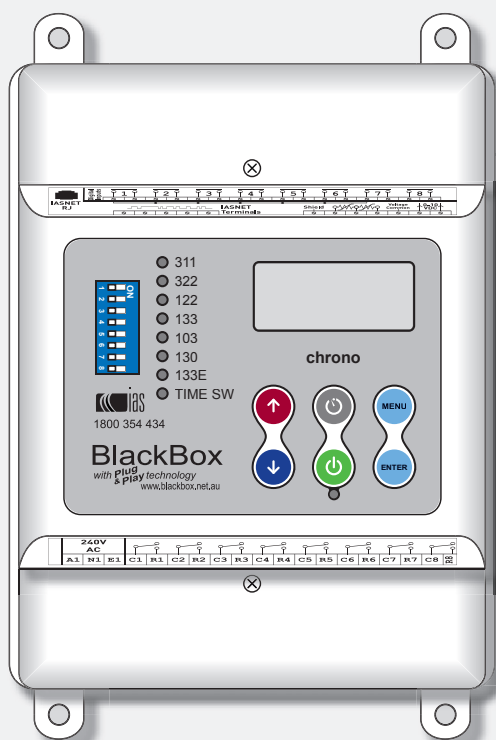


BB8-Chrono

TECHNICAL MANUAL



Product Support
1800 354 434
www.ias.net.au
support@ias.net.au

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



Publisher

Innovative Air Systems Pty Ltd (IAS)
Phone 1300 306 125
Fax 07 3890 8270
Internet www.ias.net.au
Email info@ias.net.au

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This Technical Reference Manual describes the specifications and operation of the BlackBox BB8-Chrono control module.

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Overview

This manual describes the specifications and operation of the BlackBox BB8-Chrono HVAC controller.

The BB8-Chrono is suitable for use on systems utilising any of the following HVAC strategies.

Direct Expansion

- Configure for either reverse cycle or electric heat.
- Up to 3 stages 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.
- Dedicated proof of flow input to prevent system damage.
- 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 prevent system damage.
- Staged cooling outputs.
- Staged heating outputs.
- 0-10v output for time proportional electric heating.
-

Air Cooled

- Staged cooling outputs.
- Staged heating outputs.
- 0-10v output for time proportional electric heating.

Economy Cycle

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

1.1

BB8-Chrono Control Module

The BB8-Chrono control module is a microprocessor driven HVAC plant controller and multi-channel annual timer with onboard LCD interface. The BB8-Chrono is ideal for both stand alone and networked applications (Refer to HMI Technical Manual).

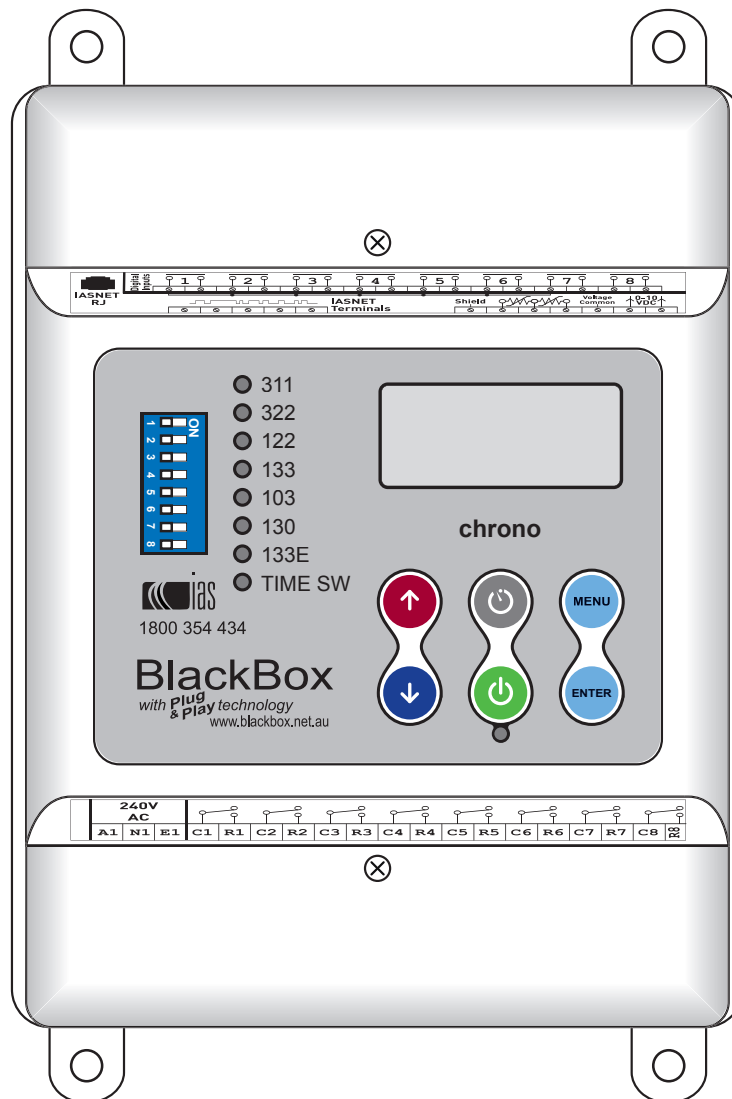
The BB8-Chrono onboard interface provides access to all controller functions detailed in the following pages.

Features:

- 8 x relay outputs
- 2 x analog outputs
- 8 x digital inputs
- 2 x universal inputs
- 8 x preprogrammed personalities
- 16 character (2 x 8 character lines) LCD display
- programmable multi-channel annual timeclock

Redundant relay outputs (not assigned to HVAC functions) are assigned to auxiliary timer channels that may be allocated to other services such as toilet exhaust fans and community lighting. The timer channels are linked to the corresponding digital input providing remote manual override.

All terminals are protected by terminal covers which are mechanically fastened.



1.2 Personality

Plug and play outputs make the BlackBox series the most flexible controller in its class. The control module outputs are allocated to the appropriate HVAC plant resources according to the personality imposed on the control module during the initialisation sequence when power is applied to the controller.

The controller personality can be imposed in one of two ways:

- Onboard configuration DIP switches
- An external interface module

A control module can support multiple interface modules [optional interface expansion module(s) may be required]. Where more than one interface is connected, they may be different interface types but must have the same personality.

If a compatible interface module is detected at initial power up, the device(s) transmits its personality to the control module, and when the initialisation sequence has successfully completed, the controller begins normal operation.

If any compatibility issues are detected during the initialisation sequence, the control module will enter Safety Mode and no relays will be energised until the issue is resolved.

BlackBox personalities are represented by a numerical code comprising of three digits, each from the range 0-3, and an optional fourth alphanumeric character to indicate special options.

The personality coding is directly referenced to the control modules relay outputs and is always in the following order:

1. **Fan Outputs:** The first digit represents the number of fan outputs.
2. **Cooling Outputs:** The second digit represents the number of cooling/compressor outputs.
3. **Heating Outputs:** The third digit represents the number of heating/reversing valve outputs.

1.2.1 Personality Matrix

The following table details some of the common personalities for applications that are covered by the BB8-Chrono.

Personality Code	BB8-Chrono Controller Output Allocation							
	Relay 1	Relay 2	Relay 3	Relay 4	Relay 5	Relay 6	Relay 7	Relay 8
003 ³	Heat	Heat	Heat	Timer Ch4	Timer Ch5	Timer Ch6	Timer Ch7	Timer Ch8 Pump ¹
012 ³	Cool	Heat	Heat	Timer Ch4	Timer Ch5	Timer Ch6	Timer Ch7	Timer Ch8 Pump ¹
013 ³	Cool	Heat	Heat	Heat	Timer Ch5	Timer Ch6	Timer Ch7	Timer Ch8 Pump ¹
013E ³	Cool	Heat	Heat	Heat	Timer Ch5	Timer Ch6	Timer Ch7	Timer Ch8 Pump ¹
021 ³	Cool	Cool	Heat	Timer Ch4	Timer Ch5	Timer Ch6	Timer Ch7	Timer Ch8 Pump ¹
022 ³	Cool	Cool	Heat	Heat	Timer Ch5	Timer Ch6	Timer Ch7	Timer Ch8 Pump ¹
023 ³	Cool	Cool	Heat	Heat	Heat	Timer Ch6	Timer Ch7	Timer Ch8 Pump ¹
030 ³	Cool	Cool	Cool	Timer Ch4	Timer Ch5	Timer Ch6	Timer Ch7	Timer Ch8 Pump ¹
031 ³	Cool	Cool	Cool	Heat	Timer Ch5	Timer Ch6	Timer Ch7	Timer Ch8 Pump ¹
033 ³	Cool	Cool	Cool	Heat	Heat	Heat	Timer Ch7	Timer Ch8 Pump ¹
103 ²	Fan	Heat	Heat	Heat	Timer Ch5	Timer Ch6	Timer Ch7	Timer Ch8 Pump ¹
111 ³	Fan	Cool	Heat	Timer Ch4	Timer Ch5	Timer Ch6	Timer Ch7	Timer Ch8 Pump ¹

Personality Code	BB8-Chrono Controller Output Allocation							
	Relay 1	Relay 2	Relay 3	Relay 4	Relay 5	Relay 6	Relay 7	Relay 8
112 ³	Fan	Cool	Heat	Heat	Timer Ch5	Timer Ch6	Timer Ch7	Timer Ch8 Pump ¹
113 ³	Fan	Cool	Heat	Heat	Heat	Timer Ch6	Timer Ch7	Timer Ch8 Pump ¹
121 ³	Fan	Cool	Cool	Heat	Timer Ch5	Timer Ch6	Timer Ch7	Timer Ch8 Pump ¹
122 ²	Fan	Cool	Cool	Heat	Heat	Timer Ch6	Timer Ch7	Timer Ch8 Pump ¹
130 ²	Fan	Cool	Cool	Cool	Timer Ch5	Timer Ch6	Timer Ch7	Timer Ch8 Pump ¹
131 ³	Fan	Cool	Cool	Cool	Heat	Timer Ch6	Timer Ch7	Timer Ch8 Pump ¹
131E ³	Fan	Cool	Cool	Cool	Heat	Timer Ch6	Timer Ch7	Timer Ch8 Pump ¹
133 ²	Fan	Cool	Cool	Cool	Heat	Heat	Heat	Timer Ch8 Pump ¹
133E ²	Fan	Cool	Cool	Cool	Heat	Heat	Heat	Timer Ch8 Pump ¹
202 ³	Low Fan	High Fan	Heat	Heat	Timer Ch5	Timer Ch6	Timer Ch7	Timer Ch8 Pump ¹
203 ³	Low Fan	High Fan	Heat	Heat	Heat	Timer Ch6	Timer Ch7	Timer Ch8 Pump ¹
211 ³	Low Fan	High Fan	Cool	Heat	Timer Ch5	Timer Ch6	Timer Ch7	Timer Ch8 Pump ¹
212 ³	Low Fan	High Fan	Cool	Heat	Heat	Timer Ch6	Timer Ch7	Timer Ch8 Pump ¹
220 ³	Low Fan	High Fan	Cool	Cool	Timer Ch5	Timer Ch6	Timer Ch7	Timer Ch8 Pump ¹
221 ³	Low Fan	High Fan	Cool	Cool	Heat	Timer Ch6	Timer Ch7	Timer Ch8 Pump ¹
230 ³	Low Fan	High Fan	Cool	Cool	Cool	Timer Ch6	Timer Ch7	Timer Ch8 Pump ¹
301 ³	Low Fan	Med. Fan	High Fan	Heat	Timer Ch5	Timer Ch6	Timer Ch7	Timer Ch8 Pump ¹
302 ³	Low Fan	Med. Fan	High Fan	Heat	Heat	Timer Ch6	Timer Ch7	Timer Ch8 Pump ¹
310 ³	Low Fan	Med. Fan	High Fan	Cool	Timer Ch5	Timer Ch6	Timer Ch7	Timer Ch8 Pump ¹
311 ²	Low Fan	Med. Fan	High Fan	Cool	Heat	Timer Ch6	Timer Ch7	Timer Ch8 Pump ¹
320 ³	Low Fan	Med. Fan	High Fan	Cool	Cool	Timer Ch6	Timer Ch7	Timer Ch8 Pump ¹
322 ²	Low Fan	Med. Fan	High Fan	Cool	Cool	Heat	Heat	Timer Ch8 Pump ¹
TIME SW8 ²	Timer Ch1	Timer Ch2	Timer Ch3	Timer Ch4	Timer Ch5	Timer Ch6	Timer Ch7	Timer Ch8

1. Relay 8 may be configured as a pump call relay by creating a short circuit at JP1.

2. Onboard personality

3. External interface required

1.2.2 Economy Cycle Controller

013E, 131E and 133E are economy cycle personalities that use outside air to provide the first cooling stage when conditions are suitable.

During economy mode the controller shifts the cooling relay stages 1 degree away from their normal activation points and uses the V1 (0-10V) cooling output to modulate an outside air damper.

The controller will only enter economy mode if the outside air sensor is connected to the sensor 2 terminals (S2 & SC), and, the outside air temperature will assist the cooling call (S2 temperature is 2 °C lower than S1 temperature).

1.3 Standard Control Settings

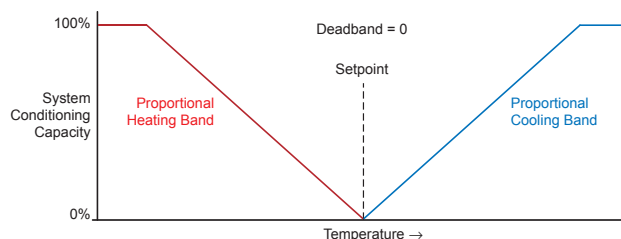
Following is a list of adjustable settings and their default values.
For details on altering these settings refer to Operation.

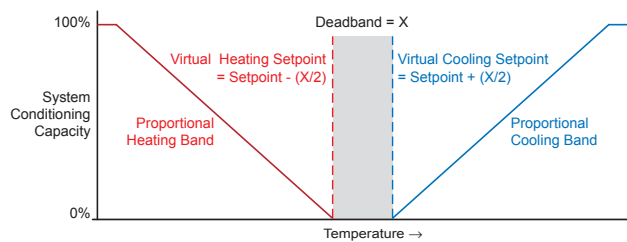
- **Setpoint (Default = 22.5 °C)**
Setpoint is the temperature the controller will try to maintain.
- **Mode (Default = Auto)**
Mode controls the operating mode of the system. Select from auto, cool, heat or vent. In auto mode the controller changes from heating to cooling as dictated by the ambient conditions.
- **Fan Speed (Default = Low)**
Fan Speed controls the indoor fan speed. Select from low, medium, high or auto. Auto fan decreases the fan speed as the temperature approaches setpoint.
- **Heat Fan (Default = Continuous)**
Heat Fan controls the indoor fan operation in heating mode. Select from continuous or auto/cyc. 'Auto/Cyc' causes the indoor fan to switch off between heating calls. If EDH has been selected (Refer to 1.5 - Hardware Settings) there is a fixed 4 minutes fan run on.
- **RunTimer (Default = Disabled)**
Run Timer counts down run hours from a preset limit. At the end of the timer period the system switches off.
- **SetBack (Default = Disabled)**
The setback function is used to maintain temperature within preset limits at all times. If the temperature moves outside these limits the controller will turn on the HVAC plant and heat or cool as required to keep the temperature within the preset limits. These limits are separate and distinct from the normal setpoint.

1.4 Advanced Control Settings

Following is a list of advanced system settings and their default values.
For details on altering these settings refer to Operation.

- **Delays (Default = 4 minutes)**
The delay variable controls the length of time between compressor cycles - on and off. Adjustable to 4 seconds, 40 seconds or 4 minutes
- **Deadband (Default = 0 °C)**
Deadband variable defines the temperature range on each side of the setpoint where no corrective action takes place. A deadband value other than 0 results in the creation of separate virtual heating and cooling setpoints, either side of the controller setpoint, offset by half of the deadband value.
Adjustable in 1 °C increments to maximum 3 °C.

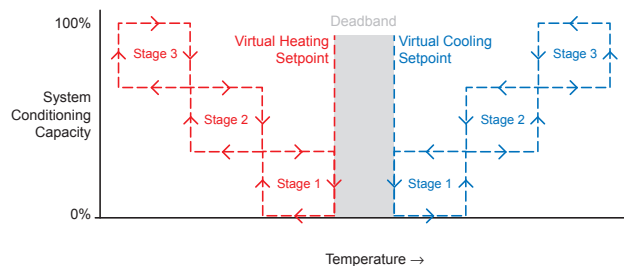
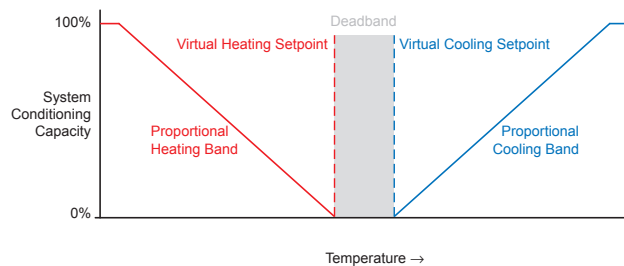




- **Control Band (Default = 0.5 °C per stage)**

Control Band defines the width of the cooling and heating proportional bands of the 0-10 volt outputs. There is a separate control band for cooling and heating operation, starting from the virtual cooling and heating setpoints dictated by the deadband.

For multi-stage applications the value of both the stage separation and the switching differential is equal to the control band value divided by the number of stages.



- **Service Timer (Default = Disabled)**

The Service Timer monitors the system run time and at the end of the time period displays a selectable message. Select from 0-990 hours in 10 hour increments.

- **Universal Input message - S1 open (Default = S1 open)**

A message is displayed on the LCD screen when sensor 1 is open circuit. The default message can be replaced by one from the message library (see Universal Inputs).

- **Universal Input message - S1 closed (Default = S1 closed)**

A message is displayed on the LCD screen when sensor 1 is closed (short) circuit. The default message can be replaced by one from the message library (see Universal Inputs).

- **Universal Input message - S2 closed (Default = S2 closed)**

A message is displayed on the LCD screen when sensor 2 is closed (short) circuit. The default message can be replaced by one from the message library (see Universal Inputs).

- **Service Timer message (Default = Service Required)**

The default message displayed when the service Timer expires can be replaced by one from the message library (see Universal Inputs).

- **Custom message (Default = Service Required)**

The message library contains one entry of 2 lines of 8 characters that can be edited as required (see Universal Inputs).

1.5 Hardware Settings

The BB8-Chrono control module has the following hardware configuration settings. Refer to specification section for the location of each.

1.5.1 DIP switches

The following table details the function of the hardware configuration DIP switches.

Control module DIP/SIP switch settings			
DIP #	Function	OFF (Factory Default)	ON
1	Compressor Delay	Software Selectable (4 minute default)	4 seconds max (overrides software)
2	Memory Lock (Diagnostic Use Only)	Disabled	Memory locked. Settings changes are discarded.
3	Restore Factory Default Settings	Disabled	Restore factory defaults at next reboot.
4	Heat Type	Reverse Cycle	Electric Duct Heat (EDH) or Cool Only

1.5.2 Pump Call Configuration Jumper Block

Create a short circuit at jumper block JP1 using the shunt provided to configure relay 8 as a pump call relay. When cooling is required relay 8 is energised to start the pump. Flow must be proved by digital input 8 before compressor outputs will energise.

1.6 Universal Inputs

Analogue inputs S1 and S2 provide additional digital inputs for feedback loops in the following manner (voltage free clean contacts required):

- **S2 Closed Circuit = System Fault**
Short circuit analogue input 2 terminals (S2 and SC) to shutdown all conditioning relays (compressors and electric duct heaters). The fan relay will remain energised only 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 emit an audible warning (2 beeps every 16 seconds). Press MENU button to stop audible warning.
- **S1 Closed Circuit = Remote On/Off**
Short circuit analogue input 1 terminals (S1 and SC) to shutdown all relays.
- **S1 Open Circuit = Forced Vent Mode**
Open circuit analogue input 1 terminals (S1 and SC) to shutdown all conditioning relays (compressors and electric duct heaters), the fan and any reversing valve relays 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.

All connected LCD interfaces will display a message on the screen for each digital input trigger and the service timer trigger. If multiple trigger events occur at the same time, the message displayed is based on the following priority:

1. SYSTEM FAULT
2. SERVICE TIMER
3. REMOTE ON/OFF
4. FORCED VENT

The default messages may be replaced by one from the message library (see next page) via the Advanced Settings Menu.

1.6.1 Message Library

The message library contains a selection of entries that may be used provide a clear indication of the function of each universal input. The same message may be linked to more than one trigger. The library contains one custom entry of 2 x 8 character lines.

Abbreviated version displayed on message 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 (Default Service Timer Message)	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

2

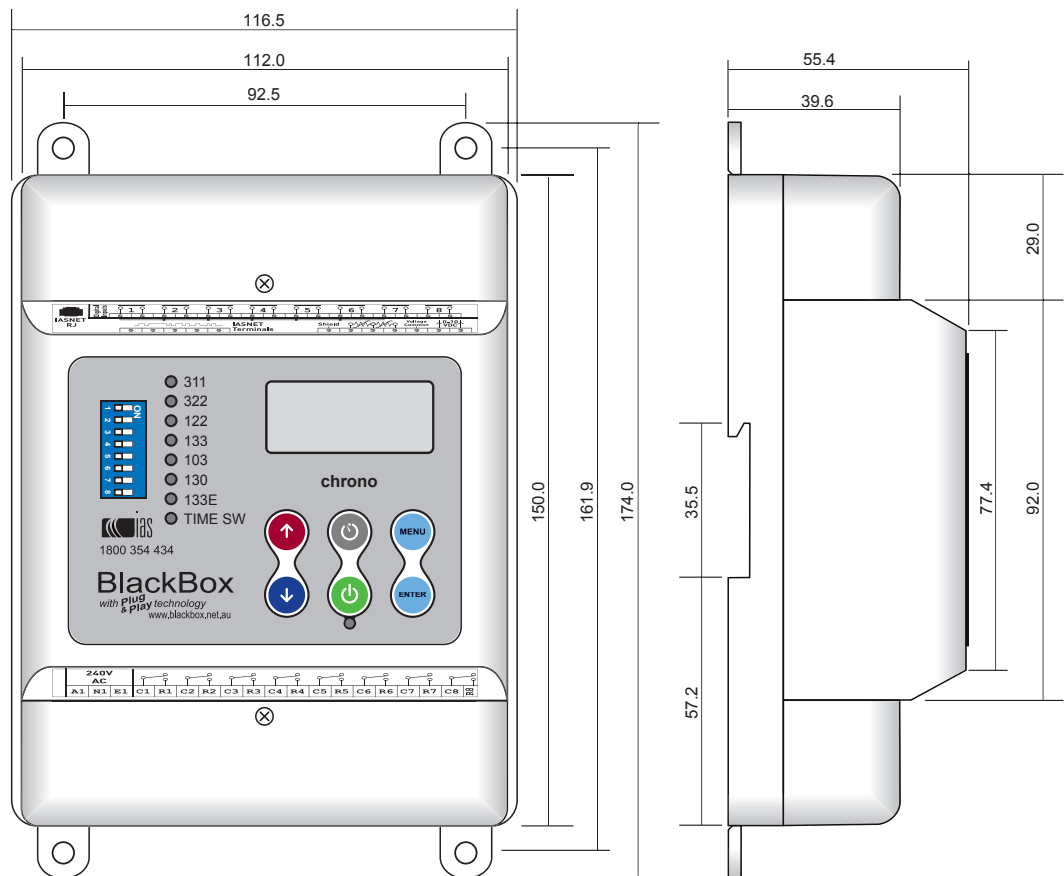
Specifications

2.1

Hardware Specification

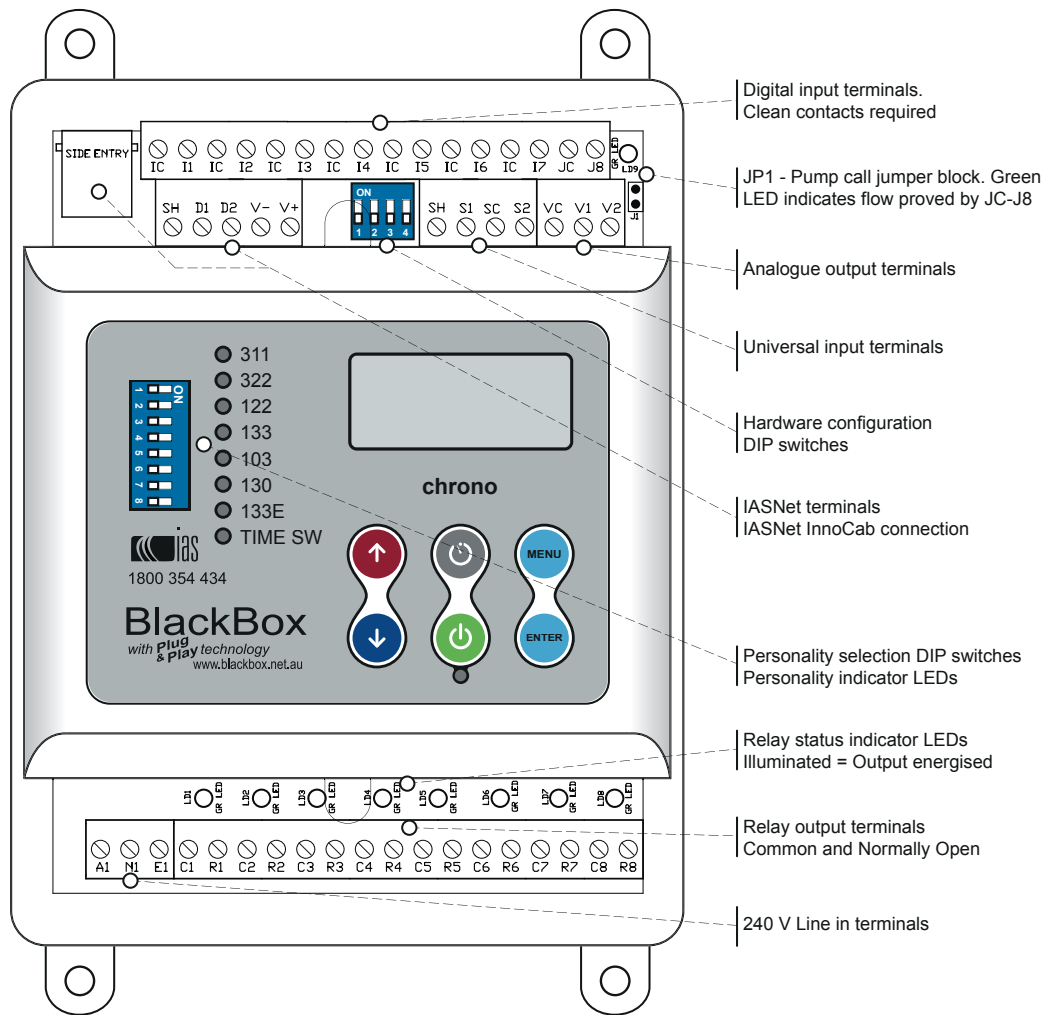
Product Code			CC-BB8-Chrono
Environmental	Transport	Temperature Range	0 - 80 °C
		Humidity	10 - 80 %
	Operation	Temperature Range	0 - 50 °C
		Humidity	10 - 80 %
		Altitude	0 - 2000 m
	Electrical	Power Supply	Supply Voltage
Frequency			50-60Hz
Connection Type			3 x Terminal
Communications	IASNet Bus - to external interfaces	Connection Type	5 x Terminal / 1 x InnoCab socket (RJ12)
		Cable Type	4 Core + 1 Shield / 5 Core + Shield (flat)
		Data Refresh Rate	1s
	Microwire Bus - to clock module	Connection Type	Integrated
		Data Refresh Rate	1s
Inputs	Analogue (see 2.1.1 - Universal inputs)	Number	2
		Type	NTC Thermistor - 47 kΩ @ 25 °C
		Connection Type	2 x Terminal
		Cable Type	2 Core + 1 Shield
		Data Refresh Rate	1s
	Digital	Number	8
		Connection Type	2 x Terminal
		Operation	Momentary Switch Mode or Latched Mode (Close to run: Open to stop)
Outputs	Relay	Number	8
		Maximum Load	2.5 A (Inductive)
		Connection Type	2 x Terminal (Common, Normally Open)
		Status Indication	Via onboard LCD Display
	Analogue	Number	2
		Type	1 x 0-10 VDC spanning cooling Control Band 1 x 0-10 VDC spanning heating Control Band
Annual Timeclock			Built-in
Physical Characteristics		Enclosure Material	ABS
		Weight	600 g
		Dimensions	174 (L) x 117 (W) x 56 (H)

2.2 Dimensions



Mounting lugs are easily removed to reduce package size for switchboard mounting.

2.3 Hardware Layout



Refer to Connection Schematics for connection details.

2.4 Onboard Personality Selection

The DIP switches on the face of the BB8-Chrono are used to select one of the preprogrammed personalities. To select a personality, refer to the table below and switch the corresponding DIP switch to the on position.

Only one DIP switch may be on at any time.

Chrono Configuration DIP Switches									
DIP #	Personality Code	Relay 1	Relay 2	Relay 3	Relay 4	Relay 5	Relay 6	Relay 7	Relay 8 ¹
1	311	Low Fan	Med. Fan	High Fan	Cool	Heat	Timer Ch6	Timer Ch7	Timer Ch8 Pump
2	322	Low Fan	Med. Fan	High Fan	Cool	Cool	Heat	Heat	Timer Ch8 Pump
3	122	Fan	Cool	Cool	Heat	Heat	Timer Ch6	Timer Ch7	Timer Ch8 Pump
4	122	Fan	Cool	Cool	Cool	Heat	Heat	Heat	Timer Ch8 Pump
5	103	Fan	Heat	Heat	Heat	Pump	Timer Ch6	Timer Ch7	Timer Ch8 Pump
6	130	Fan	Cool	Cool	Cool	Pump	Timer Ch6	Timer Ch7	Timer Ch8 Pump
7	133E ²	Fan	Cool	Cool	Cool	Heat	Heat	Heat	Timer Ch8 Pump
8	TIME SW8	Timer Ch1	Timer Ch2	Timer Ch3	Timer Ch4	Timer Ch5	Timer Ch6	Timer Ch7	Timer Ch8

¹ Relay 8 may be configured as a pump call relay by creating a short circuit at JP1.

² 133E features an economy cycle for the first stage of cooling using the 0-10V cooling ramp to drive an outside air damper.

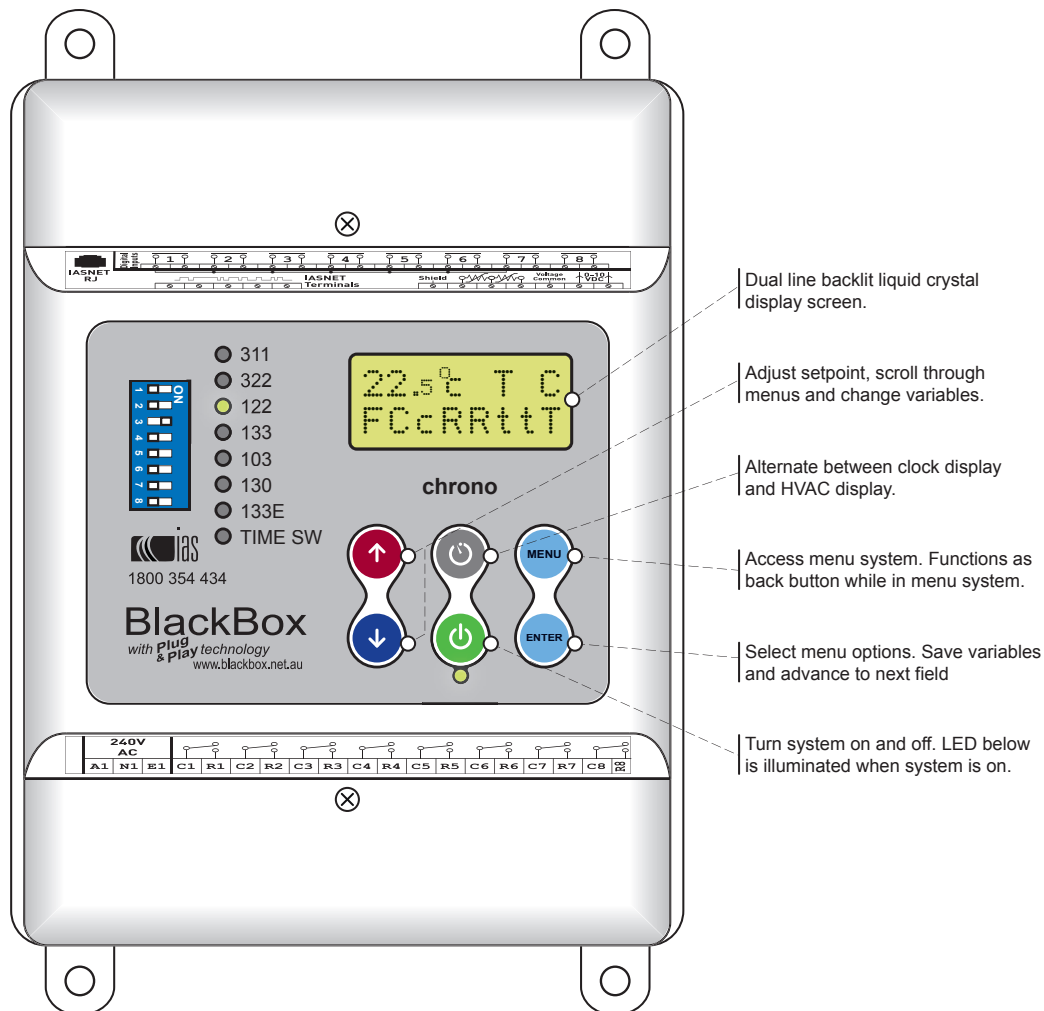
3

Operation

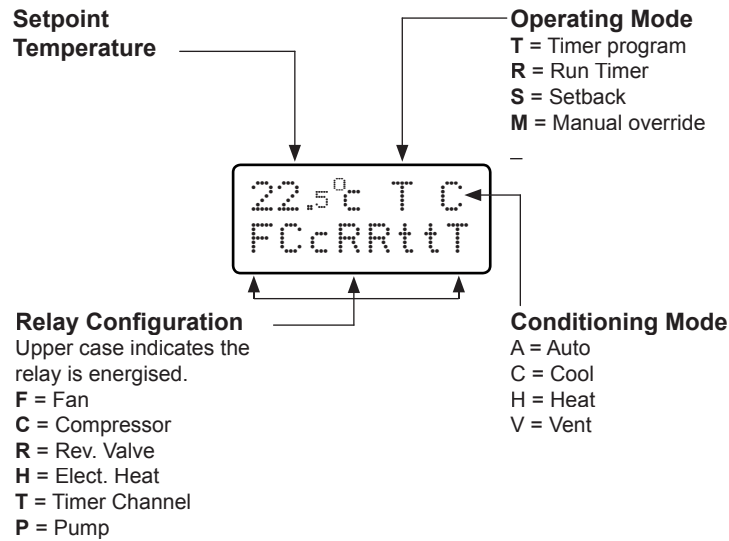
The following section details the operation of the BB8-Chrono onboard interface. This interface provides access to the full range of controller functions.

3.1

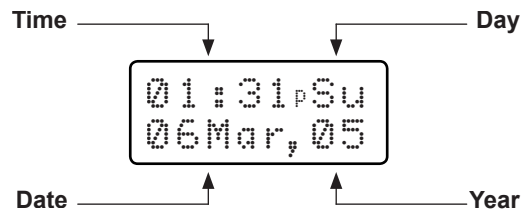
Interface Layout



3.2 HVAC Display Screen



3.3 Clock Display Screen



3.4 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 2 x 8 character lines. Additional options are viewed by using the **ARROWS** to scroll the information vertically across the screen. The flashing cursor indicates the active area of the screen (generally the top line of the display). Pressing **ENTER** will activate the selection highlighted by the flashing cursor.

- To change the setpoint, press the **ARROWS**. Once the required temperature has been set the screen will revert to the HVAC display after a short period.
- Press **CLOCK** to switch between the HVAC display screen and the clock display screen.
- All standard menu options are accessible by pressing **MENU** at the HVAC display screen.
- All clock menu options (clock module required) are accessible by pressing **MENU** at the clock display screen.
- While in the menu screens, pressing **MENU** takes you back one step.
- Pressing **ENTER** moves forward through the various screens, selecting options and saving settings.
- The current active settings appear in CAPITALS.
- The **ARROWS**, 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** to quickly scroll the selected variable.

3.5 Standard Menu Options

The HVAC menus are accessible from the HVAC display screen.

HVAC Display



- Press **MENU** to gain access to the standard menu options.
- Use the **ARROWS** to cycle the cursor to the desired menu option, then press **ENTER** to select that option.
- Pressing **MENU** (or selecting 'Exit' then pressing **ENTER**) will exit the current selection if required.

3.5.1 Change the Mode

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 screen (see section 3.5) and the mode selection screen will appear.
- Scroll down with the **DOWN ARROW** to select the required operating mode.
- Press **ENTER** to save the new value and return to the HVAC display screen.

3.5.2 Set the Fan Speed

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 screen.
- Use the **ARROWS** to select the required fan speed setting.
- Press **ENTER** to save the new value and return to the HVAC display screen.

3.5.3 Change the Heat Fan Setting

The Heat Fan function 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 'Heat Fan' from the standard menu screen and press **ENTER**.
- Use the **ARROWS** to move the cursor to the required setting.
- Press **ENTER** to save the new value and return to the HVAC display screen.

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

3.5.4 Set the Run Timer (After Hours Timer)

With the Run Timer enabled, and if the system is off (and outside any timer 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 screen and press **ENTER**, the run timer edit screen will appear.
- The cursor will highlight the minutes space.
- Use the **ARROWS** 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 **ENTER** to save the new value and return to the HVAC 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 screen. If the Run Timer is enabled, 'RUNTIMER' will appear in CAPITAL letters in this screen.

3.5.5 Edit the Setback Temperatures

Setback is used to maintain temperature within preset limits at all times. 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 screen and the setback edit screen will appear.
- The cursor will highlight the minimum temperature value.
- Use the **ARROWS** 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 **ARROWS** to alter the value to the required temperature (in 1 °C increments).
- Press **ENTER** to save and return to the HVAC display screen.

NOTE: The Setback Range is from 5 - 50 °C. The setback function is enabled whenever there is at least one valid limit set as detailed above. The setback temperatures values are to be linked to setpoint in the following manner:

Minimum setback temperature settings higher than setpoint minus 2 °C will cause the system to start at setpoint minus 2 °C.

Maximum setback temperature settings lower than setpoint plus 2 °C will cause the system to start at setpoint plus 2 °C.

3.6

Advanced Menu Options (Service Personnel Only).

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

- Select 'Advanced' from the standard menu screen and press **ENTER** to access the advanced menu screen.
- The line 'CAUTION!' will alternate with 'Service' and 'use only'.
- Press either **ARROW** to scroll the cursor from 'Exit' to 'Proceed' then press **ENTER** to access the advanced menu screen .

3.6.1 Change the Compressor Delays

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

The following options are available for Compressor Delays:

Safety = 4 minutes (minimum) **Extended** = 40 seconds (minimum)

Standard = 4 seconds (minimum)

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

3.6.2 Set the Deadband

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 advanced menu screen, then press **ENTER** to access the deadband edit screen .
- The cursor will highlight the deadband value.
- Use the **ARROWS** to alter the value in 1 °C increments from 0 to 3.
- Press **ENTER** to save and return to advanced menu screen.

3.6.3 Set the Control Band

Control Band is a common variable defining the width of the proportional band, and by extension the value of the Switching Differential, and for multi-stage applications the value of the Stage Separation. There is a separate control band for Heating and Cooling operation starting from the virtual heating and cooling setpoints dictated by the deadband.

- Highlight 'CtrlBand' from the advanced menu screen, then press **ENTER** to access the control band edit screen.
- The cursor will highlight the Heating value.
- Use the **ARROWS** 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 **ARROWS**.
- Press **ENTER** to save and return to the advanced 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.

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 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 and stage separation equal to 1/3 the control band value.

3.6.4 Edit the Service Timer

The Service Timer monitors system run time and at the end of the timer period displays a message.

Select 'SvcTimer' from the advanced menu screen, then press **ENTER** to access the service timer edit screen .

- Use the **ARROWS** to move the cursor to highlight 'Set'. Press **ENTER** and the cursor will highlight the number of hours. Use the **ARROW** to change the hours shown in increments of 10 hours.
- Press **ENTER** and the Service Timer will reset and the cursor will move back to highlight 'Set'.
- Press menu to return to the advanced 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.

3.6.5 Select the Forced Vent Input Message

Refer to the message library table in Universal Inputs for the complete list of available messages.

- Select 'Msg S1op' from the advanced menu screen and press **ENTER**.
- The screen will display the abbreviated message library, with the cursor highlighting the current selection.
- Press the **ARROWS** to scroll to the required selection then press **ENTER**.

3.6.6 Select the Remote On/Off Input Message

Refer to the message library table in Universal Inputs for the complete list of available messages.

- Select 'Msg S1cl' from the advanced menu screen and press **ENTER**.
- The screen will display the abbreviated message library, with the cursor highlighting the current selection.
- Press the **ARROWS** to scroll to the required selection then press **ENTER**.

3.6.7 Select the System Fault Message

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

Refer to the message library table in Universal Inputs for the complete list of available messages.

- Select 'Msg S2cl' from the advanced menu screen and press **ENTER**.
- The screen will display the abbreviated message library, with the cursor highlighting the current selection.
- Press the **ARROWS** to scroll to the required selection then press **ENTER**.

3.6.8 Select the Service Timer Message

Refer to the message library table in Universal Inputs for the complete list of available messages.

- Select 'MsgTimer' from the advanced menu screen and press **ENTER**.
- The screen will display the abbreviated message library, with the cursor highlighting the current selection.
- Press the **ARROWS** to scroll to the required selection then press **ENTER**.

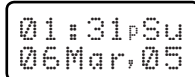
3.6.9 Edit the Custom Message

- Highlight 'Edit Msg' and press **ENTER**.
- The current custom message will appear on the display (default = SERVICE REQUIRED) and the cursor will highlight the first letter. Using the **ARROWS**, 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 the advanced settings menu.

3.7 Clock Menu Options

The clock menus are accessible via the clock display screen.

Clock Display



- If the HVAC display is showing on the screen, press **CLOCK** to access the clock display screen.
- While the clock display screen is displayed press **MENU** to enter the clock menu screen.
- Use the **ARROWS** to cycle the cursor to the desired menu option, then press **ENTER** to move to the edit screen for that menu option.

3.7.1 Set the Clock

- Select 'SetClock' from the clock menu screen, then press **ENTER**.
- The cursor will highlight the Hour value. Use the **ARROWS** 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.

3.7.2 Edit the Timer Programs

Each of the 15 timer programs may be assigned to any one of the available relay channels.

Active Programs will appear in CAPITALS

("PROG 02" = active; "prog 02" = not active)

To disable a timer program, select a start & stop time of "--:--", or make all days inactive.

- Select 'SetProgs' from the clock menu screen then press **ENTER** to select a timer program to edit.
- Use the **ARROWS** to select the timer program to be edited, then press **ENTER** to edit the start time.
- The cursor will highlight the minutes value. Use the **ARROWS** to select the correct time in 10 minute increments, then press **ENTER** to edit the stop time.
- Use the **ARROWS** to set the stop time then press **ENTER**.
- The display will show the channel and run day selection screen.
- Use the **ARROWS** to select the relay channel controlled by this program.
NOTE: Channel 1 is always used for the air conditioning system (except for TIME SW8) and so it appears as "A/C" at this screen.
Other channels display as "Ch#" (# = Relay Number)
- Press **ENTER** to define the days the program will be active. The cursor will highlight the first letter on the bottom line, representing Sunday.
- Press the **UP ARROW** to turn the program on, or the **DOWN ARROW** to turn the program off for this day.
- Press **ENTER** to save and move the cursor to the next day.
- Press menu to go back one day if required.
- Repeat this procedure for each day of the week.

- Press **ENTER** at Saturday to return the display to the program selection screen and the cursor will highlight the last program edited.
- To enter more programs, use the **ARROWS** to select another program and repeat the process.
- To return to the clock display screen, simply use the **ARROWS** to navigate back up to the exit options and press **ENTER**.

3.7.3 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 timer program signals (On or 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 to be valid. For a one day holiday, enter the same start and stop date. To disable a holiday program, set it's start or stop date to "----".

- Select '**Set Hols**' from the clock menu screen then press **ENTER**.
- Use the **ARROWS** to select the Holiday program to be edited, then press **ENTER**.
- The cursor will highlight the Month value. Use the **ARROWS** 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 procedure to set the 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 **ENTER**.
- To enter more holidays, use the **ARROWS** to select another holiday entry and repeat the entire process.

3.7.4 Set Daylight Savings

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.

(Typically: Southern Hemisphere = Oct 31...Mar 31; Northern Hemisphere = Mar 31...Oct 31)

- Select 'Day Save' from the clock menu screen (see Section 3.7), then press **ENTER** to select the start date for daylight savings.
- Use the **ARROWS** to select the correct Month , then press **ENTER**.
- Repeat this procedure for the Day value.
- 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 occurs at 1:59 am (advances to 3:00 am) and the 1 hour revert occurs at 2:59 am (reverts to 2:00 am).

3.8 TIME SW⁸ - 8 channel timeswitch

The TIME SW⁸ personality provides 15 timer programs to switch the eight relay outputs. When this personality is selected, only the timeswitch functions are displayed on the screen.

Timer Display

```
12345678
tttttttt
```

Clock Display

```
01:31pSu
06Mar,05
```

3.8.1 Manually switching a channel ON or OFF

- While viewing the Timer display, press the **ARROWS** to move the cursor to the channel you wish to switch ON or OFF.
- Press **POWER** to toggle the channel ON or OFF.
- Repeat for each additional channel as required.
- Press **ENTER** to accept the change(s).

3.8.2 Activating a timer program

Active programs (that is, programs with a start and/or stop time AND one or more active days) appear in upper case in the program list. Example: PROG 01 is active, prog 01 is inactive. To deactivate a program, select a start and stop time of '--:--' or deactivate all seven days on that program.

- Press **CLOCK** to view the clock display.
- Press **MENU** to access the clock menus.
- Use the **ARROWS** to select '**SetProgs**' from the clock menu then press **ENTER**
- Use the **ARROWS** to select the timer program to be edited, then press **ENTER** to edit the start time.
- The cursor will highlight the minutes value. Use the **ARROWS** to select the correct time in 10 minute increments, then press **ENTER** to edit the stop time.
- Use the **ARROWS** to set the stop time then press **ENTER**.
- The display will show the channel and run day selection screen.
- Use the **ARROWS** to select the relay channel (**Ch#**) controlled by this program.
- Press **ENTER** to define the days the program will be active. The cursor will highlight the first letter on the bottom line, representing Sunday.
- Press the **UP ARROW** to activate the program , or the **DOWN ARROW** to deactivate the program for this day.
- Press **ENTER** to save and move the cursor to the next day.
- Repeat this procedure for each day of the week.
- Press **MENU** to go back one day if required.
- Press **ENTER** at Saturday to return the display to the program selection screen. The cursor will highlight the last program edited.

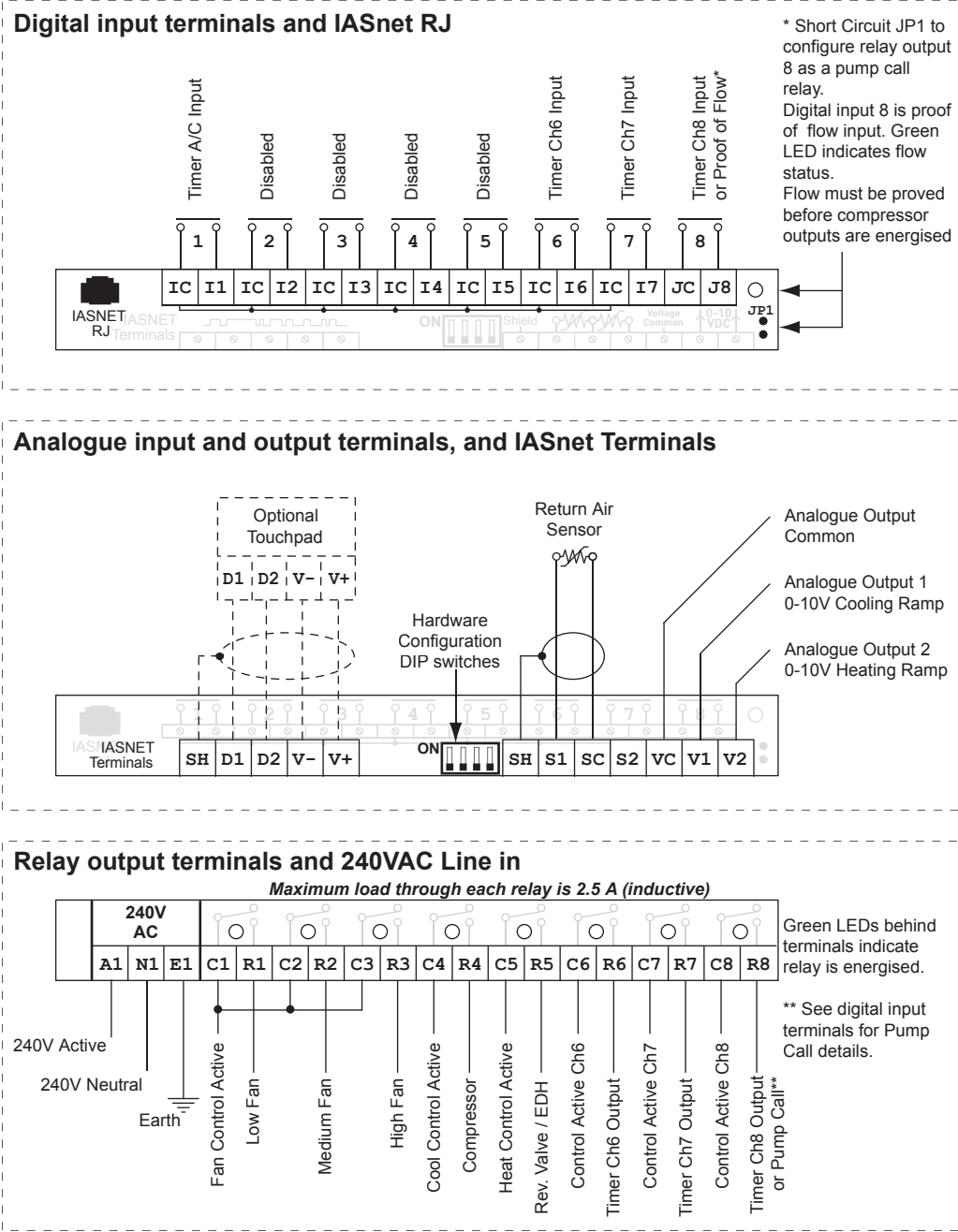
Refer to Section 3.7 for additional details on setting the clock, holiday and daylight saving functions.

Connection Diagrams

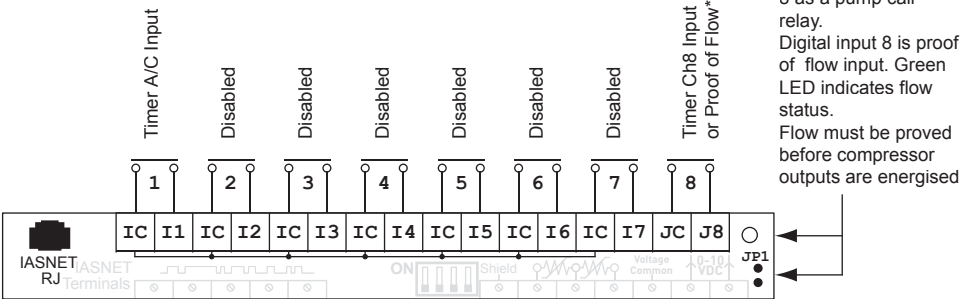
The following pages detail the connection schematics for the 8 onboard personalities of the BB8-Chrono.

4.1

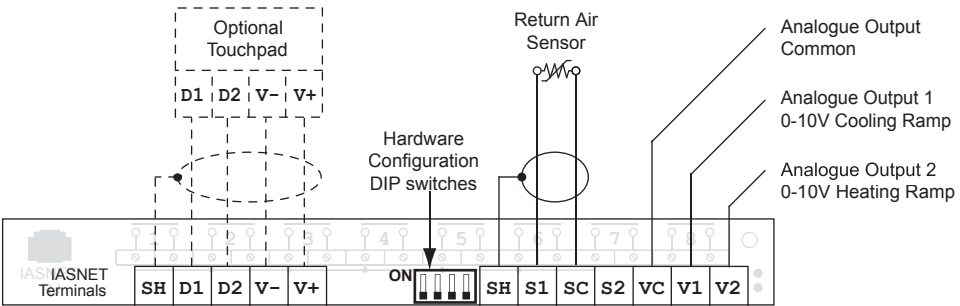
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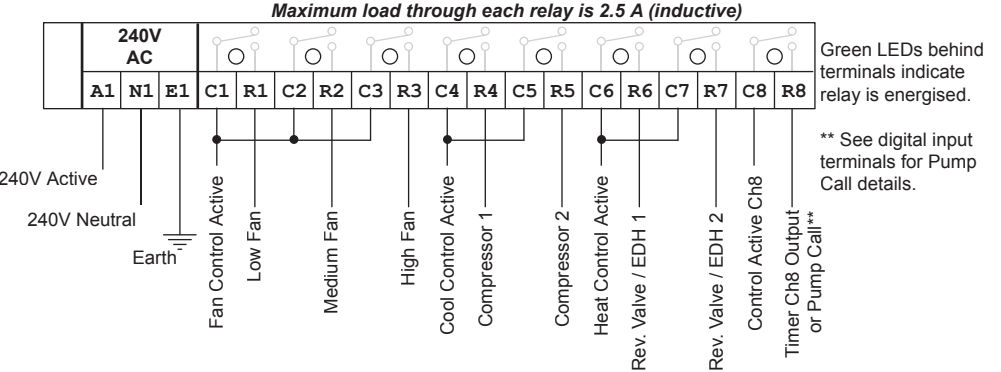
Digital input terminals and IASnet Socket

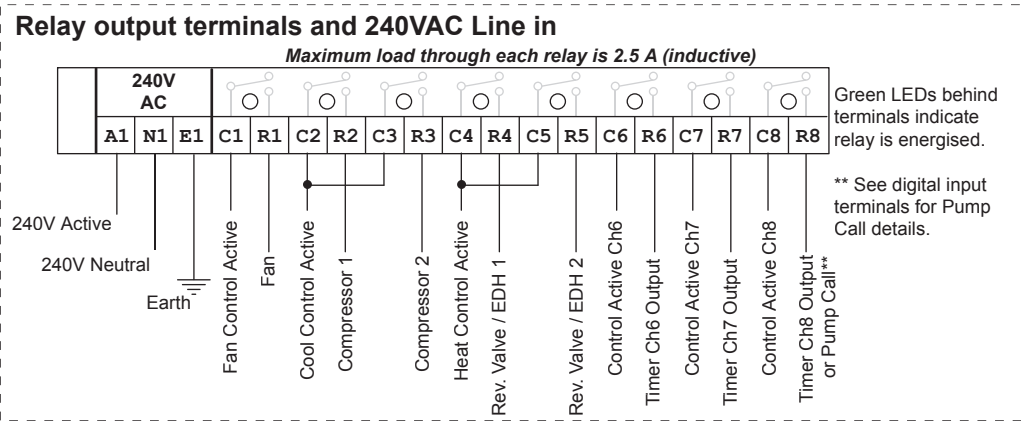
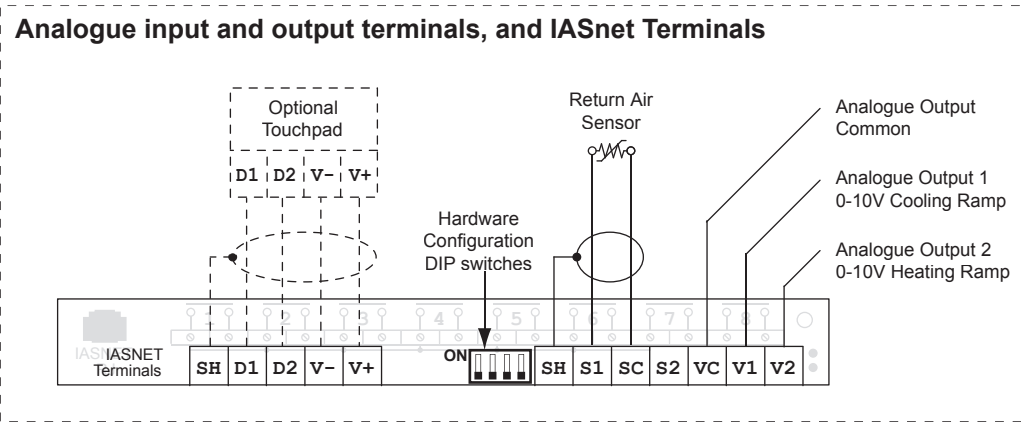
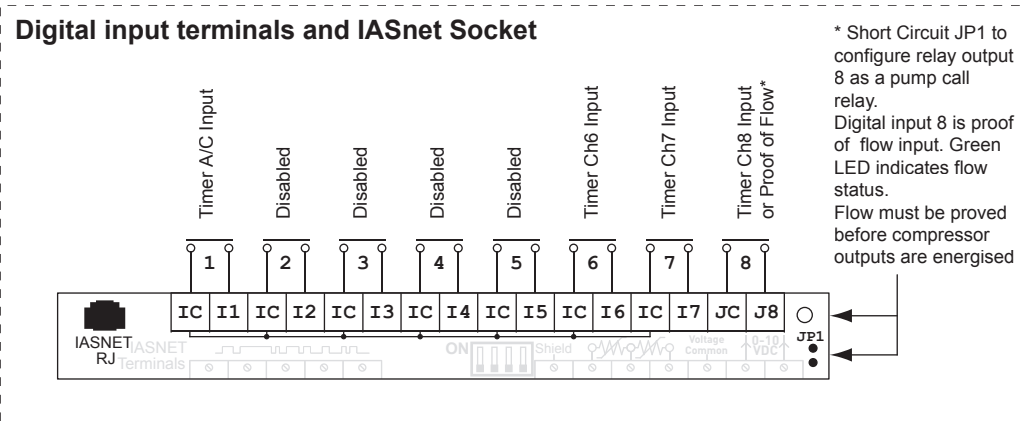


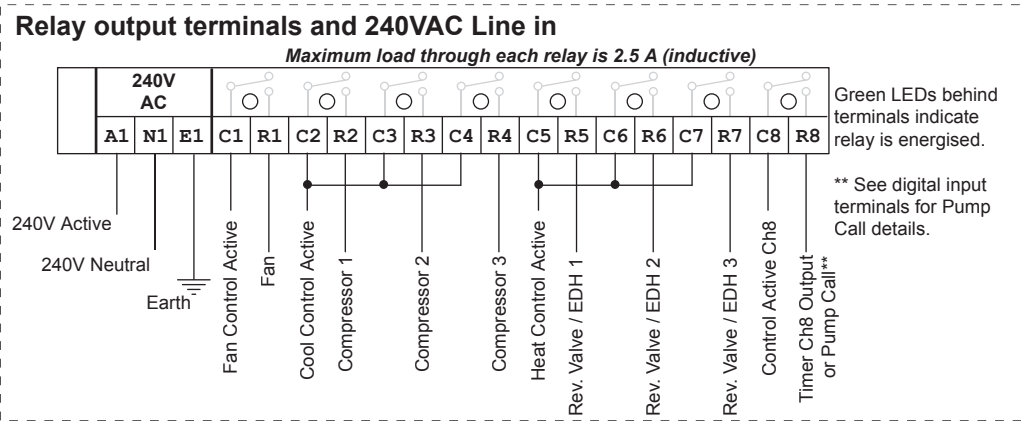
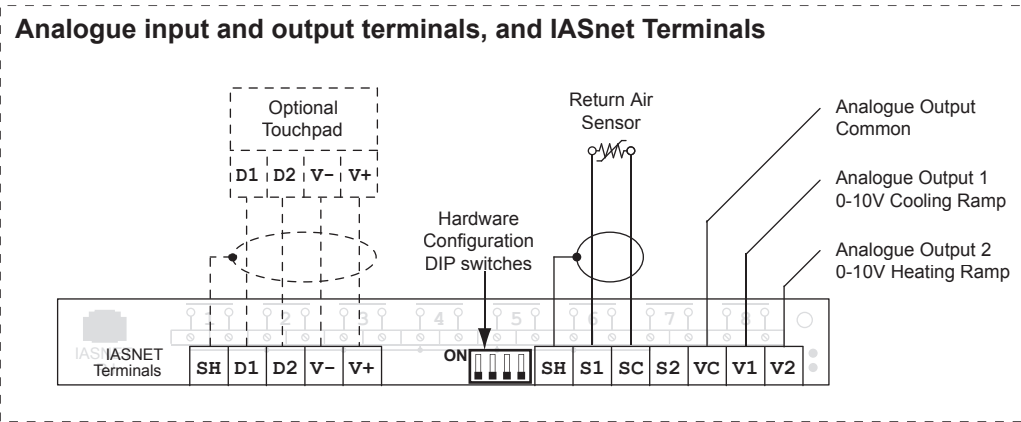
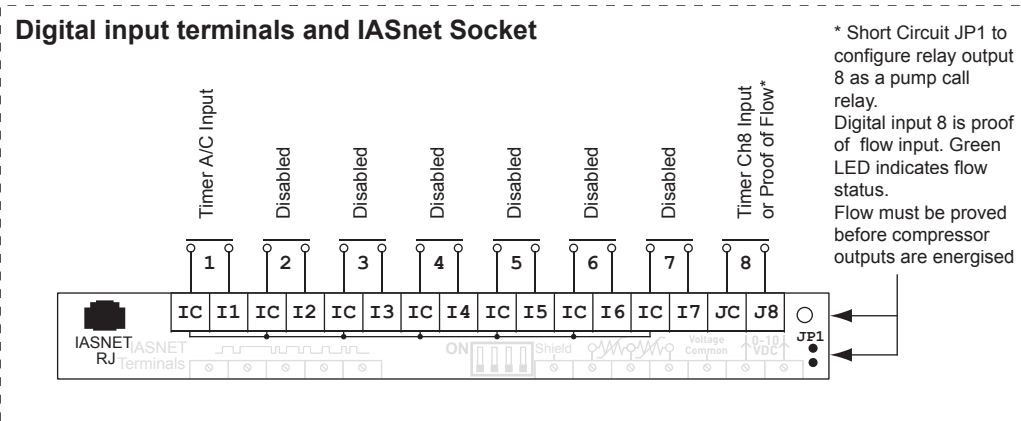
Analogue input and output terminals, and IASnet Terminals



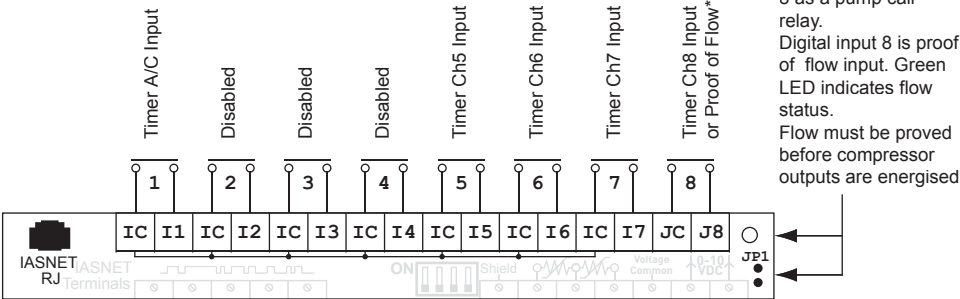
Relay output terminals and 240VAC Line in



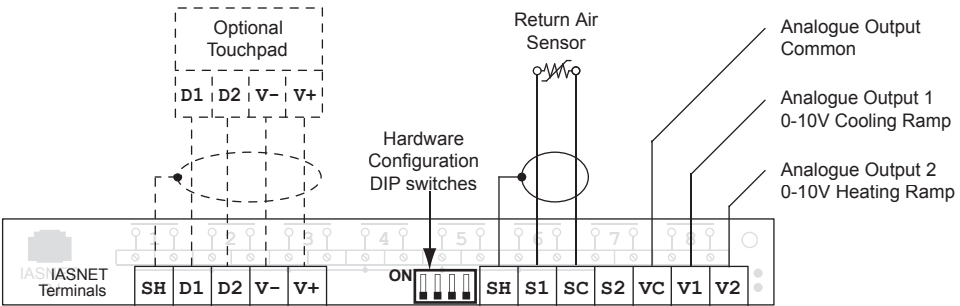




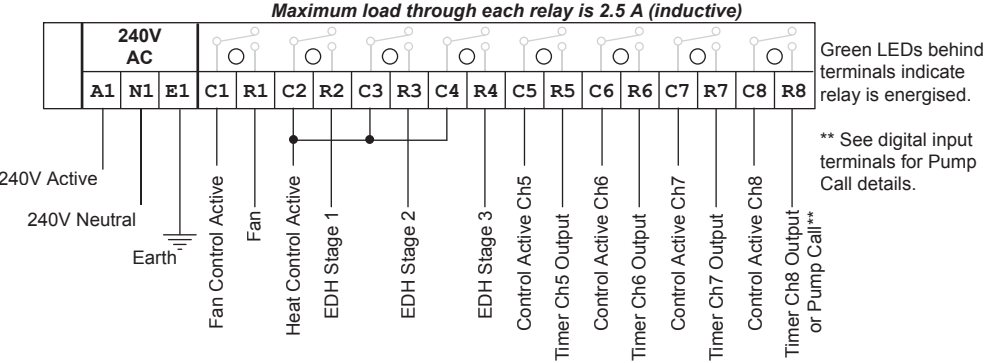
Digital input terminals and IASnet Socket

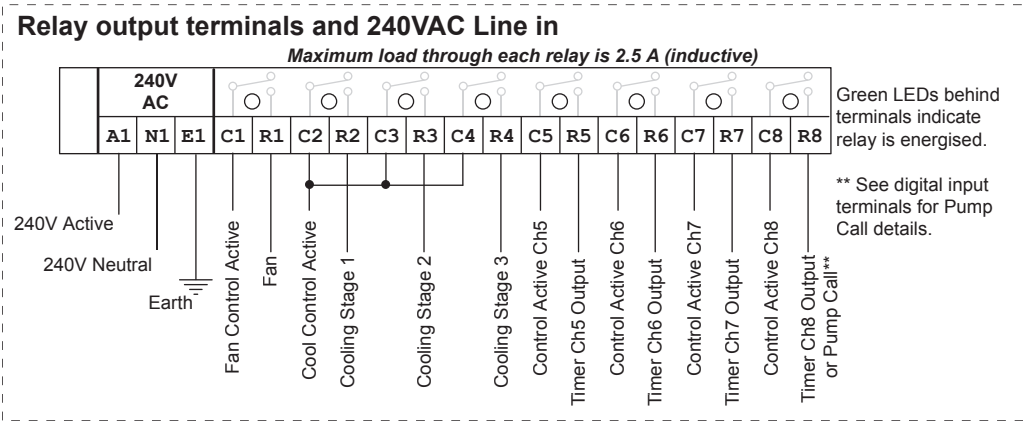
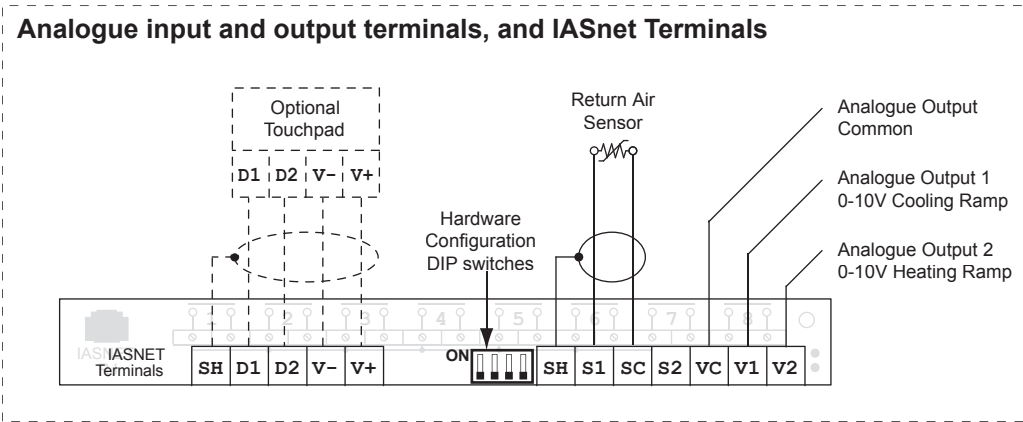
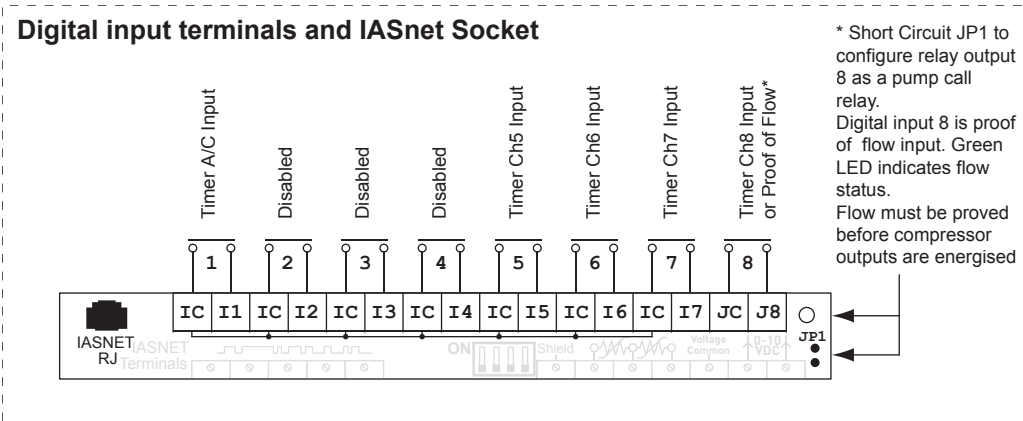


Analogue input and output terminals, and IASnet Terminals

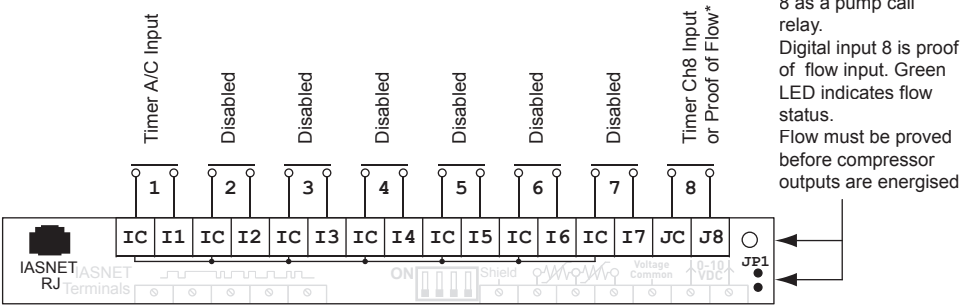


Relay output terminals and 240VAC Line in

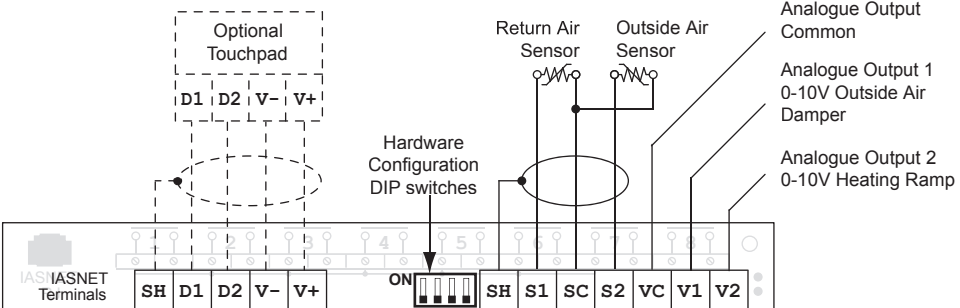




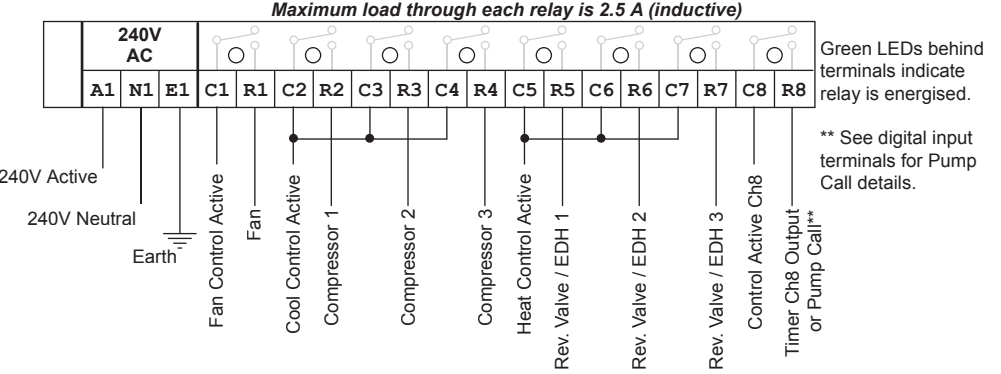
Digital input terminals and IASnet Socket



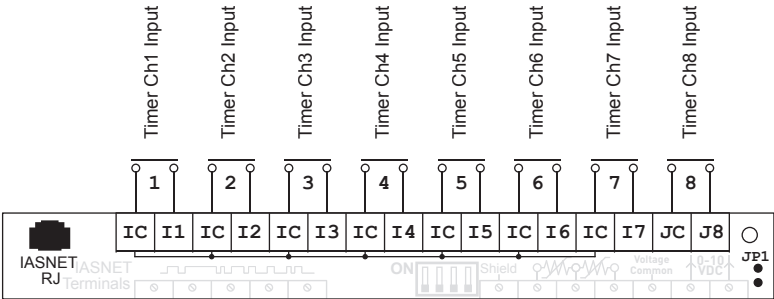
Analogue input and output terminals, and IASnet Terminals



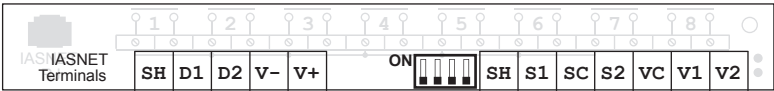
Relay output terminals and 240VAC Line in



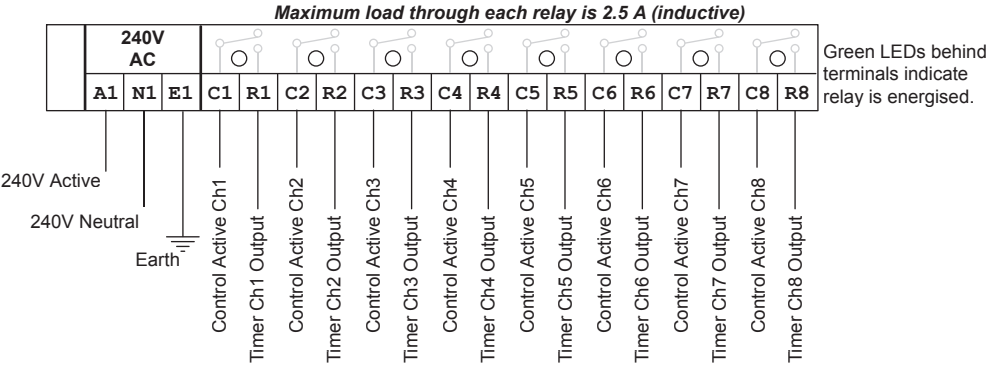
Digital input terminals and IASnet RJ



Analogue input and output terminals, and IASnet Terminals



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Product Support

Freecall **1800 354 434**

www.ias.net.au

support@ias.net.au

National Sales

Phone: 1300 306 125

sales@ias.net.au



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