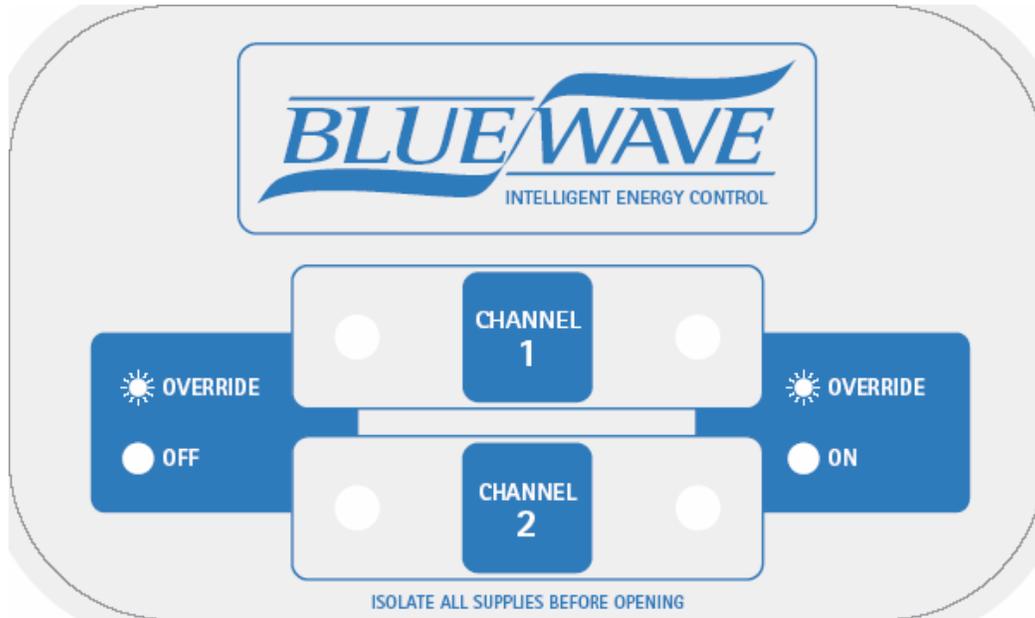


BlueWave ~ Intelligent Energy Control

Installation and User Manual
for BW2/C and BW3/C versions

Quick Guide



Press button to override or activate Channel 1



Press button to override or activate Channel 2

Indicators show the status of each channel:

SYMBOL	DESCRIPTION	STATUS
	Red (solid)	Automatic off
	Red (flashing evenly)	Override off
	Red (short off flash)	Off - lux high
	Blue (solid)	Automatic on
	Blue (flashing evenly)	Override on
	Blue (short off flash)	On - Lux override
	Red and blue (flashing evenly)	Remote Override on
	Red and blue (all on)	Test Mode on

BlueWave ~ Intelligent Energy Control

Installation and User Manual

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BlueWave ~ Intelligent Energy Control

Installation and User Manual

INTRODUCTION

This manual describes the Installation and Operation of the **BlueWave ~ Intelligent Energy Control**.

This control must be installed according to the current IEE Wiring Regulations and should include full disconnection means and fusing appropriate to the connected loads.

1 TECHNICAL SPECIFICATIONS

1.1 Operating Environment

Operating temperature range:
0° C to 40° C

Operating humidity range:
0 to 90% RH.

Control IP rating:
IP30

Pollution degree:
II environment
Control safety construction:
Class II

Mains supply:
230Vac nominal, 200Vac to
265Vac actual, 50Hz.

Recommended control supply fuse:
3A

Rated impulse voltage: 2500V

Dimensions: 216mm X 124mm X
62mm

**Conformities: EMC – 89/336/EEC
LVD – 73/23/EEC**

1.2 Performance Specifications

An independently mounted
electronic control for surface
mounting.

Operation is by Class A software
and Type 1A action.

The mains supply to the electronic
circuit is to be protected by a fuse.

Remote switch inputs will be volt
free, 12Vdc/5mA

Occupancy sensor inputs are volt
free, normally closed (contacts
open on detection of occupancy) as
Chalmor BW/MINI, BW/35,
BW/CUR, BW/MW and PIR/CM.

Lux sensor readings are from a
photo-diode, operating at 12V dc
as Chalmor BW/LUX or
BW/LUX/WP.

Maximum sensor rating: 175mA

Timer Range: 10s -60m or
10s-12 hours (selectable)

Light Level Control: Min to Max

Status Indicators:
Red LED (Channel off)
Blue LED (Channel on)

1.3 BW2/C Version Electrical Specifications

The power supply is isolated, therefore all remote sensor and remote switch wiring to the control does not need to be mains level rated, but should be insulated to the highest voltage present where entering the control box.

Channel 1 volt free changeover relay rating:
16A/240Vac resistive
6A/240Vac inductive / fluorescent
3A/240Vac compact fluorescent

Channel 2 volt free changeover relay rating:
16A/240Vac resistive
6A/240Vac inductive / fluorescent
3A/240Vac compact fluorescent

Relay contacts make to the normally closed (NC) contact when the channel is ON and to the normally open (NO) contact when the channel is OFF. This provides a fail safe facility in the event of a controls supply fault.

1.4 BW3/C Version Electrical Specifications

The power supply is isolated, therefore all remote sensor and remote switch wiring to the control does not need to be mains level rated, but should be insulated to the highest voltage present where entering the control box.

Channel 1 volt free changeover relay rating:
16A/240Vac resistive
6A/240Vac inductive / fluorescent
3A/240Vac compact fluorescent

Channel 2 volt free changeover relay rating:
16A/240Vac resistive
6A/240Vac inductive / fluorescent
3A/240Vac compact fluorescent

Channel 3 volt free changeover relay rating:
16A/240Vac resistive
6A/240Vac inductive / fluorescent
3A/240Vac compact fluorescent
Channel 3 relay replicates Channel 2 operation

2 INSTALLATION INSTRUCTIONS

2.1 Mounting the Control Assembly

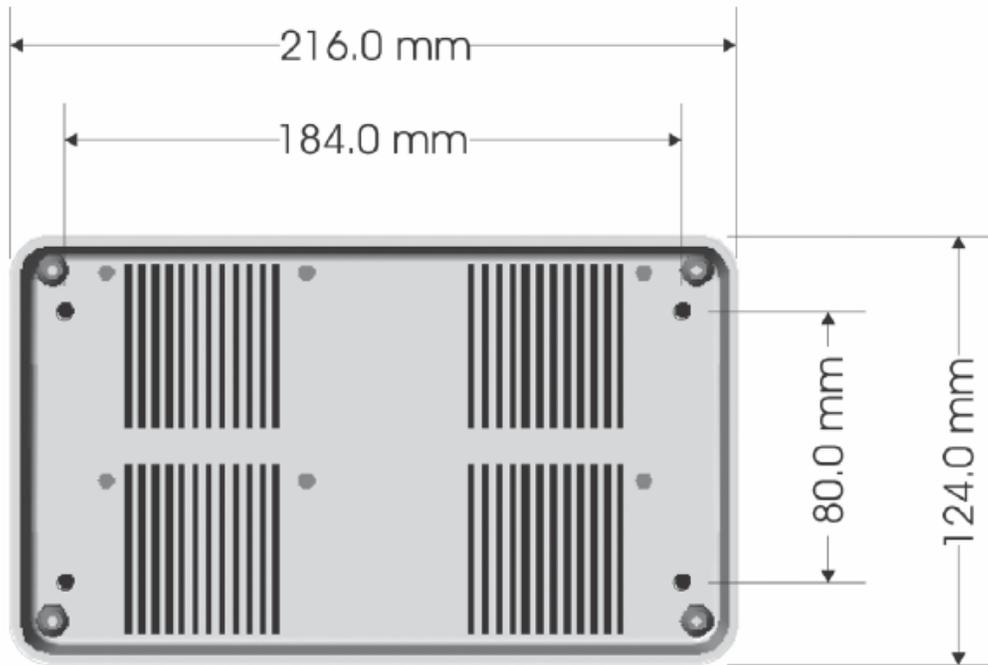
For installations where the integral push buttons are to be used, the controller should be positioned to allow the user easy access to the push buttons for Channel 1 & Channel 2 operation.

The controller can be positioned with the cable entry to the bottom or the top depending on the cable routing.

The controller back box can be rotated through 180 degrees to accommodate top or bottom cable entry. Allow adequate cabling so that the controller may be opened freely to allow visibility and adjustment of the control settings.

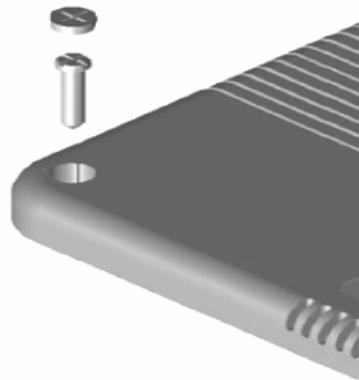
Do not mount the controller on a warm surface or where it could be affected by direct sunlight or other heat sources.

The mounting surface should be non-conducting or earth bonded and should prevent access to the rear of the control.



The housing consists of a two part plastic moulding held together by four screws.

Plugs are supplied to cover the screws following installation.



Knockouts are provided for cable glands to allow mains and remote sensor and switch cables to be fitted to the control assembly.

Knock the plastic out to fit the glands as required. Never leave holes that allow finger access.



NOTE: Some cable knockouts will be restricted when the controller lid is fitted to the back box. Take care to ensure that only suitable knockouts are used, which will depend on the orientation of the controller back box.

2.2 General Wiring Specifications

A suitably qualified person must make all wiring connections

Please refer to the following wiring connection drawings (see 2.3 and 2.4) and observe the notes referring to cable type and length. Failure to follow these guidelines may result in electrical interference or unsatisfactory operation. When making connections to screw terminals please ensure that no more than 6mm of insulation is stripped back and that no stray wire strands escape.

0-12V outputs for occupancy and lux sensors and remote switch inputs should be connected by 0.75mm² cable of maximum length 100m.

The remote light level sensor(s) may be placed at a distance of up to 10m from the control unit. If the cable run is long or will be close to mains wiring, then we recommend using screened 0.75mm² cable. Connect the screen to a ground terminal (-).

All sensor and signal wiring should be kept separate from mains wiring to minimise noise pick-up.

Where longer sensor wiring is required, then leaded transient suppressors should be fitted to the controller. The suppressor should be fitted across the lux sensor input (- & LUX) and the occupancy input (- & ALM). An appropriate part is available from RS components, part number 348-6700.

IMPORTANT NOTE

The BlueWave controller is designed to fail safe, so that if the controls supply or controller power supply fails, then the connected load will fail to the on condition.

Care should be taken to connect the load appropriately.

For example, if the BlueWave controller is switching lighting circuits, then the appropriate lighting circuit should be connected to the common on the channel relay (COM) and the lighting load connected to the normally closed contact on the channel relay (NC).

Where a volt-free changeover contact is required, the Normally Closed contact (NC) will be made when the controller output is in the ON condition, and the Normally Open contact (NO) will be made when the controller output is in the OFF condition.

2.3 BW2/C VERSION WIRING CONNECTIONS

The terminal identification and description are provided below, together with the maximum terminal capacity in mm² (shown in brackets). Note that some terminals may require more than one cable to be terminated, and therefore cable sizing should be selected accordingly. The 12V dc (+) and 0V dc (-) terminals for Input 1 and Input 2 may require several cables to be terminated, according to the number of remote sensors required.

CONTROLS SUPPLY

L	Live supply input	(2.5)
E	Earth termination point	(2.5)
N	Neutral supply input	(2.5)

RELAY CONNECTIONS (CH1 & CH2)

NO	Normally open relay output	(2.5)
COM	Common relay input	(2.5)
NC	Normally closed relay output	(2.5)

SEE IMPORTANT NOTE ON PAGE 6

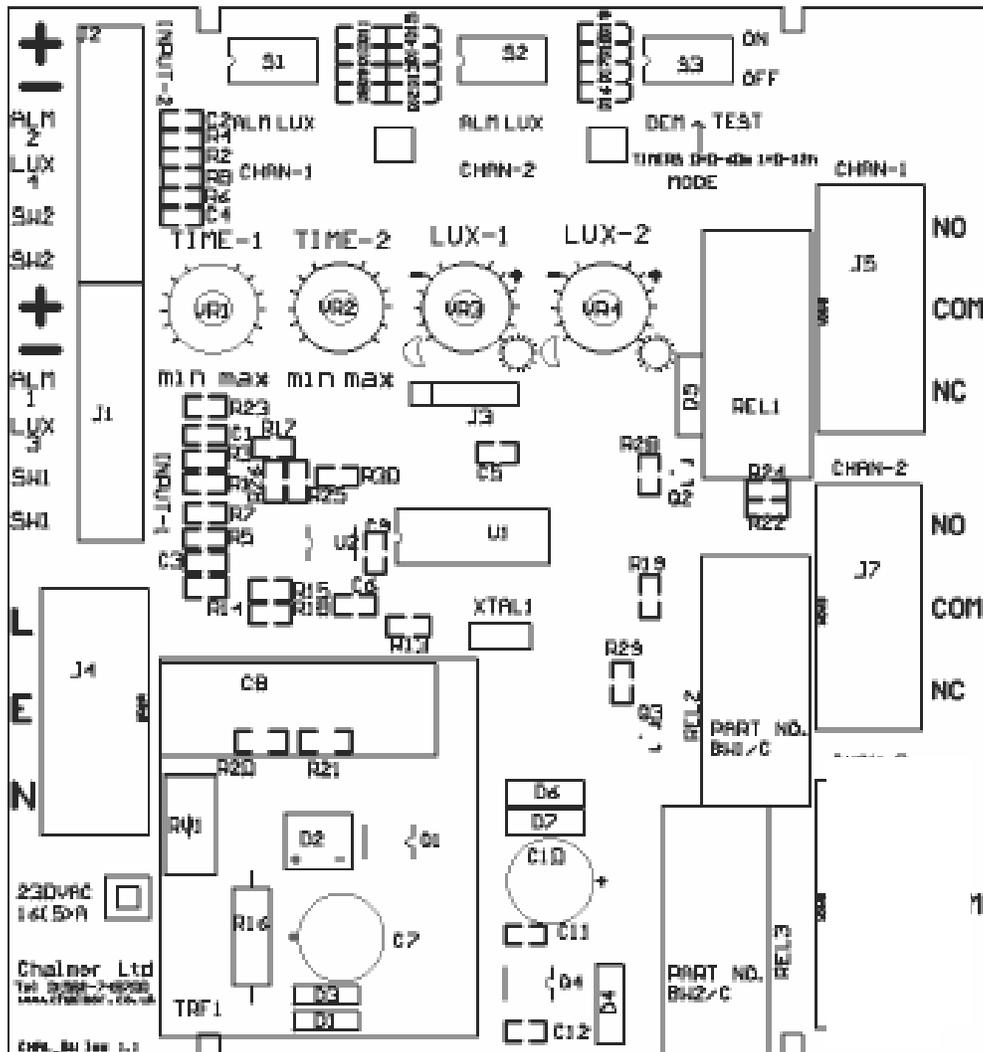
INPUT-1

+	12V dc output	(1.5)
-	0V dc output	(1.5)
ALM1	Occupancy input (NC)	(1.5)
LUX3	Light level input	(1.5)
SW1	Remote volt free switch – Chan 1	(1.5)
SW1	Remote volt free switch – Chan 1	(1.5)

INPUT-2

+	12V dc output	(1.5)
-	0V dc output	(1.5)
ALM2	Occupancy input (NC)	(1.5)
LUX4	Light level input	(1.5)
SW2	Remote volt free switch – Chan 2	(1.5)
SW2	Remote volt free switch – Chan 2	(1.5)

Figure – BW2/C PCB connections



2.4 BW3/C VERSION WIRING CONNECTIONS

The terminal identification and description are provided below, together with the maximum terminal capacity in mm² (shown in brackets). Note that some terminals may require more than one cable to be terminated, and therefore cable sizing should be selected accordingly. The 12V dc (+) and 0V dc (-) terminals for Input 1 and Input 2 may require several cables to be terminated, according to the number of remote sensors required.

CONTROLS SUPPLY

L	Live supply input	(2.5)
E	Earth termination point	(2.5)
N	Neutral supply input	(2.5)

RELAY CONNECTIONS (CH1, CH2 & CH3)

NO	Normally open relay output	(2.5)
COM	Common relay input	(2.5)
NC	Normally closed relay output	(2.5)

SEE IMPORTANT NOTE ON PAGE 6

Channel 3 relay replicates Channel 2

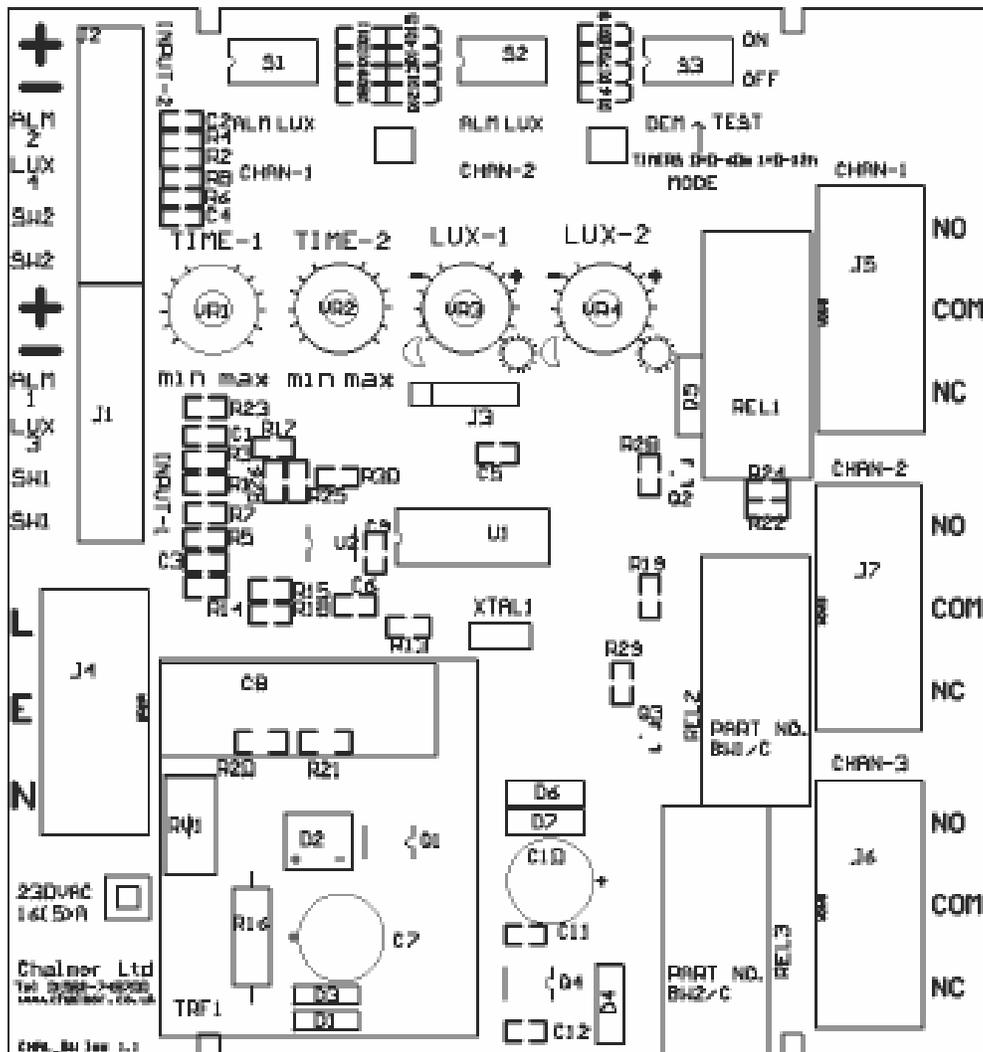
INPUT-1

+	12V dc output	(1.5)
-	0V dc output	(1.5)
ALM1	Occupancy input (NC)	(1.5)
LUX3	Light level input	(1.5)
SW1	Remote volt free switch – Chan 1	(1.5)
SW1	Remote volt free switch – Chan 1	(1.5)

INPUT-2

+	12V dc output	(1.5)
-	0V dc output	(1.5)
ALM2	Occupancy input (NC)	(1.5)
LUX4	Light level input	(1.5)
SW2	Remote volt free switch – Chan 2	(1.5)
SW2	Remote volt free switch – Chan 2	(1.5)

Figure – BW3/C PCB connections



2.5 OCCUPANCY SENSOR 12V WIRING CONNECTIONS

Where occupancy detection is required, a range of BlueWave sensors are designed for use with the BlueWave controller. BW/MINI sensors draw 12mA, PIR/CM sensors draw 14mA, BW/MW sensors draw 30mA.

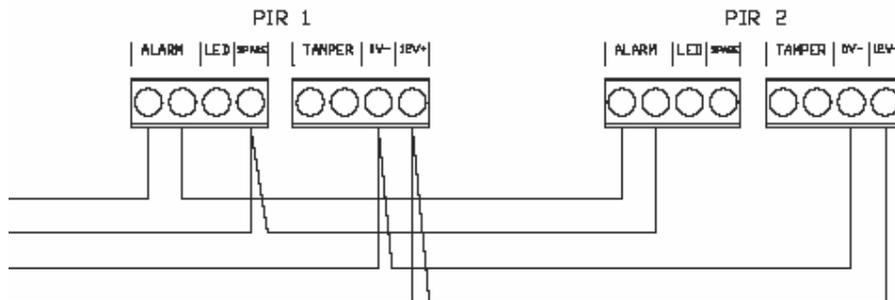
Overall the sensors that can be connected should not exceed 175mA.

The preferred cable is 4-core stranded and connections will be as follows:

<u>BlueWave Controller</u>		<u>BlueWave Sensor</u>
+	→	+
-	→	-
-	→	ALARM
ALM	→	ALARM
1 or 2		

Note: Tamper & LED terminals on the BlueWave/PIR sensor(s) are not used.

Where more than one sensor is required for a channel, installation should be as above with the exception of the wiring. To use two or more sensors connect + & - in parallel and connect - & ALM contacts (ALARM) in series. Connections on different versions of sensors may vary slightly to the drawing:



2.6 LIGHT LEVEL SENSOR 12V WIRING CONNECTIONS

Where light level sensing is required, BlueWave Lux sensors are designed for use with the BlueWave controller. An inside sensor (BW/LUX) is suitable for wall mounting. An outside sensor (BW/LUX/WP) is suitable for fixing to 20mm conduit and may be used inside or externally. Both sensors draw 10mA. Up to two lux sensors may be connected, one to LUX3 and one to LUX4.

Overall the sensors that can be connected should not exceed 175mA.

The preferred cable is 3 or 4-core stranded and connections will be as follows:

<u>BlueWave Controller</u>		<u>BlueWave Sensor</u>
+	→	+
-	→	-
LUX	→	LUX
3 or 4		

Where one sensor is to be shared by two channels, installation should be as above. To use one sensor for two channels, simply connect a link between the LUX terminals for Input 1 and Input 2 (LUX 3 and LUX 4).

2.7 REMOTE SWITCH 12V WIRING CONNECTIONS

Where remote switching is required, two switch options exist:

a) Momentary push button / retractive switch will replicate the function of the built in Channel 1 or Channel 2 push buttons to override or activate the channel when the button is pressed (contact made), as follows:

<u>BlueWave Controller</u>	<u>Momentary switch</u>
SW1	→ COM
SW1	→ PRESS TO MAKE (N/O)

<u>BlueWave Controller</u>	<u>Momentary switch</u>
SW2	→ COM
SW2	→ PRESS TO MAKE (N/O)

Ranges of suitable push buttons are available from Chalmor, engraved to suit the application, eg Demand, Override, Lighting etc.

b) Permanent override switch (rocker switch or key switch) overrides the channel to “Permanent Override On” when the switch is engaged (contact made). To override both channels with a single switch, use a double pole switch.

<u>BlueWave Controller</u>	<u>Permanent override switch</u>
SW1	→ COM
SW1	→ N/O

<u>BlueWave Controller</u>	<u>Permanent override switch</u>
SW2	→ COM
SW2	→ N/O

When the permanent override switch is in the Override position, the red and blue LED's will flash evenly for any channel that is in override mode.

Note 1 It is possible to connect both a Momentary push button and a Permanent override switch to the same channel. However, when the Permanent override switch is in use, the momentary push button will not function.

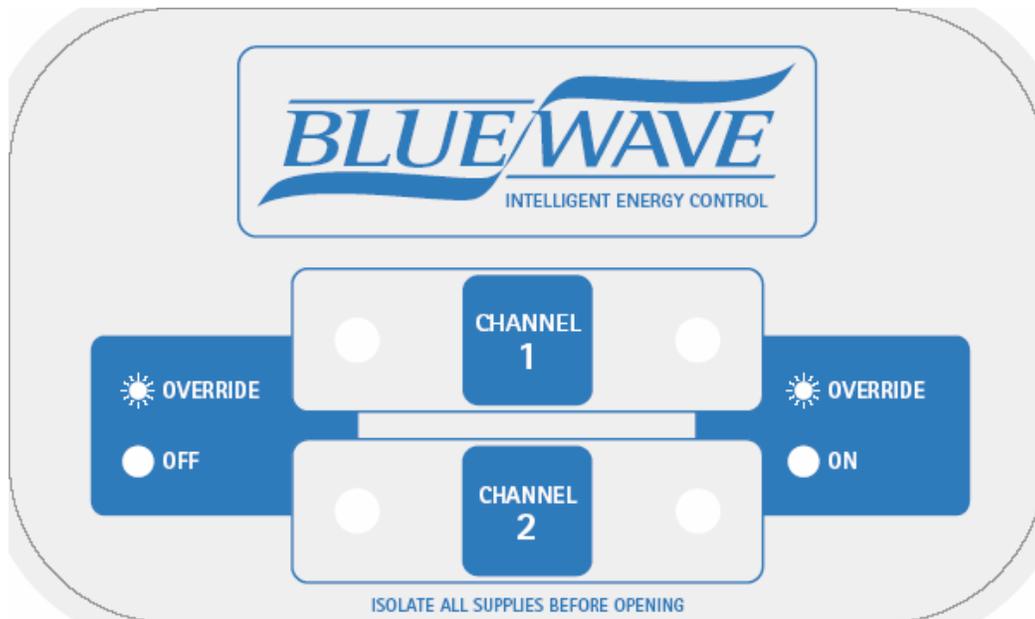
Note 2 It is possible to connect a single Momentary switch or Permanent override switch to both channels. In this case, simply connect the remote switch(es) in parallel to the SW1 and SW2 terminals.

<u>BlueWave Controller</u>	<u>Override switch</u>
SW1	→ COM
SW1	→ N/O
SW2	→ COM
SW2	→ N/O

Note 3 Where more than one remote switch is required, simply connect additional switches in parallel.

3 OPERATING INSTRUCTIONS

The **BlueWave ~ Intelligent Energy Control** front panel incorporates a push button plus one red and one blue LED indicator for each channel.



3.1 The buttons

The built in push buttons (or remote momentary switches) have the following functions:



Press button to override or activate Channel 1



Press button to override or activate Channel 2

The action of the press button depends on the status of the controller and operates as follows:

- Off to On (demand mode)
- On to Off (demand mode)

- Off to Override On (auto mode)
- On to Override Off (auto mode)
- Override On to Off (auto mode)
- Override Off to On (auto mode)

- Off (lux high) to On (lux override)
- On (lux override) to Off (lux high)

The status of each channel can be ascertained from the LED indicators, described overleaf.

3.2 The indicators

Indicators show the status of each channel:

SYMBOL	DESCRIPTION	STATUS
	Red (solid)	Automatic off
	Red (flashing evenly)	Override off
	Red (short off flash)	Off - lux high
	Blue (solid)	Automatic on
	Blue (flashing evenly)	Override on
	Blue (short off flash)	On - Lux override
	Red and blue (flashing evenly)	Remote Override on
	Red and blue (all on)	Test Mode on

3.3 Remote equipment

The **BlueWave ~ Intelligent Energy Control** will often have remote equipment connected.

Remote equipment can include:

- Occupancy sensors
- Daylight sensors (internal or external)
- Momentary switches (push button)
- Override switches (rocker or key operated)

The controller will react to the information provided by the switches and sensors. The function of the controller will depend on the settings selected by the installer. These are described fully in the Engineer Functions section.

BlueWave
Occupancy Sensor



BlueWave
Light Level Sensor



Inside Sensor



External
Sensor

Engraved
Override key switch



The controller includes an independent adjustable timer for each channel, an independent light level setting for each light level sensor, and can be set to operate in a variety of modes to suit the application.

4 ENGINEER FUNCTIONS

This section is to be used by the installing / commissioning engineer and will help with the correct set up of the **BlueWave ~ Intelligent Energy Control**.

The settings are adjusted using the 3 sets of DIL switches at the top of the controller PCB.

When the DIL switch is pushed up towards the top of the PCB, the switch is on. When the DIL switch is pushed down towards the bottom of the PCB, the switch is off.



Each channel of the BlueWave controller can be set to operate as:

- Light Switch – Manual On / Manual Off
- Occupancy controller – Auto On / Auto Off
- Occupancy and light level controller – Auto On / Auto Off
- Occupancy controller – Manual On / Auto Off (demand)
- Occupancy and light level controller – Manual On / Auto Off (demand)
- Light level controller – Auto On / Auto Off
- Light level controller – Manual On / Auto Off (demand)
- Timer: Resetting 0-60m
- Timer: Resetting 0-12h
- Timer: On / Off 0-60m (demand)
- Timer: On / Off 0-12h (demand)

4.1 Channel 1 & 2 settings

The DIL switch labeled CHAN-1 sets the functions of Channel 1. The DIL switch for CHAN-2 sets the functions of Channel 2.

Switch 1 and Switch 2 are used to select the Occupancy Sensor inputs to be used for each Channel.

Switch 1 = OFF	Switch 2 = OFF	Do not use Occupancy inputs
Switch 1 = ON	Switch 2 = OFF	Use Occupancy input 1
Switch 1 = OFF	Switch 2 = ON	Use Occupancy input 2
Switch 1 = ON	Switch 2 = ON	Use Occupancy inputs 1 & 2

Switch 3 and Switch 4 are used to select the Lux Sensor inputs to be used for each Channel.

Switch 3 = OFF	Switch 4 = OFF	Do not use Light Level Sensor inputs
Switch 3 = ON	Switch 4 = OFF	Use Light Level Sensor input 1, LUX 3
Switch 3 = OFF	Switch 4 = ON	Use Light Level Sensor input 2, LUX 4
Switch 3 = ON	Switch 4 = ON	Use Light Level Sensor inputs 1 & 2, LUX 3 and LUX 4.



Example settings are provided in section 4.3

4.2 Mode settings

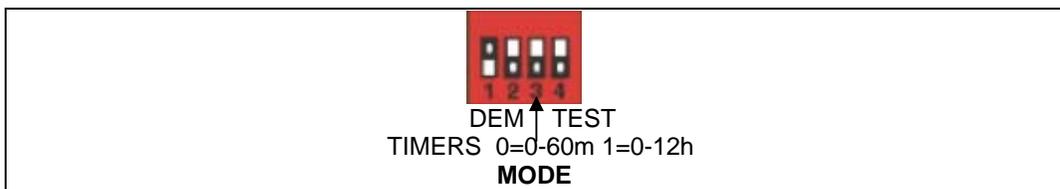
The DIL switch labelled MODE sets the demand mode and timer range for both channels plus Auto or Test mode.

Switch 1 = OFF	Channel 1 operates Automatically (Auto On, Auto Off)
Switch 1 = ON	Channel 1 operates in Demand mode (Manual On, Auto Off)

Switch 2 = OFF	Channel 2 operates Automatically (Auto On, Auto Off)
Switch 2 = ON	Channel 2 operates in Demand mode (Manual On, Auto Off)

Switch 3 = OFF	Timer delay range is 10 seconds to 60 minutes
Switch 3 = ON	Timer delay range is 10 seconds to 12 hours

Switch 4 = OFF	Normal mode
Switch 4 = ON	Test mode (see 4.7)



Example settings are provided in section 4.3

4.3 Example settings

Operation Channel 1	Channel 1 DIL Switch 1,2,3,4	Mode DIL Switch 1,2,3,4	Notes
Light Switch (On/Off)	<u>ON</u> OFF OFF OFF	<u>ON</u> OFF OFF OFF	ALM1 input open cct
Occupancy via ALM1	<u>ON</u> OFF OFF OFF	OFF OFF OFF OFF	
As above, with demand	<u>ON</u> OFF OFF OFF	<u>ON</u> OFF OFF OFF	Use CH1/SW1 input
Occupancy via ALM2	OFF <u>ON</u> OFF OFF	OFF OFF OFF OFF	
As above, with demand	OFF <u>ON</u> OFF OFF	<u>ON</u> OFF OFF OFF	Use CH1/SW1 input
Resetting 0-12h timer	OFF OFF OFF OFF	OFF OFF <u>ON</u> OFF	Use CH1/SW1 input
On/Off 0 – 60m timer	OFF OFF OFF OFF	<u>ON</u> OFF OFF OFF	Use CH1/SW1 input
Lux Control	OFF OFF <u>ON</u> OFF	OFF OFF OFF OFF	Use LUX3 input
As above, with demand	OFF OFF <u>ON</u> OFF	<u>ON</u> OFF OFF OFF	Use LUX3+CH1/SW1
Occ. via ALM1 + LUX3	<u>ON</u> OFF <u>ON</u> OFF	OFF OFF OFF OFF	Use LUX3 input
As above, with demand	ON OFF <u>ON</u> OFF	<u>ON</u> OFF OFF OFF	Use LUX3+CH1/SW1
Test	OFF OFF OFF OFF or or or or ON ON ON ON	OFF OFF OFF <u>ON</u> or or or <u>only</u> ON ON ON	

Operation Channel 2	Channel 2 DIL Switch 1,2,3,4	Mode DIL Switch 1,2,3,4	Notes
Light Switch (On/Off)	OFF <u>ON</u> OFF OFF	OFF <u>ON</u> OFF OFF	ALM2 input open cct
Occupancy via ALM1	<u>ON</u> OFF OFF OFF	OFF OFF OFF OFF	
As above, with demand	<u>ON</u> OFF OFF OFF	OFF <u>ON</u> OFF OFF	Use CH2/SW2 input
Occupancy via ALM2	OFF <u>ON</u> OFF OFF	OFF OFF OFF OFF	
As above, with demand	OFF <u>ON</u> OFF OFF	OFF <u>ON</u> OFF OFF	Use CH2/SW2 input
Resetting 0-12h timer	OFF OFF OFF OFF	OFF OFF <u>ON</u> OFF	Use CH2/SW2 input
On/Off 0 – 60m timer	OFF OFF OFF OFF	OFF <u>ON</u> OFF OFF	Use CH2/SW2 input
Lux Control	OFF OFF OFF <u>ON</u>	OFF OFF OFF OFF	Use LUX4 input
As above, with demand	OFF OFF OFF <u>ON</u>	OFF <u>ON</u> OFF OFF	Use LUX4+CH2/SW2
Occ. via ALM1 + LUX4	<u>ON</u> OFF OFF <u>ON</u>	OFF OFF OFF OFF	Use LUX4 input
As above, with demand	<u>ON</u> OFF OFF <u>ON</u>	OFF <u>ON</u> OFF OFF	Use LUX4+CH2/SW2
Test	OFF OFF OFF OFF or or or or ON ON ON ON	OFF OFF OFF <u>ON</u> or or or <u>only</u> ON ON ON	

CHAN-2



Switch 1 Off
Switch 2 On
Switch 3 Off
Switch 4 On

Occupancy control according to
ALM Occupancy Input 2
Light Level Control according to LUX 4
Light Level Sensor Input 2

CHAN-2

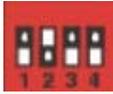


Switch 1 Off
Switch 2 Off
Switch 3 Off
Switch 4 On

No Occupancy control

Light Level Control according to LUX 4
Light Level Sensor Input 2

CHAN-2

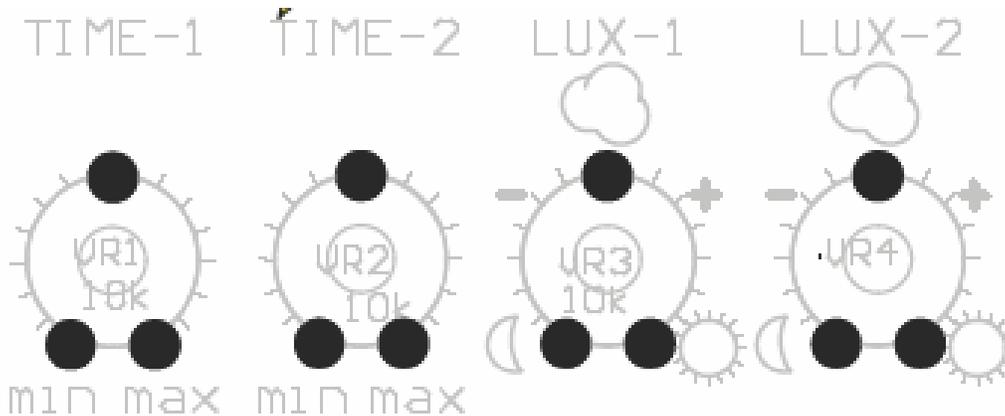


Switch 1 Off
Switch 2 On
Switch 3 Off
Switch 4 Off

Occupancy control according to
ALM Occupancy Input 2

No Light Level Control

4.4 Commissioning settings



Four potentiometers are provided to set the time delays and light level setting.

4.5 Timer setting

Once the time range has been set (using switch 3 of the mode switch block – see 4.2) then the Time-1 or Time-2 potentiometer may be used to set the time delay for Channel 1 and Channel 2.

At minimum position, the timer will operate at approximately 10 seconds. At maximum position, the timer will operate at 60 minutes or 12 hours, depending on the timer range setting.

To facilitate easy testing, it is recommended to set the timer using the 0 to 60-minute range. For example, setting the timer potentiometer to half way, the timer should run and test to approximately 30 minutes. Adjusting the timer range to 0 to 12 hours will then increase the setting to 6 hours.

4.6 Light Level setting

Once the light level sensor has been selected (using switch 3 or 4 of the Channel 1 / 2 switch block – see 4.1) then the LUX-1 potentiometer sets the light level for the sensor connected to Input 1 (LUX 3) and the LUX-2 potentiometer sets the light level for the sensor connected to Input 2 (LUX 4).

At minimum position, the light level is set low so it has to be very dark before the channel will operate. At maximum, the light level is set high so the channel will operate in relatively bright conditions. The setting can be adjusted to suit the application between these two points using the appropriate potentiometer.

By starting with the potentiometer in the moon position, the setting can be increased by rotating the potentiometer clockwise. The channel relay will switch when the current light level reading has been reached. Using this position as a reference point, the setting may be adjusted as described. Ideally, set the lux setting when the light level is at the point where lighting is required to switch on.

4.7 Test mode

A test mode is provided through DIL switch 4 of the mode switch block (see 4.2). When the switch is on, all control functions are bypassed and all LED indicators will be on. All channel relays will operate to the Channel ON condition.

This facility may be used when the BlueWave is first installed and awaiting commissioning, or to test that the control relays switch on, regardless of the sensor conditions.

When the switch is moved to the OFF position, the BlueWave will behave as if it has been powered up for the first time and will respond to any new sensor or switch inputs when detected.



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