

Using your Bisun Flexitwin V5

In all operation modes, all operation of the light is by manipulation of the normal power switch on the left hand side of the host lamp unit.

Though a 'classic mode' operating like the standard 14LED insert is available, most users will use the Flexitwin in one of its 'variblend' modes.

The V5 is pre-configured to the 4-power/4-beam-blend mode 2. with 'boost' power.

Variblend modes

In a variblend mode, the unit operates with the power switch in the centre position, with the switch allowing the total power level and the beam-blend to be controlled independently. This keeps operation simple while allowing a high degree of control, and also gives excellent tolerance to poor switch contacts since the switch is only used briefly to change the unit settings

Power control

Changing total power level is achieved by brief down-and-back-to-centre movement of the power switch to nudge the unit into the next power level in sequence, the sequence being a perpetual cycle from highest stepping down to lowest and then wrapping back round back to the highest.

Beam blend control

Beam blend control operates similarly, with brief up-and-back movements of the power switch cycling through a selection of beam blends, with the sequence starting from a pure flood, with an increasing shift towards spot beam content, and then back round to the pure flood. 3 or 4 blends are available, depending on the mode. The total power level is independent of the beam blend, the blend simply controls how the total power is shared between the two LEDs.

Reversible spot

To temporarily engage a full power spot-only beam for checking out distant targets, the switch is moved upwards and kept up.

After a 0.75s delay, the spot beam comes on at full power and stays on as long as the switch stays up. When the switch is centred, the unit goes back to its previous settings (possibly including 'off' - see below).

Turning on

The V5 can be turned on by briefly nudging the switch in either direction and back to the centre position, when it will power up at the settings it was using before it was last turned off.

If turned on by moving the switch down, as soon as the switch is down the unit will turn the flood LED on at the 'pilot' setting. If the switch is returned to centre within 2s, the unit powers up at the last-used settings. If the switch is held down for more than 2s it will return to off when returned to centre.

Operation is similar if the switch is moved upwards when the unit is off. If the switch is moved up and returned to the centre position within 0.75s, the unit will power up at the last-used settings. If held up for more than 0.75s, the full power spot will run for as long as the switch is kept up, and the unit will turn off when the switch is returned to centre.

Turning off

To turn the unit off, the switch is moved down, kept down for more than two seconds and then returned to the centre position.

After two seconds with the switch down, the main unit switches off, leaving the lamp running at an extra-low power 'pilot' setting on the flood beam via independent circuitry running directly from the switch.

From this state, returning the switch to the centre position will cause the unit to turn off completely.

Power ranges

A power *range* is a set of available output power levels

Three output power ranges are available for every operating mode.

The standard power range gives good brightness with a maximum power chosen to give good runtime even at the highest level (6-8h with decent rechargeable cells).

The high range has a maximum output twice the standard maximum while widening the steps between power levels to give extended runtime at low power levels.

The boost range has the same settings as the standard, except that the highest power setting is a boosted one - for the first minute after selecting high power or changing the beam blend at high power the light runs at a double-power setting, after which it gently drops to the standard high power level.

In normal use, unless high power is being repeatedly re-selected, the runtime will be basically the same as in the standard range, but with more light available for short periods. As this is the best range for most users, this is the default setting.

Operating modes

There are multiple variants of the variblend mode available, which all work in the same way but give extra choice to the user. They differ in whether there is a low battery warning, the number of beam blends, the number of power settings, and the output power levels.

There is a 'classic mode' which operates like the 14LED modules, with the unit always off whenever the switch is centred.

This has a fixed blend, with flood-heavy beams selected by having the switch down, and spot-heavy blends selected by having the switch up, and with power changed by brief turning off and back on in the same way a standard 14LED unit operates.

Mode	Type	Power Levels	Beam Blends	Battery warning	Output
1	Variblend	4	4	No	Normal
2	Variblend	4	4	Yes	Normal
3	Variblend	3	3	No	Normal
4	Variblend	3	3	Yes	Normal
5	Variblend	3	3	No	Economy
6	Variblend	3	3	Yes	Economy
7	Classic	3	Fixed	No	Normal
8	Classic	3	Fixed	Yes	Normal

For the variblend modes, in modes 1 and 2:

The available beam blends are:

Flood

A 10:1 flood:spot ratio

A 3:1 flood:spot ratio

A 1:1 flood:spot ratio

The available power levels are extra-low, low, medium and high.

In modes 3-6, the 10:1 flood:spot blend and the extra-low power level are removed to make the operating sequences shorter and simpler.

In all variblend modes, an extra-low flood level is always available by pushing and leaving the switch down to engage the 'pre-off' pilot setting, and a full-power spot is always available by pushing and leaving the switch up.

The 'economy' mode has power levels 2/3 of the equivalent normal power to extend the runtime by 50%. Typically this is used in club lights to make battery changing unlikely to be needed on most normal trips even if a user keeps the light constantly on high.

Power consumption

The power consumption at a given power level is independent of the beam blend chosen.

With 'normal' output settings (modes 1-4), the current draw in mA and approximate light outputs in lumens are:

	Extra-low	Low	Medium	High	Boosted High *
Standard range	22mA/11lm	55mA/29lm	140mA/72lm	360mA/180lm	N/A
Boost range	22mA/11lm	55mA/29lm	140mA/72lm	360mA/180lm	700-1050mA/360-500lm
High range	26mA/12lm	80mA/39lm	230mA/120lm	700mA/360lm	N/A

(*In boost mode, while in the initial boost period of high power, the power consumption is ~700mA except for the 50:50 flood:spot mode, where it is ~1050mA)

With 'economy' output settings (modes 5&6), the figures are:

	Extra-low	Low	Medium	High	Boosted High *
Standard range	15mA/7lm	36mA/18lm	90mA/44lm	235mA/115lm	N/A
Boost range	15mA/7lm	36mA/18lm	90mA/44lm	235mA/115lm	450-650mA/200-290lm
High range	17mA/8lm	50mA/25lm	150mA/75lm	450mA/220lm	N/A

The figures above are for the light output of the LEDs. All LED optics (as used on the spot beam) cause some light loss, so the spot LED+optic combination has an output a little lower than the above figures would suggest, though the large spot optic in the V5 has very low loss. A scratched Duo lens can significantly reduce light output, and diffuse a spot beam.

Selecting a mode

To select a mode, first open the headset to get access to the configuration button, which depending on the model of V5 is either on the front of the mounting plate above the spot LED, or a tiny button on the main circuit board. An onboard button is best pressed using a fingernail

- a) Set the power switch to select the power range desired (see below)
- b) Press the configuration button.
- c) The spot LED will flash to indicate the current selected mode (1 through 8).
- d) Return the power switch to the centre position if it is not there already
- e) If the mode displayed is the desired one, go to step h, otherwise briefly press the configuration button to advance to the next mode
- f) Go to step c
- g) If the button is pressed and held down, the current selected mode will first be displayed by flashes and then the mode will be advanced, indicated by extra flashes, as the button is held down. If the button is kept held after mode 8 is reached, the mode will reset to 1. Once the button is released, see step c.
- h) When the desired mode number is reached, operate the main power switch up or down to exit configuration and save the mode for future use.

Finally, close the headset.

Selection of the power *range* depends on the main switch when entering setup. Switch down - standard range; central - boost range; up - high range.

Storage of running settings

To make operation easier in Variblend mode with poor battery connections, the V5 flexitwin stores its current operating settings and if power is disconnected while a unit is running, it will restart running with the stored mode and power level when power is restored.

This persistent-through-power-disconnection feature means knocks to the helmet which cause temporary interruptions of power only cause brief interruptions of light.

To avoid excessive writing of settings to memory, the V5 does not store changes immediately they are made, but only after the unit has run with stable settings for a short period of time.

The only exception to this is that when turned on it immediately records that it is on, so that if a unit is turned on it can't be turned off even by an interruption of power immediately afterwards.

If a power level or beam blend is changed, that change is only stored after a short delay, of 10-20 seconds, and interruption of power before the store happens will cause reversion to the previous power and beam blend on restoration of power.

Similarly, if a unit is turned off, that turning off isn't recorded immediately, but only after a few seconds - turning off and instantly interrupting power would result in powering back up on reconnection as if it had not been turned off.

If operating in a 'boost' mode at high power, only the standard power level is stored, not the temporary boosted level, so power interruptions in the first 90 seconds of a boost will result in an immediate reversion to the standard levels.

Batteries

Typically people will run the unit from 4x NiMH cells or 4x Alkaline cells.

If using '1.5V' lithium cells, (or 'NiZn' rechargeable cells) only 3 cells should be used, along with a dummy AA cell.

'14500' size rechargeable Lithium-Ion cells must never be used.

Low battery voltage warning

This warning option is included for users running from 4xNiMH cells, to give them advance warning of battery depletion and to allow them to swap cells in good time before any become fully flattened, which helps maximise the longevity of the cells. When the input voltage drops below a pre-set threshold, the unit will give five 'off' pulses, kept brief for safety.

There is no automatic power level changing, just the warning. Only one warning will be given per set of batteries, to avoid repeated warnings becoming annoying.

If unsure if a warning has occurred, turn the unit off and then briefly disconnect power to allow a repeat.

The threshold is set at a level well above the voltage typically needed to run the LEDs at maximum power, so significant runtime will remain after this point.

A voltage warning happening in a Duo soon after starting operating with 4 freshly-charged NiMH cells or 4 fresh alkaline cells indicates that either one of the cells is in poor condition, or there is some kind of connection issue in the Duo - poor battery contacts, cable issues or some problems in the headset.

Thermal limiting

The Flexitiwn has built-in thermal limiting to ensure the unit does not get too hot if running at the highest power levels, especially in warm environments.

This operates subtly, smoothly adjusting the power down (or back up) to keep the internal temperature acceptable, rather than stepping to different power levels.

Redundancy

For added peace of mind, the Flexitiwn has redundant electronics to provide a low power level to the flood beam whenever the switch is down, irrespective of the rest of the control circuitry.

Photography and slaves

The low-power flood beam that the V5 produces with the switch left down is flash-slave-safe, and so may be useful for cave photographers or their assistants.

For more information email sales@bisun.co.uk

Any suggestions for new features will be welcome - user suggestion was the reason for the 'economy' modes for group use, to reduce the likelihood of needing a battery change on any reasonable trip.