

# SALUS

## Programmable Digital Thermostat with RF Boiler Control



Instruction Manual  
Model No RT500BC



Certification Mark



## PRODUCT COMPLIANCE

This product complies with the essential requirements of the following EC Directives:

- Electro-Magnetic Compatibility Directive 2004/108/EC
- Low Voltage Directive 2006/95/EEC
- EC Marking Directive 93/68/EEC
- R&TTE Directive 99/5/EC

## SAFETY INFORMATION

These instructions are applicable to the SALUS Controls model stated on the front cover of this manual only, and must not be used with any other make or model.

These instructions are intended to apply in the United Kingdom only, and should be followed along with any other statutory obligations.

This accessory must be fitted by a competent person, and installation must comply with the guidance provided in the current editions of BS7671 (IEE Wiring Regulations) and Part 'P' of the Building Regulations. Failure to comply with the requirements of these publications could lead to prosecution.

**Always isolate the AC Mains supply before opening or removing the unit from the wall or wall box.**

**When fitting batteries don't mix old and new batteries together. Do not use rechargeable batteries.**

Please leave these instructions with the end user where they should be kept in a safe place for future reference.

## **What is a programmable room thermostat?**

### **... an explanation for householders**

A programmable room thermostat is both a programmer and a room thermostat. A programmer allows you to set 'On' and 'Off' time periods to suit your own lifestyle. A room thermostat works by sensing the air temperature, switching on the heating when the air temperature falls below the thermostat setting, and switching it off once this set temperature has been reached.

So, a programmable room thermostat lets you choose what times you want the heating to be on, and what temperature it should reach while it is on. It will allow you to select different temperatures in your home at different times of the day (and days of the week) to meet your particular needs.

Turning a programmable room thermostat to a higher setting will not make the room heat up any faster. How quickly the room heats up depends on the design of the heating system, for example, the size of boiler and radiators.

Neither does the setting affect how quickly the room cools down. Turning a programmable room thermostat to a lower setting will result in the room being controlled at a lower temperature, and saves energy.

The way to set and use your programmable room thermostat is to find the lowest temperature settings that you are comfortable with at the different times you have chosen, and then leave it alone to do its job. The best way to do this is to set low temperatures first, say 18°C, and then turn them up by one degree each day until you are comfortable with the temperatures. You won't have to adjust the thermostat further. Any adjustments above these settings will waste energy and cost you more money.

If your heating system is a boiler with radiators, there will usually be only one programmable room thermostat to control the whole house. But you can have different temperatures in individual rooms by installing thermostatic radiator valves (TRVs) on individual radiators. If you don't have TRVs, you should choose a temperature that is reasonable for the whole house. If you do have TRVs, you can choose a slightly higher setting to make sure that even the coldest room is comfortable, then prevent any overheating in other rooms by adjusting the TRVs.

The time on the programmer must be correct. Some types have to be adjusted in spring and autumn at the changes between Greenwich Mean Time and British Summer Time.

You may be able to temporarily adjust the heating programme, for example, 'Override', 'Advance' or 'Boost'. These are explained in the manufacturer's instructions.

Programmable room thermostats need a free flow of air to sense the temperature, so they must not be covered by curtains or blocked by furniture. Nearby electric fires, televisions, wall or table lamps may prevent the thermostat from working properly.

## INTRODUCTION

The RT500 programmable room thermostat from SALUS Controls is a stylish and accurate 5/2 or 7 day programmable electronic thermostat with a large, easy to read display. This programmable thermostat has been specifically designed to be used for both Volt Free and AC heating applications. This programmable thermostat can replace most common residential thermostats and is designed to be used with electric, gas or oil heating boilers. Unlike ordinary single unit design thermostats, this is a new type of thermostat separating the operational functions into two units.

The RF Boiler Control is used for wiring connections and heat on/off control. The RT500 provides the user interface and temperature sensing / control. The two units are linked together by a Radio Frequency (RF) signal.

## Features

- 5/2 or 7 day programming flexibility
- Built-in start up programming for quick installation
- Large, easy to read display with blue backlight
- Frost protection
- Burner on symbol
- Easy to use programming
- User friendly



## INSTALLATION

Please read the important safety information at the start of this manual before you begin to install the device.

The RT500 programmable room thermostat is easily installed using the Industry Standard back plate supplied with the unit – this is used purely for mounting purposes, as no wiring is needed for the RT500. The back plate can be mounted directly to the wall surface.

The ideal position to locate the RT500 is about 1.5m above floor level. It should be mounted in a location where the thermostat is accessible, reasonably lit and free from extremes of temperature and draughts. Do not mount the thermostat on an outside wall, above a radiator or in a location where it may be subjected to direct sunlight.

To ensure trouble free operation of the Radio Frequency (RF) signal, always ensure that the programmable thermostat is mounted away from any possible sources of interference (such as radios, TV sets, computers, etc.), and is not mounted on or in close proximity to large metal objects. Installing the RT500 in enclosed areas such as cellars and basements is not recommended.

## CONNECTING THE RT500 BOILER CONTROL

**NOTE: All electrical installation work should be carried out by a suitably qualified electrician or other competent person.**

If you are not sure how to install the Boiler Control consult either with a qualified electrician, heating engineer or your boiler / heating system supplier for advice on how to continue.

## INSTALLING THE RF BOILER CONTROL

1. Remove the front panel from the boiler.
2. Pull out the mechanical timer.
3. Do not remove link wire.
4. Connect the electrical plug.
5. Push fit boiler control into housing.
6. Replace the front panel ensuring a good seal is made.
7. Power up the boiler and check the correct operation.



## RF Boiler Control

LED indicator for learning / output status  
Recessed button for ID learning  
Max. ambient temperature 55°C  
Transmitter link via radio frequency  
Current rating 5A (resistive) @ 230V AC

### Connections:

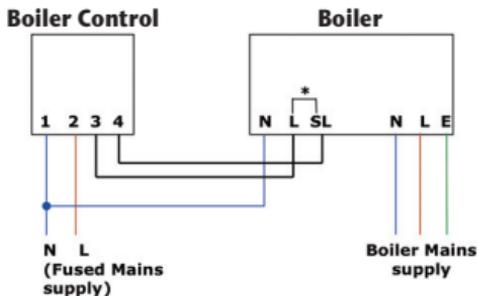
- 1 - Neutral input
- 2 - Live input
- 3 - Common input
- 4 - Normally open output



## BOILER CONTROL WIRING TERMINALS

Terminal	Identifier	Description
1	N	Neutral
2	L	Live feed (230V AC)
3	COM	Linked Live feed
4	N.O.	Switched Live (Normally Open [N.O.] contact)

## TYPICAL WIRING INSTALLATION



## RT500 THERMOSTAT DEFAULT SETTINGS

Changes to the default settings should only be made by the Engineer carrying out the installation or other qualified person.

The installer should select the “jumper” positions required if changes need to be made to the factory default settings. The “jumpers” are found on the rear of the RT500.



Jumper	Function
Program	Jumper for 5-2 (factory default setting) or 7 individual days programming.
Span	Movable jumper for selecting temperature span of $\pm 0.5^{\circ}\text{C}$ (factory default setting) or $\pm 1.0^{\circ}\text{C}$
1,2,3,4,5	Removable jumpers for altering the RF address code when used in conjunction with the teaching mode of the boiler control.

**NOTE:** The Reset button must be pressed after changing jumper positions.

## CHANGING THE BATTERIES ON THE RT500



1. Open the front flap on the right hand side of the unit, this reveals the SET & SELECT buttons
2. On the bottom right hand side pull the small flap down which will reveal the batteries as shown above.
3. Remove the old batteries
4. Now insert the new batteries, insert bottom battery with the “+” end first followed by the top battery “ – “first .

### **Note:**

**When changing the batteries the RT500 will save your settings for 10 seconds. After 10 seconds your settings will be lost.**

## RF ID CODE SETTING

Normally, the RT500 can link with the Boiler Control the ID code setting. If there is another unit being used nearby, e.g. in the next house, your Boiler Control may be triggered by the other RT500. You can change the RF ID Code to help prevent this problem.

Each Boiler Control can only respond to RF transmissions from a RT500 with the same RF ID code setting.

To adjust the RF ID code of the RT500, remove one or more of the jumper caps located on the back of the unit (labelled 1 to 5 as shown in this picture): Then follow the steps below to resync the RF communication.



Change ID code settings if you are experiencing communication loss between the thermostat and the receiver.

## SYNCHRONISING THE BOILER CONTROL

### (a) Boiler Module

- Press the sync button on the Boiler Module for 3 seconds until its red LED starts flashing (this indicates it's in sync mode).



### (b) RT500 Thermostat

- First change the thermostat RF ID code by removing one or more of the address code jumpers as described in page 9. (Changing from the default RF ID reduces the risk of error-switching from another thermostat locally).
- With the Boiler Module LED flashing, press the thermostat SELECT button for 3 seconds until '10SY' appears on its screen. (The 10 indicates a 10min countdown whilst synchronising). Once the receiver LED stops flashing the synchronisation procedure is complete. Pressing any button on the thermostat will return it to normal mode (or it will time out when the 10mins is expired).



- (c) Now test the RF connection as per page 11.

## TESTING THE RF TRANSMISSION

It is important to site the RT500 in locations where the RF signal cannot be interrupted.

The receiving range between the RT500 and the Boiler Control is 70 metres in open air, however many factors can affect the RF transmission and shorten the operating distance, e.g. shielding by thick walls, foil backed plasterboard, metal objects such as filing cabinets, general RF interference, and so on.

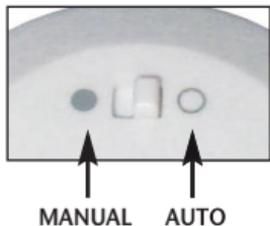
The operating range in most household applications is around 30 metres, which should be more than adequate in most cases. It is advisable to test the RF transmission from the intended RT500 location to the Boiler Control location, particularly if you intend to fix the RT500 to the wall. To check the RF reception, follow the following steps:

1. Press the UP button on the RT500 programmable room thermostat until the set point temperature is higher than room temperature by a few degrees.
2. Wait for a few seconds. The “boiler on” (heat call) indicator should appear on the bottom left of the display on the RT500.
3. Check the LED (light) on the Boiler control - it should be lit.
4. Press the DOWN button to adjust the set point temperature to be lower than room temperature.
5. Wait for a few seconds, and the “boiler on” (heat call) indicator should disappear and the LED (light) on the Boiler Control should switch off.
6. Repeat steps 1 to 5 to make sure the LED (light) on the Boiler Control can turn on and turn off each time.

If you are unable to get a stable RF connection between the Boiler Control and RT500, check that the Boiler Control has a mains supply. If this isn't the problem you can also alter the RF address code by following the 'RF ID Code Setting' section of this manual, and then repeat steps 1 to 5.

## BOILER CONTROL MANUAL OVERRIDE

The AUTO/MANUAL switch allows you to turn on the Boiler Control manually if required.



When the switch on the Boiler Control is in the AUTO (normal) position, the Boiler Control will automatically receive the RF signal from the RT500 and control the boiler based on the programming of the RT500.

The user can also move the switch to the MANUAL position; when in this mode, the boiler will be always turned on and the LED indicator will also be lit constantly. The manual mode is only to be used as a temporary control if problems develop with the communication from the RT500.

## AFTER INSTALLATION

The following table shows the settings of the RT500 programmable thermostat after Power on, or after RESET is pressed:

Function	Status After Reset or Power On
Operation Mode	Normal mode
Room Temperature	22.0 °C, updated within 5 seconds
°C indicator	On
Clock	12:00
AM/PM indicator	AM
Day of Week indicator	M
Program	Default factory setting
Set Point Temperature	Default factory setting
Program Number indicator	5
SET indicator	Off
PROG indicator	Off
Frost Protection indicator	Off
Heat indicator	Off
Low-Battery Warning indicator	Off, updated within 5 seconds
Output Relay	Off

After Power on, the thermostat will operate in **Normal** mode (Normal mode is when the thermostat is displaying the room temperature):

- The set point temperature is reset to the default setting
- The room temperature display is updated within 5 seconds
- The control process starts
- The programme number is updated to indicate the running program

If the Reset Button is pressed, the RT500 will behave in the same way as described above, user settings stored in the internal memory will be deleted and overwritten with the default settings, and all programmable thermostat control settings will be returned to default values.

## USER INTERFACE

The status and operation of the RT500 is clearly shown on the display.

This display allows the user to see at a glance the current status of the heating system, the current time and day of the week, as well as a clear indication of the current room temperature.

There are few user controls for the RT500, making the programmable thermostat very easy to operate. These controls are shown below, along with a description of each of their functions.



## USER CONTROL FUNCTION SUMMARY

Key / Operation	Symbol	Functions
UP key		Increases the selected setting
DOWN key		Decreases the selected setting
BACKLIGHT / FROST key		Manually turns on the LCD backlight for 5 seconds, or activates / deactivates Frost Protection
SELECT key		Selects a clock or programme setting and enters learning mode
SET key		Sets a clock or programme setting
RESET button	 <b>RESET</b>	Resets the programmable thermostat to default (original factory) settings

## OPERATION

The RT500 is configured and adjusted by the use of a minimal number of user controls.



## SETTING THE TIME



Press and hold SET and SELECT when the RT500 is in Normal mode for a few seconds to enter the Clock setting mode. Release both keys and the display will look like the image below:

The Time and Day are displayed along with a SET indicator, with all other indicators cleared from the display. The hour part of the time is flashing to indicate that it is the currently selected item and is ready to be adjusted.

- Press the UP or DOWN keys to increase or decrease the 'hour' setting – the selected item will stop flashing while a key is pressed, and will resume flashing when you release the key.
- Press the SELECT key to select the 'minutes' section of the time. Set the minutes in the same way as the hour by using the UP and DOWN keys.
- Press SELECT again to select the Day, and again change the setting with the UP and DOWN keys.
- Press the SET key to confirm the new time and day settings. This will store the changes and return the RT500 to **Normal** mode.

The RT500 will also return to Normal mode (and save the clock settings) if no keys are pressed for more than 15 seconds.

## PROGRAMMING THE RT500

The RT500 offers great versatility with its programming options, allowing the user to programme the unit to operate on a 5/2 or 7 day control cycle. The programmable thermostat has a default set of Programmes that have been designed to meet the needs of most users. If these default programmes are not suitable for your particular situation, reprogramming the RT500 with your own settings is a very straightforward operation.

Selection of the default programming mode (5/2 or 7 day) is made by changing the jumper setting on the rear of the RT500 Control Unit, as previously described within the Installation section of this manual.

### 5/2 DAY MODE

5/2 day mode is the default programming mode for the RT500. With this mode selected, five different sets of time and set point temperatures can be set for Weekdays or Weekends.

To review or change a programme, press the SET key when the RT500 is in Normal mode. This will change the unit status to Programme Setting mode.

The LCD display will display programme number 1 and SET PROG, with all other indicators cleared. The weekdays will be flashing to indicate they are the selected item and are ready to be adjusted:



Press the UP or DOWN key to select the programme set for either Weekday or Weekend to be reviewed or adjusted. Pressing the SET key at any time when in programming mode will return the RT500 into Normal mode.

Press the SELECT key to confirm the Weekday or Weekend selection. Once this is set, the 'Hour' will flash to indicate that it is the selected item and is the next item to be adjusted:



Press the UP or DOWN key to adjust the hour setting to the desired value, and confirm your selection by pressing the SELECT key.

Pressing the SELECT key allows you to step through each of the items to be reviewed or adjusted within the programmes in the following sequence:

Programme	Function Sequence		
1	Hour	Minutes	Set point temperature
2	Hour	Minutes	Set point temperature
3	Hour	Minutes	Set point temperature
4	Hour	Minutes	Set point temperature
5	Hour	Minutes	Set point temperature

...before then allowing you to cycle back to Programme 1. Pressing the SET key at any time will confirm the setting and return to the programme set selection.

## 7 DAY MODE

The RT500 also offers a 7 day programming mode, which allows you to programme five different sets of time and set point temperatures for each day of the week to give a total of 35 separate programme settings.

To review or change a programme, press the SET key when the RT500 is in **Normal** mode. This will change the unit status to Programme Setting mode.

The LCD display will display programme number 1 and SET PROG, with all other indicators cleared. The weekdays will be flashing to indicate they are the selected item and are ready to be adjusted.



Press the UP or DOWN key to change the display to indicate the single day you want to programme:

Pressing the SET key at any time when in programming mode will return the RT500 into Normal mode. Press the SELECT key to confirm the Day selection. Once this is set, the 'Hour' will flash to indicate that it is the selected item and is the next item to be adjusted:



Press the UP or DOWN key to adjust the hour setting to the desired value, and confirm your selection by pressing the SELECT key.

Pressing the SELECT key allows you to step through each of the items to be reviewed or adjusted within the programmes.

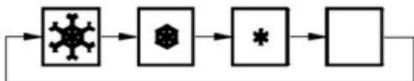
Pressing the SET key at any time will confirm the setting and return to the programme set selection. Each programme for all the other days of the week is set in exactly the same way – just repeat the steps shown above, after entering programming mode and selecting the day you want to programme.

Regardless of which programming mode the RT500 is set for (5/2 or 7 day), not pressing any keys for 15 seconds will automatically save any programming changes and exit to **Normal** mode. You can also review or change programme settings when Frost Protection is enabled.

## FROST PROTECTION

To enable the Frost Protection mode, press and hold the BACKLIGHT / FROST button for a few seconds with the RT500 in **Normal** mode. Once Frost Protection is enabled, the set point temperature is automatically set to 5°C to provide protection from the risk of freezing.

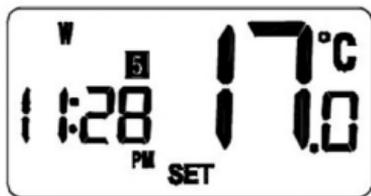
Whenever Frost Protection is activated, the Frost Protection indicator will flash in the sequence shown below:



While Frost Protection is activated, it will override any programme settings until the mode is changed. To turn off Frost Protection mode, press and hold the BACKLIGHT / FROST button for a few seconds.

## REVIEWING SET POINT TEMPERATURE

You can view the set point temperature at any time by pressing either the UP or DOWN key.



When any programme is running, the LCD display will show the programme set point temperature with the SET indicator displayed:



When operating in Frost Protection mode, the LCD display will show a reading of 5 °C and also display the Frost Protection indicator:



When operating in Temporary Override mode, the LCD display will show the temporary set point temperature:

To exit from the set point review, press any key except the UP or DOWN keys, or don't press any keys for a few seconds – either of these actions will return the RT500 to **Normal** mode.

## TEMPORARY OVERRIDE

It is possible to temporarily override the current set temperature of the RT500. There are two ways to do this:

- While reviewing set point temperature: Pressing the UP or DOWN key will increase or decrease the set point temperature in 0.5 °C steps.
- In normal mode press and hold either the up or down key to display the set point temperature. After a few seconds the RT500 will enter temporary override mode and will allow increase or decrease of the set point temperature.

Once in Temporary Override mode, the clock and day are displayed, along with the SET indicator; all other indicators are cleared from the display. The set point temperature will flash to indicate that it can be changed:



The set point temperature can be adjusted within 5 °C to 35 °C.

Temporary Override mode remains active until the new set point settings are adjusted, Frost Protection is activated or the next programme time / temperature set point is reached.

### **On/Off Control**

When the RT500 is operating in NORMAL mode, if the Boiler Control has not received a signal from the RT500 after 1 hour, the Boiler Control will turn off the boiler, and the LED indicator will flash constantly (two times every second).

Once the Boiler Control receives a valid ON or OFF signal, the Boiler Control will control the heating system accordingly.

## OTHER FUNCTIONS AND CONTROLS

### Backlight

The backlight of the RT500 is switched on automatically whenever any of the keys are pressed. The backlight will remain illuminated for a few seconds after the last key press.

The backlight will not illuminate if the battery voltage is low.

### Battery Status

The RT500 checks the battery voltage frequently during normal operation. If the battery voltage is sensed as being low, the low battery indicator  will be displayed on the screen.

Although the programmable thermostat will continue to operate normally at this stage, you should replace the batteries as soon as possible to prevent any possible operating problems.

### Reset Button

The Reset Button is provided as a way to restore the programmable thermostat to its default factory settings. **Pressing this button will delete any previously entered settings.**

### Sleep Mode

By pressing both the UP and DOWN keys together for a few seconds, the RT500 will enter SLEEP mode. In this mode, all of the functions will be paused to save battery power, with the exception of the clock which will continue to run in the background.

#### **While in SLEEP mode:**

- The LCD display will be blank.
- All output from the RT500 will be turned off immediately.

Press any key to wake up the RT500 and exit SLEEP mode.

## ENERGY TIP

One way to set and use your room thermostat is to find the lowest temperature setting that you are comfortable with, and then leave it set at this temperature. You can do this by setting the room thermostat to a low temperature, (for example 17 °C) and then increasing the setting by one degree each day until you are comfortable with the room temperature - you won't have to adjust the thermostat further, as adjustment above this setting will waste energy 1 °C increase in temperature is equal to 3% of your heating costs.

## MAINTENANCE

The RT500 programmable thermostat requires no special maintenance. Periodically, the outer casing can be wiped clean using a dry cloth (please DO NOT use solvents, polishes, detergents or abrasive cleaners, as these can damage the thermostat).

Should the RT500 programmable thermostat fail to function correctly, check:

- The batteries are the correct type, fitted correctly and are not exhausted - fit new batteries if in doubt.
- Heating system is switched on.
- If the RT500 is still not functioning correctly, press the Reset Button.

## WARRANTY

SALUS Controls warrants that this product will be free from any defect in materials or workmanship, and shall perform in accordance with its specification, for a period of two years from the date of installation. SALUS Controls sole liability for breach of this warranty will be (at its option) to repair or replace the defective product.

## PRODUCT SPECIFICATION

Model:	RT500BC
Type:	Electronic programmable thermostat with RF Boiler Control, designed for Volt Free and AC heating applications.

### Programming

Programming Modes:	User selectable for 5/2 or 7 day option.
Number of Programmes:	Five (5) user programmes plus factory default programme.
Override Facility:	User selectable programme override facility.

### Default Programmes

Programme	Output	Weekday	Weekend
1	ON	6:00 AM	6:00 AM
	TEMP	21 °C	21 °C
2	ON	8:00 AM	8:00 AM
	TEMP	14 °C	21 °C
3	ON	4:00 PM	4:00 PM
	TEMP	21 °C	21 °C
4	ON	6:00 PM	6:00 PM
	TEMP	21 °C	21 °C
5	ON	10:00 PM	10:00 PM
	TEMP	14 °C	14 °C

Note: The RT500BC is time and temperature controlled. A low temperature set point can be used if an 'OFF' time period is required.

## Temperature

Scale:	Celsius
Display Range:	5 °C to 35 °C
Display Resolution:	0.5 °C
Tolerance:	Less than $\pm 0.5$ °C at 25 °C
Setpoint Range:	5 °C to 35 °C
Measured Air Temperature Range:	5 °C to 45 °C
	If room temperature is higher than 45°C, display will show HI. If it is lower than 5°C, it will show LO.



## Clock

Accuracy:	$\pm 1$ minute per month
Display Format:	12 hour

## Frost Protection

Setting:	5 °C
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## RT500

Power Source:	2 x AA alkaline batteries (do not use rechargeable batteries)
Radio Frequency:	868 MHz

## Boiler Control

Power Source:	230V AC / 50Hz
Radio Frequency:	868 MHz
Switching Voltage:	0-230V AC / 50Hz
Switching Current:	5A resistive, 1A inductive

## Environment

Operating Temperature:	0 °C to + 40 °C
Storage Temperature:	- 20 °C to + 60 °C

## RT500BC Warranty

SALUS Controls warrants that this product will be free from any defect in materials or workmanship, and shall perform in accordance with its specification, for a period of two years from the date of installation. SALUS Controls sole liability for breach of this warranty will be (at its option) to repair or replace the defective product.

**Customer Name:** .....

**Customer Address:** .....

.....

**Post Code:** ..... **Tel No:** .....

**Email:** .....

**Engineers Company:** .....

**Tel No:** .....

**Email:** .....

**Date of Instalation:** .....

**Engineers Name:** .....

**Engineers Signature:** .....



Certification Mark



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