	Plant	:	__	
H7	:	Fr	__.	__	to	__.	__	Plant	:	__		H8	:	Fr	__.	__	to	__.	__	Plant	:	__	
H9	:	Fr	__.	__	to	__.	__	Plant	:	__		H10	:	Fr	__.	__	to	__.	__	Plant	:	__	
H11	:	Fr	__.	__	to	__.	__	Plant	:	__		H12	:	Fr	__.	__	to	__.	__	Plant	:	__	
H13	:	Fr	__.	__	to	__.	__	Plant	:	__		H14	:	Fr	__.	__	to	__.	__	Plant	:	__	
H15	:	Fr	__.	__	to	__.	__	Plant	:	__		H16	:	Fr	__.	__	to	__.	__	Plant	:	__	
H17	:	Fr	__.	__	to	__.	__	Plant	:	__		H18	:	Fr	__.	__	to	__.	__	Plant	:	__	
H19	:	Fr	__.	__	to	__.	__	Plant	:	__		H20	:	Fr	__.	__	to	__.	__	Plant	:	__	
H21	:	Fr	__.	__	to	__.	__	Plant	:	__		H22	:	Fr	__.	__	to	__.	__	Plant	:	__	
H23	:	Fr	__.	__	to	__.	__	Plant	:	__		H24	:	Fr	__.	__	to	__.	__	Plant	:	__	
H25	:	Fr	__.	__	to	__.	__	Plant	:	__													

° SUMMER TIME : Fr __. __ to __. __