Blackbox Plus
Modular Control System
Technical Manual

National Sales
Ph: 1300 306 125
sales@ias.net.au

Product Support
Freecall: 1800 354 434
support@ias.net.au

Designed and Manufactured in Australia by:

Innovative Air Systems Pty Ltd
Unit 1 / 49 Miller Street
Murarrie Qld 4172

Contents

Blackbox Series Controllers

The Blackbox Series is the basis for a new way of thinking in airconditioning controllers.

Comprising of a Blackbox Plus relay module connected to one or more Blackbox Series interface modules, the Blackbox Series of controllers is highly expandible due to its modular design.

With a wide range of touchpad options the Blackbox Series offers unparalleled versatility.

More sophisticated control requirements may be covered by incorporating one of the available expansion / bridging modules with other products from the IAS control range.

Recommended System Applications

The Blackbox Series is suitable for use on systems utilising any of the following conditioning methods.

Direct Expansion

Configurable for either reverse cycle or electric heat.
Up to 3 steps of cooling/heating.
0-10v output on cooling call for modulating zone damper.
0-10v output on heating call for time proportional heating.

Chilled Water

Dedicated pump call.
0-10v output for modulating chilled water valve.
Staged electric heat outputs.
0-10v output for time proportional or staged heating.

Water Cooled

Pump call output.
Dedicated proof of flow input to protect compressors from running when there is no condenser water flow.
Staged cooling outputs.
Staged heating outputs.
0-10v output for time proportional electric heating.

Economy Cycle Applications

0-10v output for modulating both outside air and return actuators
Dedicated outside air sensor.
Fully automatic economy changeover.
Staged heating output.
0-10v output for time proportional electric heating.

The Blackbox Plus

The Blackbox Plus relay module is the core component of the Blackbox Series of controllers. Physically and electronically designed to offer simple installation and operation, the Blackbox Plus may be either DIN-Rail or surface mount.

The Blackbox Plus relay module (BBP-5) has 5 relay outputs, 2 analogue outputs and 2 analogue inputs. All external I/O device connections are made via terminals and are protected by terminal covers.

When the 240VAC power is applied the Blackbox Plus searches for connected modules, the touchpad(s) transmits its relay configuration data to the Blackbox Plus, and the controller is ready for use. The Blackbox Plus relay module can support multiple touchpads [optional touchpad expansion module(s) may be required]. Where more than one touchpad is required, the touchpads may have different interfaces but MUST HAVE THE SAME RELAY CONFIGURATION (refer to Interface Selection Notes). If any compatibility issues are detected during the initialisation sequence, the Blackbox Plus will enter Safety Mode and no relays will be energised until the issue is resolved.

Interface Selection Notes.

The Blackbox Plus is a plug and play device. Its analogue inputs, analogue outputs and relay outputs are allocated during the initialisation sequence, according to which user interface module (touchpad) has been selected.

The IAS product code system has been developed to simplify the selection process.

Interface Type		Personality		Special (Optional)		Connection Type
_ _ _	-	_ _ _	-	_ _ _	-	_ _
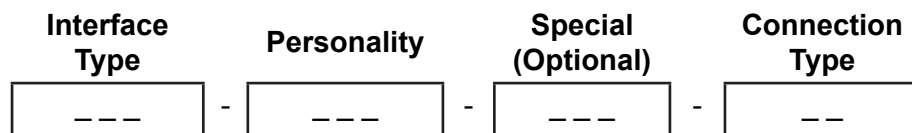
Interface Types:
The features required will dictate the type of interface that should be selected. The following types are available.

1. **OSP**: The Onboard Set Point module connects to the auxilliary IDC connector socket located directly behind the analogue output terminals on the BBP-5 relay module. The OSP allows the setpoint to be set only at the BBP-5 relay module, making it ideal for tamper proofing applications.
   On/Off and Vent/Condition control is achieved by switching the two analogue inputs (refer to BBP-5 Technical Notes and OSP wiring diagram for details)
   When connected in the absence of any other interface module the OSP imposes a 1 fan, 2 cool, 2 heat personality on the BBP-5 relay module.
   When connected in conjunction with any touchpad the OSP default personality is overridden by the touchpad personality.

2. **RSP**: The Remote Set Point module is a wall mounted touchpad with onbard sensor, temperature selection dial, On/Off and Vent/Condition buttons.
   Similar to the OSP, the RSP imposes a default 1 fan, 2 cool, 2 heat personality on the BBP-5 relay module which is overridden by any allternate touchpad personality.

3. **RCP:** The Remote Control Panel is a wall mounted touchpad with On/Off button and Run, Fault and After Hours indicator LEDs.
   The RCP imposes a default 1 fan, 2 cool, 2 heat personality on the BBP-5 relay module which is overridden by any allternate touchpad personality.
   Alternatively the RCP provides configuration jumpers enabling a 131 personality to be selected.

4. **BLB:** The BLB series touchpads offer full personality authority with a limited feature set via a simple elegant display. BLB touchpads are available in 122 and 311 personalities only.

5. **DIG:** The DIG series touchpads combines full personality authority and the simplicity of the a limited feature set, with a 2x7 segment LED digital display. DIG touchpads are available in 122 and 311 personalities only.

6. **LCD:** The LCD series touchpads featurs a 16 character (8x2) backlit liquid crystal display providing full access to the controller configeration settings.

Personality:

Plug and play outputs and inputs make the Blackbox Plus the most flexible controller in its class. The product coding that represents the personality relates directly to the relay allocation, and the order and number of outputs. The personality coding is directly referenced to the controllers relay outputs and is always in the following order:

1. **Fan Outputs:** The first digit represents the number of fan outputs required. Select from 0, 1, 2, or 3.

2. **Cooling Outputs:** The second digit represents the number of cooling/compressor outputs required. Select from 0, 1, 2, or 3.

3. **Heating Outputs:** The third digit represents the number of heating/reversing valve outputs required. Select from 0, 1, 2, or 3.

When connecting the Blackbox Plus relay outputs, connect the fans first, then the cooling outputs, then the heating outputs, starting at relay 1 through to relay 5. If a relay is allocated but is not required skip the relay and continue from the next relay.
(e.g. a single fan, single cool, single heat application is covered by any interface with a 122 personality, using relays 1, 2 and 4)

Special options:

Some special applications may require alternate configuration of the analogue inputs and outputs. These changes will be documented in the User Instructions for each special module.

Connection:

The connection type indicates the method of conncetion to the Blackbox Plus relay module. There are devices using the following connection types:

1. **TL:** This indicates the module is to be connected to the touchpad terminals

2. **ST:** This indicates the module is to be connected to the analogue input terminals.

3. **AS:** This indicates the module is to be connected to the BBP-5 on-board auxilliary socket.

IMPORTANT NOTES FOR INSTALLERS

Wiring

All electrical installation is to be carried out by a licensed trades person in accordance with IAS and unit manufacturers connection diagrams, and local bylaws.

Device I/O Cabling Requirements

All touchpad and sensor cables should be shielded, and kept the maximum practical distance from any power cables ≥ 240 volts (minimum = 300mm).
Shielded 4 core data cable is acceptable provided the drain is firmly connected by a mechanical means to the SH terminal. The mechanical connection of the earth terminal on the Relay Module to a suitable point enables this shielded cable to function as intended.

Relay Output Allocation

The Blackbox Plus is capable of controlling many different A/C configurations of up to 5 relay outputs.

The interface module chosen to connect to the BBP-5 defines the relay module outputs. The first 3 numbers of the product code for the interface module indicates the assigned relays from 1 to 5 in order of Fan, Cool, Heat. Refer to the table below for the relay assignments for all standard interface modules.

Please follow the connection diagram included with your interface module.

Relay Allocation Table

Code	Relay 1	Relay 2	Relay 3	Relay 4	Relay 5
xxx-013-xx	Cool	Heat	Heat	Heat	Pump
xxx-022-xx	Cool	Cool	Heat	Heat	Pump
xxx-023-xx	Cool	Cool	Heat	Heat	Heat
xxx-103-xx	Fan	Heat	Heat	Heat	Pump
xxx-112-xx	Fan	Cool	Heat	Heat	Pump
xxx-113-xx	Fan	Cool	Heat	Heat	Heat
xxx-121-xx	Fan	Cool	Cool	Heat	Pump
xxx-122-xx	Fan	Cool	Cool	Heat	Heat
xxx-130-xx	Fan	Cool	Cool	Cool	Pump
xxx-131-xx	Fan	Cool	Cool	Cool	Heat
xxx-202-xx	Low Fan	High Fan	Heat	Heat	Pump
xxx-203-xx	Low Fan	High Fan	Heat	Heat	Heat
xxx-211-xx	Low Fan	High Fan	Cool	Heat	Pump
xxx-212-xx	Low Fan	High Fan	Cool	Heat	Heat
xxx-220-xx	Low Fan	High Fan	Cool	Cool	Pump
xxx-221-xx	Low Fan	High Fan	Cool	Cool	Heat
xxx-230-xx	Low Fan	High Fan	Cool	Cool	Cool
xxx-301-xx	Low Fan	Med. Fan	High Fan	Heat	Pump
xxx-302-xx	Low Fan	Med. Fan	High Fan	Heat	Heat
xxx-310-xx	Low Fan	Med. Fan	High Fan	Cool	Pump
xxx-311-xx	Low Fan	Med. Fan	High Fan	Cool	Heat
xxx-320-xx	Low Fan	Med. Fan	High Fan	Cool	Cool

BBP-5 Generic Connection Diagram

NOTES:

JP1 - For external proof of flow input, remove shorting jumper from JP1, located behind Flow Input terminals. Short JP1 for constant flow (no proving)

LED - The green relay LEDs when lit indicate that the NO output for each relay is energised.
The flow LED indicates flow proved when lit.

For systems designed for reverse cycle cooling, energise the reversing valve output from the Normally Closed (NC) relay terminal.
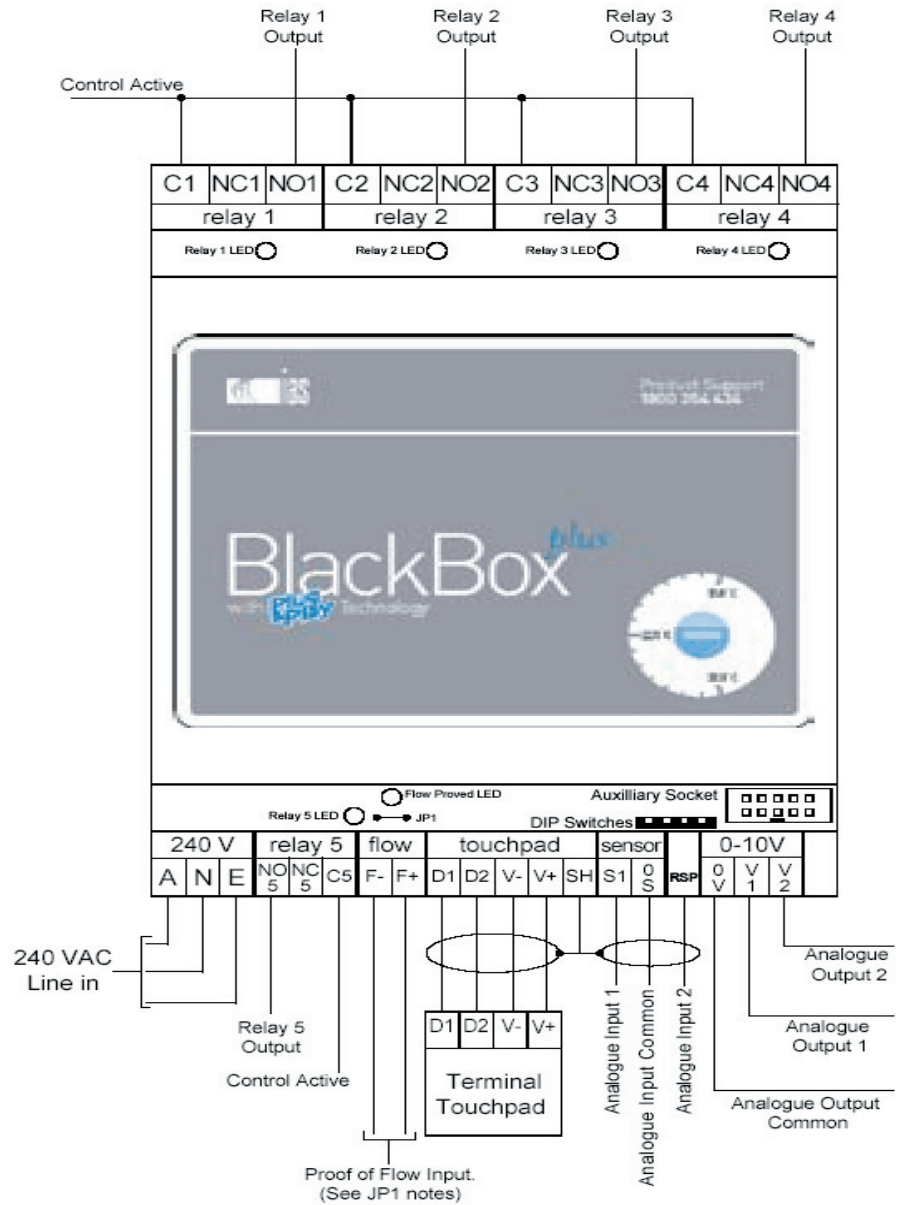
DIP Switch Settings

Number	Function	OFF (Factory Default)	ON
1	Compressor Delay	Software Selectable (4 minute default)	4 seconds (max)
2	Reserved	OFF	IAS Factory Use Only
3	Reserved	OFF	IAS Factory Use Only
4	Heat Type	Reverse Cycle	EDH or Cool Only

Component Positioning

The Relay Module can be positioned on or near the systems air handling unit, in the condensing unit or in the mechanical services switchboard. Maintain a minimum distance of 300mm from the indoor fan motor or similar inductive fields.

The Touchpad(s) should be mounted in a central position within the air conditioned space. It has been designed to be flush mounted to a cavity wall, or surface mounted through the use of a 15mm mounting block.

The Sensor should be mounted either, inside the return air duct as close to the return air grille as possible , or wall mounted 1.5 meters from floor level close to the return air grille. Most importantly, the return air/room sensor should always be protected from direct sources of heat such as direct sunlight and office equipment.

Commissioning

Prior to applying 240VAC power to the system, double check all wiring connections.
Ensure all connected touchpads are the same relay configuration and that no dipswitch conflicts exist.
Refer to the Touchpad User Guide for further commissioning information.

BBP-5 Technical specifications:

Power input to Controller ....**240 volt ± 10%**
Line frequency ....**50 Hz**
Power Consumption ....7VA (max)
Operating temperature ....0°C to 50°C
Altitude ....0 to 2000 meters
Operating Relative Humidity ....10% to 80%
Unit Dimensions (mm) ....173(L) x 116(W) x 76(H)
Weight..545g
Avoid static electricity hazards
Avoid electromagnetic radiation sources
Avoid dust contamination
Avoid highly corrosive environments

Inputs/Outputs

5 x relay outputs
Relay Ratings (Max inductive load)
• Max load through relay 1, 2, 3 & 4 terminals is 7Amps.
• Max load through relay 5 terminals is 5Amps.

2 x analogue inputs
• 1 x NTC thermistor - 47 kΩ @ 25°C
• 1 x Multi purpose

2 x analogue outputs
• 1 x 0-10VDC linked to cooling - V1
• 1 x 0-10VDC linked to heating - V2

Technical Notes

Analogue Inputs provide Digital Input in the following manner: (voltage free clean contacts required)
LCD Touchpads display selectable message.

- **S1 OPEN - FORCED VENT MODE**
  Open circuit analogue input 1 terminals (S1 and 0S) to shutdown all conditioning relays (compressors and electric duct heaters), the fan relay will remain energised.
  If the system is Off the relay for the currently selected fan speed will be energised.
  For 3 speed fan models in Auto fan mode the controller will default to Low fan speed. Manual changes to fan speed will be accepted.

- **S1 CLOSED - REMOTE ON/OFF**
  Close circuit analogue input 1 terminals (S1 and 0S) to shutdown all relays.

- **S2 CLOSED - SYSTEM FAULT**
  Close circuit analogue input 2 terminals (RSP and 0S) to shutdown all conditioning relays (compressors and electric duct heaters).
  The fan relay will remain energised if the system is On.
  For 3 speed fan models in Auto fan mode the controller will default to Low fan speed. Manual changes to fan speed will be accepted.

  LCD touchpads will display the linked message (see note below and refer to Touchpad User Guide) and emit an audible warning (2 beeps approximately every 16 seconds).

  The RCP touchpad will have the 'Fault' LED illuminated.

NOTE: With the LCD touchpad each digital input trigger, as well as the service timer trigger, is linked to a message from the message library (refer to LCD Touchpad User Guide). The linked message will be displayed on the LCD screen when each trigger is activated in the following priority order (if more than 1 trigger event).
  1 - SYSTEM FAULT:
  2 - SERVICE TIMER:
  3 - REMOTE ON/OFF:
  4 - FORCED VENT
  The library contains one customisable entry of 2x8 character lines. The default message for each trigger is a description of the trigger (e.g the display will show S1Closed Circuit, etc).

Default Settings

HeatFan - default = Continuous (adjustable)

HeatFan controls the indoor fan operation in heating mode.
Adjustable via LCD touchpad only. The indoor fan will run continuously
by default. Select 'Auto/Cyc' to cycle the fan between heating calls. If
EDH has been selected there is a fixed 60 second fan run on.

Delays - default = 4 minutes (adjustable)

The compressor delay variable controls the length of time between
compressor cycles - both On & Off.
Adjustable via relay module dipswitch 1 (ON = 4 seconds)
or LCD touchpad menu to 1, 4, 40 seconds or 4 minutes (default)

Deadband - default = 0°C (adjustable)

Adjustable via LCD touchpad only, in 1°C increments to 3°C

Control Band - default = 0.5°C per stage (adjustable)

Control Band is a common variable covering both Stage Seperation
and Switching Differential.
The Heating and Cooling control bands can be adjusted independantly
The Stage Separation / Switching Differential value is equal to the
Control Band value displayed divided by the number of stages.
Adjustable via LCD touchpad only in 0.5°C increments per stage to,
maximum 1.5°C per stage for 1 and 2 stage units, or maximum 1.0°C
per stage for 3 stage units.

Service Timer - default = Disabled (adjustable)

Adjustable via LCD touchpad only, from 0-990 hours in 10 hour increments.
The Service Timer monitors the system run time and at the end of
the time period displays a selectable message and emits an audible
warning (refer to LCD Touchpad User Guide).

Technical Data Sheet
C-BBP-5

Environmental Conditions

Transport

Temperature Range .... 0 - 80°C

Humidity .... 10 - 80%

Operation

Temperature Range .... 0 - 50°C

Humidity .... 10 - 80%

Power Supply

Supply Voltage .... 240VAC ± 10%

Frequency 50-60Hz

Connection Type .... 3 x Terminal

Communications

IASNet Proprietary Bus - to touchpads

Connection Type .... 5 x Terminal

Cable Type .... 4 Core + 1 Shield

Data Refresh Time 1s

Microwire Bus - to clock module

Connection Type .... 1 x IDC10 Socket

Data Refresh Time 1s

Inputs

2 x Analogue

Connection Type .... 3 x Terminal

Cable Type .... 2 Core + 1 Shield

Input Data Refresh Time 1s

Outputs

5 x Relay

Connection Type .... 3 x Terminal

Status Indication .... 1 x Green LED

2 x Analogue

Connection Type .... 3 x Terminal

DIP Switches

Configuration .... x 4

Physical Characteristics

Enclosure Material .... ABS

Weight 570g

Dimensions .... see drawing

Drawing Not to Scale
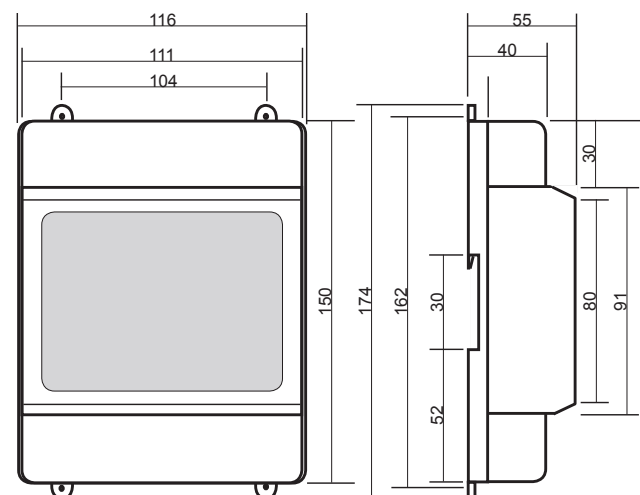
LCD Touchpad User Guide

The Default Display Screen

Setpoint Temperature

Operating Mode
TC = Timeclock
RT = Run Timer function
SB = Setback function

```
22.5°t      TC
FCcRR        A
```

Relay Configuration
Upper case indicates the
relay is energised.
F = Fan
C = Compressor
R = Rev. Valve
H = Elect. Heat
P = Pump

Conditioning Mode
A = Auto
V = Vent only
C = Cool
H = Heat
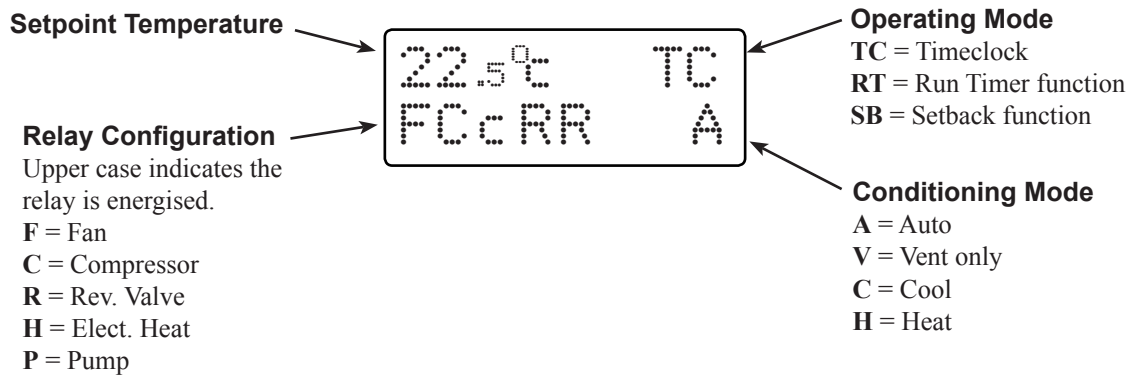
The Clock Display Screen

Optional Clock Mode Required

Time

Day

```
01:31pMo
02Dec,02
```

Date

Year
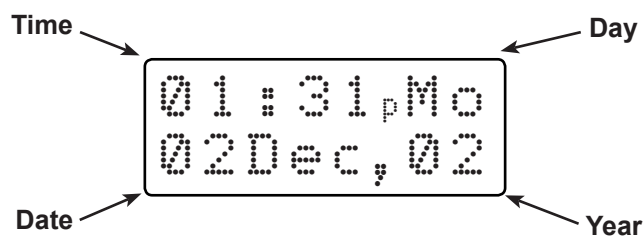
1.0 Quick Start Options

This controller provides a menu based user interface. The information that can be displayed at any given time is limited by the screen area of 2x8 character lines. Additional options are viewed by using the arrow buttons to scroll the information across the screen. The flashing cursor indicates the active area of the screen (generally the top line of the display). Pressing the enter button will activate the selection highlighted by the flashing cursor.

- To change the setpoint, press the arrow buttons. Once the required temperature has been set the screen will revert to the default display after a short period (see image page 13).
- All standard menu options are accessible by pressing menu at the default display screen.
- All clock menu options (clock module required) are accessible by pressing menu at the clock display screen.
- Press the clock button to switch between the default display screen and the clock display screen.
- While in the menu screens the menu button, when pressed, takes you back one step.
- The enter button when pressed moves forward through the various screens, selecting options and saving settings.
- The current active settings appear in CAPITALS.
- The arrow buttons, when pressed in a menu will either cycle the cursor and scroll the screen through the various options available, or, alter the value of the selected variable.
- Press and hold the arrow button to quickly scroll the selected variable.

2.0 Standard Menu Options

While viewing the default display screen press the menu button to gain access to the standard menu options. Use the arrow buttons to cycle the cursor to the desired menu option, then press the enter button to select that option.

Pressing the menu button (or selecting '**Exit**' then pressing enter) will exit the current selection if required.

2.1 To Change the Mode

Operation: The Mode controls the operation of the A/C system. Available options are Cool, Heat, Vent or Auto (automatically switches between cooling and heating as required)

- Select '**Set Mode**' from the standard menu options screen (see section 2.0) and the mode selection screen will appear. (Quick Tip: Press menu, down, enter)
- Scroll down with the down arrow to select the required operating mode.
- Press the enter button to save the new value and return to the default display screen.

2.2 To Set the Fan Speed (Multi-speed Fan Models Only)

Operation: The Fan Speed enables the user to manually select the fan speed or set the fan to Auto. In Auto mode the fan speed decreases as the temperature approaches setpoint.

- Select '**FanSpeed**' from the standard menu options screen.
- Use the arrow buttons to move the cursor to the required fan speed setting.
- Press the enter button to save the new value and return to the default display screen.

2.3 To Change the HeatFan Setting

Operation: HeatFan controls the indoor fan operation in heating mode. In '**Contin**' mode the fan will run whenever the system is On. In '**Auto/Cyc**' mode the fan will cycle off between heating calls. Electric Duct Heating is protected by 60 second fan run-on.

- Select '**HeatFan**' from the standard menu options screen and press enter.
- Use the arrow buttons to move the cursor to the required setting.
- Press the enter button to save the new value and return to the default display screen.

NOTE: The fan can never cycle off in cool mode or during a cool or heat call.

2.4 To Set the Run Timer (After Hours Timer)

Operation: With the Run Timer enabled, and if the system is off (and outside any timeclock periods), pressing the On/Off button will start the system in Run Timer Mode. The system will run for the duration of time set in the Run Timer, after which the system will turn itself off.

- Select '**RunTimer**' from the standard menu options screen and press enter, the run timer edit screen will appear.
- The cursor will highlight the minutes space.
- Use the arrow buttons to alter the hours shown (in ten minute increments) to the required period (up to 24 hours).
- Press and hold the arrows to scroll numbers quickly.
- Press the enter button to save the new value and return to the default display screen.

To disable the Run Timer, select the minimum value of "-----" and press enter.

NOTE: The Run Timer status can be determined from the standard menu options screen. If the Run Timer is enabled, '**RUNTIMER**' will appear in CAPITAL letters in this screen.

2.5 To Edit the Setback Temperatures

Operation: Setback is used to maintain temperature within preset limits <u>at all times</u>. If the temperature moves outside these limits the Controller will turn the system On and heat or cool as required to keep the temperature within the preset limits. These limits are separate and distinct from the normal setpoint.

CAUTION: When activated, Setback will cause the system to start irrespective of any timer programs including holidays. Pressing the Off button WILL NOT stop the system if running in Setback Mode.

To disable Setback, select a minimum of "----" and a maximum of "----". These "----" settings are found by scrolling the minimum all the way down, and the maximum all the way up.

- Select '**Setback**' from the standard menu options screen and the setback edit screen will appear.
- The cursor will highlight the minimum temperature value.
- Use the arrow buttons to alter the value to the required temperature (in 1°C increments).
- Press enter to save and the cursor moves to the maximum temperature value.
- Use the arrow buttons alter the value to the required temperature (in 1°C increments).
- Press enter to save and return to the default display screen.

NOTE: The setback function is enabled whenever there is at least one valid limit set as detailed above. The setback temperatures are to be linked to setpoint in the following manner:
- The highest minimum setback temperature allowed is SETPOINT MINUS 2°C
- The lowest maximum setback temperature allowed is SETPOINT PLUS 2°C
- The Setback Range is from 5 - 50°C.

3.0 To Edit the System Settings (Service Personnel Only).

Changing these settings may adversely affect system operation and in extreme cases may cause system damage.

- Select '**Settings**' from the standard menu options screen and press enter to access the settings sub-menu screen.
- The line '**CAUTION!**' will alternate with '**Service**' and '**use only**'.
- Press either arrow button to scroll the cursor from '**Exit**' to '**Proceed**' then press enter to access the settings sub-menu screen .

3.1 To Change the Compressor Delays

Operation: The compressor delays dictate the length of time that the compressor must remain on or off after cycling.

- Select '**Delays**' from the settings sub-menu screen, then press enter to access the delay select screen.
- The current Delay setting is displayed in CAPITALS.
- Use the arrow buttons to highlight the required Delay setting.
- Press enter to save and the display will return to the settings sub-menu screen.

The following options are available for Compressor Delays:

Safety = 4 minutes (minimum)	**Extended** = 40 seconds (minimum)
Standard = 4 seconds (minimum)	**Instant** = 1 second (min), 4 seconds (max)

3.2 To Set the Deadband

Operation: A deadband value other than 0 will create separate Heating and Cooling setpoints (half of the deadband value either side of the displayed setpoint).

- Select '**Deadband**' from the settings sub-menu screen, then press enter to access the deadband edit screen .
- The cursor will highlight the deadband value.
- Use the arrow buttons to alter the value in 1°C increments from 0 to 3.
- Press enter to save and return to settings sub-menu screen.

3.3 To Set the Control Band

Operation: Control Band is a common variable covering both Stage Separation and Switching Differential. There is a separate control band for Heating and Cooling working from the heating and cooling setpoints dictated by the DEADBAND.

- Highlight '**CtrlBand**' from the settings sub-menu screen, then press enter to access the control band edit screen.
- The cursor will highlight the Heating value.
- Use the arrow buttons to change the value.
- Press enter to save the value and move the cursor to the Cooling value. Now change this value by using the arrow buttons.
- Press enter to save and return to the settings sub-menu screen.

SINGLE STAGE CONTROLLERS: The control band for single stage controllers is adjustable in 0.5°C increments from 0.5°C to 1.5°C, resulting in a switching differential equal to the control band value and stage separation also equal to the control band value.

TWO STAGE CONTROLLERS: The control band for two stage controllers is adjustable in 1.0°C increments from 1.0°C to 3.0°C, resulting in a switching differential for each stage equal to half the control band value and stage separation equal to half the control band value.

THREE STAGE CONTROLLERS: The control band for three stage controllers can either be 1.5°C or 3.0°C, resulting in a switching differential for each stage equal to 1/3 the control band value and stage separation equal to 1/3 the control band value.

3.4 To Edit the Service Timer

Operation: The Service Timer monitors system run time and at the end of the timer period displays a message (see 3.8 page 18) and gives an audible warning (2 beeps every 16 seconds). Press any button to silence the audible warning.

- Select '**SvcTimer**' from the settings sub-menu screen, then press enter to access the service timer edit screen .
- Use the arrow buttons to move the cursor to highlight '**Set**'. Press the enter button and the cursor will highlight the number of hours. Use the arrow button to change the hours shown in increments of 10 hrs.
- Press enter and the Service Timer will reset and the cursor will move back to highlight '**Set**'.
- Press menu to return to the settings sub-menu screen.
- To disable the service timer, select a set time of "----".

NOTE: The Due Value is the time remaining until the Service Timer message appears on the display. This value will revert to the Set Value when the above procedure is followed.

3.5 To Select the Forced Vent Input Message

- Select '**Msg S1op**' from the settings sub-menu screen and press enter.
- The screen will display the abbreviated message library, with the cursor highlighting the current selection.
- Press the arrow buttons to scroll to the required selection then press enter.

Refer to the message library table on page 22 for the complete list of available messages and their abbreviations. Refer to the BBP-5 Installation Manual for information on input triggers.

3.6 To Select the Remote On/Off Input Message

- Select '**Msg S1cl**' from the settings sub-menu screen and press enter.
- The screen will display the abbreviated message library, with the cursor highlighting the current selection.
- Press the arrow buttons to scroll to the required selection then press enter.

3.7 To Select the System Fault Message

Operation: The input trigger for the System Fault Message (S2 closed circuit), when activated, displays the message and causes the touchpad to emit an audible warning (2 beeps every 16 seconds). Press any button to silence the audible warning.

- Select '**Msg S2cl**' from the settings sub-menu screen and press enter.
- The screen will display the abbreviated message library, with the cursor highlighting the current selection.
- Press the arrow buttons to scroll to the required selection then press enter.

3.8 To Select the Service Timer Message

- Select '**MsgTimer**' from the settings sub-menu screen and press enter.
- The screen will display the abbreviated message library, with the cursor highlighting the current selection.
- Press the arrow buttons to scroll to the required selection then press enter.

3.9 To Edit the Custom Message

- Highlight '**Edit Msg**' and press enter.
- The display will show '**SERVICE REQUIRED**' and the cursor will highlight the first letter. Using the arrow buttons, select the alphanumeric symbol required then press enter to save and move to the next letter. (Press menu to go back, if required.)
- Repeat until the both 8 character lines are complete.
- Press enter to save and return to settings sub menu screen.

4.0 Clock Menu Options

NOTE: This clock section is only relevant if the optional clock module has been plugged in to the relay module. The clock module CAN BE plugged in (and removed) while the relay module is powered up and running.

- From the default display screen press the clock button to enter the clock display screen.
- While the clock display screen is displayed press the menu button to enter the timeclock menu options screen.
- Use the arrow buttons to cycle the cursor to the desired menu option, then press the enter button to move to the edit screen for that menu option.

4.1 To Set the Clock

- Select '**SetClock**' from the timeclock menu options screen (see Section 4.0) then press enter and the set clock edit screen will appear.
- The cursor will highlight the Hour value. Use the arrow buttons to select the correct hour (watch for am/pm), then press enter.
- Repeat this procedure for the Minutes, Day, Month and Year values.
- After pressing enter on the Year, the display will return to the clock display screen.

4.2 To Edit the Timeclock Programs

- Select '**SetProgs**' from the timeclock menu options screen (see Section 4.0) to go to the set program edit screen. The cursor will highlight '**Exit**'.
- Use the arrow buttons to select the timeclock program to be edited, then press enter to move to the set start time screen.
- The cursor will highlight the minutes value. Use the arrow buttons to select the correct time in 10 minute increments, then press enter.
- The display will then change to the set stop time screen.
- Follow the same procedure as detailed above to set the stop time then press enter.
- The display will then change to the set run days screen. This is the screen at which you define the days that are going to use these start and stop times. Use the arrow buttons to toggle between UPPER and lower case.
- The cursor will highlight the first letter on the bottom line, representing Sunday. These letters "SMTWTFS", when made UPPER CASE, attach the start and stop times to that day of the week. To ignore the start and stop times on a particular day, make the corresponding letter lower case. Press enter to save and move the cursor to the next letter.
- Repeat the procedure detailed above for each day of the week. Press menu to go back one letter if required.
- Pressing enter after Saturday will return the display to the set programme edit screen and the cursor will be highlighting the last edited program.
- To return to the clock display screen, simply use the arrows to navigate back up to the exit options and press the enter button.
- To enter more programs, use the arrow buttons to select another program and repeat entire process.

To disable a program, select a start & stop time of "--:--".

NOTE: Active Programs (i.e. programs with a start or stop time or both, AND with active days) will appear in CAPITALS. (E.g. "PROG 02" = active; "prog 02" = not active)

4.3 To Set Holidays

NOTE: Active Holidays (i.e. ONLY holidays with a start AND stop date) will appear in CAPITALS. Active Holidays will cause the system to ignore timeclock switching (on and off).

Holidays may be set as single days, or as blocks.

DATES ARE INCLUSIVE AND ALL HOLIDAY PROGRAMS MUST HAVE A START AND STOP DATE ENTERED OR THEY WILL BE INVALID. FOR A ONE DAY HOLIDAY, MAKE THE START AND STOP DATE THE SAME.

- Select '**Set Hols**' from the timeclock menu options screen (see Section 4.0) then press enter and the set holiday edit screen will appear.
- The cursor will highlight '**Exit**'. Use the arrow buttons to select the Holiday program to be edited, then press enter to move to the set start date screen.
- The cursor will highlight the Month value. Use the arrow buttons to select the correct Month , then press enter.
- Repeat this procedure for the Day value which completes setting the start date for the holiday.
- The display will change to the set stop date screen.
- Repeat the steps detailed above to set the required stop date for the holiday.
- The display will revert to the set holiday edit screen and the cursor will highlight the last holiday edited.
- To return to the clock display screen, simply use the arrows to navigate back up to the '**Exit**' options and press the enter button.
- To enter more holidays, use the arrow buttons to select another holiday entry and repeat the entire process.
- To disable a holiday setting, program it's date to "----".

4.3 To Set Daylight Savings

Operation: The daylight savings function advances the clock's time by 1 hour whilst the current date and time are between the start and stop dates set. (E.g. Southern Hemisphere = Oct31...Mar31; Northern Hemisphere = Mar31...Oct31)

- Select '**Day Save**' from the timeclock menu options screen (see Section 4.0) then press enter and the start daylight savings edit screen will appear.
- Use the arrow buttons to select the correct Month , then press enter.
- Repeat this procedure for the Day value which completes setting the start date for the daylight savings.
- The display will change to the set stop daylight savings screen.
- Repeat the steps detailed above to set the required stop date for the daylight savings.

To disable daylight savings, simply select a start date of "----" or start & stop in the same month.

NOTE: The 1 hour advance happens at 1:59am (the next minute is 3:00am) and the 1 hour back happens at 2:59 (next minute is 2:00am).

5.0 Installation and Commissioning

- Ensure all electrical connections are in accordance with the supplied connection diagrams and local bylaws.
- Set the Dipswitches on the back of the touchpad according to the notes and tables below.
- Set all the system settings as mentioned in Section 3.
- If the clock module has been purchased and fitted, refer to Section 4.0 to configure the clock and automated on/off programs, holidays and daylight savings.
- Operate the controller in heat, cool and try each fan speed setting.
- Ensure that the Delay in the Settings Menu is restored to Safety prior to finishing commissioning.

5.1 Touchpad Dipswitch Configurations

Some touchpads are backward compatible with earlier Blackbox versions. The touchpad will configure its dipwitches depending on the relay module it is connected to.

Touchpad Dipswitches when connected to Blackbox Plus relay module (BBP-5)

	Function	OFF (Factory Default)	ON
1	Menu Lock	Menus Available	Menus Locked
2	Setpoint Lock	Setpoint Adjustable	Setpoint Locked
3	Setpoint Range	15-30°C (0.5°C increments)	20-25°C (0.5°C increments)
4	On/Off Lock	On/Off Available	On/Off Locked

Touchpad Dipswitches when connected to earlier version Blackbox relay modules (BB-5) for backward compatibility

	Function	OFF (Factory Default)	ON
1	Compressor Delay	Software Selectable (4 minute default)	4 seconds (max)
2	Lock System Settings Menu	Allow Access	Deny Access
3	Setpoint Range	15-30°C (0.5°C increments)	20-25°C (0.5°C increments)
4	Heat Type	Reversing Valve	Electric Duct Heat or Cool Only

Message Library

Refer to BBP-5 Instal Guide for information on input triggers.
The same message may be linked to more than one trigger.

ABBREVIATED VERSION DISPLAYED IN SELECTION SCREEN	MESSAGE DISPLAYED ON SCREEN AFTER TRIGGER IS ACTIVATED
<Blank>	
SERVICER (Default Custom Message)	SERVICE REQUIRED
DoorOpen	Door Open
VentMode	Vent Mode
RemoteOf	Remote Off
RemoteSh	Remote Shutdown
CleanFil	Clean Filters
ServiceR	Service Required
NoWaterF	No Water Flow
FanOverl	Fan Overload
FireShut	Fire Shutdown
ACPlantF	AC Plant Fault
HPFault	HP Fault
LPFault	LP Fault
HP/LPFau	HP/LP Fault
S1OpenCi (Default Forced Vent Input Message)	S1 Open Circuit
S1Closed (Default Remote On/Off Input Message)	S1Closed Circuit
S2Closed (Default System Fault Input Message)	S2Closed Circuit

Blackbox Plus Trouble Shooting Guide

Symptom	Suggested Action
Fan runs continuously but no cooling or heating	Analogue Input 1 terminals S1 and 0S are open circuit. Check sensor is not connected to S1 and SH (shield) (see page 10 - Sensor Inputs) Check flow input / JP1 for flow proved.
Sensor reads 0°C	See above
No fan, cooling or heating	Check Analogue Input 1 and 2 terminals and cable for closed/short circuit. (see page 10 - Sensor Inputs)
Sensor reads +60°C	See above
Too hot or too cold	Check operating mode (Auto, Cool, Heat) Check On Off status.
LCD touchpad displays '**?????...**'	Check all connected touchpads are the same relay configuration. Check all touchpads for dipswitch conflicts Check cable to touchpad/s
LCD touchpad freezes with '**Init...**' on the display.	Indicates failure to establish communications. Check connection to terminals D1 and D2 on touchpad and Blackbox Plus module.
DIG touchpad flashes '04' then 'E0'	See above
BLB touchpad flashes all LEDs for more than 10 seconds	See above