

RACE



# FREEWheel

RACE  
*Solid-state system*

*user guide &  
fitting instructions*

*"So eager to order this! Need to ditch my steering wheel umbilical as soon as possible!"*

*"Installation was really straight forward ... and the configuration software worked well"*

*"All installed and tested, works perfectly, insanely pleased :D"*



***"I cannot recommend the kit enough"***

*"my favourite upgrade yet.. get one."*

*"Absolutely amazing.. I'll be sure to recommend your product as it really is a fantastic piece of kit"*

*Thank you for purchasing FREEWheel!*

**FREEWheel, the most advanced wireless steering wheel system in the world.**

Here's all the information you'll need.



### CONTENTS

Solid-state Receiver and Transmitter  
Battery (3V CR2 lithium) and USB cable  
Optionally: 0.7m loom or connector & pins  
Optionally: Easyfit Transmitter assembly or button plate bundle comprising IP67-rated OFF / [ON] momentary switches, nut covers, button plate, spacer disk, decals

### YOU WILL NEED

IP67-rated OFF / [ON] momentary switches  
USB configuration software from [www.blinkstop.co.uk](http://www.blinkstop.co.uk)  
Wire strippers, soldering iron (not Easyfit)  
Optionally: hook-and-loop or servo tape, heat shrink

### WARNINGS

Please check the contents and read the fitting instructions carefully before commencing

**FREEWheel is rated for ground-switching a maximum load of 600mA per channel and is designed to be used with additional relays or connected to a separate power distribution unit (not supplied).**

### FEATURES

- Wireless solution allows full push-button and paddle control with a detachable steering wheel
- Integrated BlinkSTOP and BeamSTOP functions – smart indicator cancelling and headlight control
- Integrated IVA fog mode – inhibits and resets fog lights when headlights are turned off
- Integrated racing features – two rainlight modes and Flash-to-Pass headlight mode
- Supports two simultaneous button presses – includes indicator channel hazard mode
- Uniquely, lets you use your choice of buttons, paddles and mounts. Don't be tied to a manufacturer's styling choices!
- Two analogue output (0 - 4.7V) channels for variable control (10-channel systems only)
- Choice of momentary and latching switch behaviour for all solid-state channels via USB configuration software

## TRANSMITTER INSTALLATION

### SPECIFICATION

Compact case in flame-retardant ABS plastic. Requires one 3V CR2 lithium battery. Weight with battery: 61g

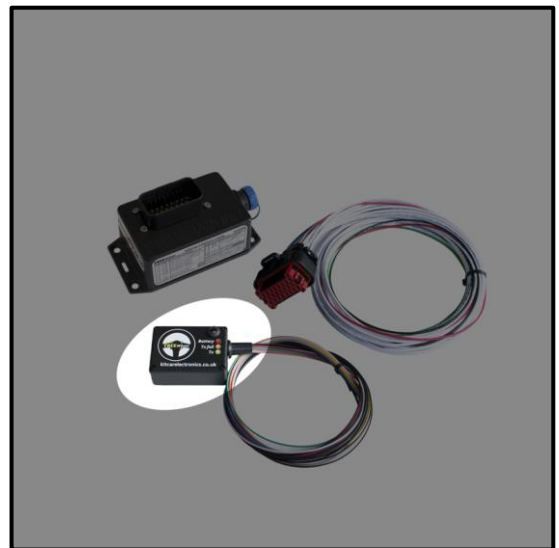
Robust performance even at 2.65V. Unique Transmitter ID prevents cross-talk from nearby kits.

No need to disconnect the Transmitter battery if the vehicle is off the road. The sleep drain of 0.9uA and 25mA drain per ~20msec button press allows over 6 million transmissions.

Tri-colour LED indicating performance state:

- GREEN = Transmit OK. Transmission successfully received and acknowledged by the Receiver;
- ORANGE = Transmit Fail. Transmission not acknowledged by the Receiver. Possible causes are obstruction, lack of range or de-powered Receiver (e.g., vehicle ignition is OFF);
- RED = Low Battery <2.65V. Replace battery now.

Transmission time of 6 milliseconds for a real-time response.



### EASYFIT TRANSMITTER INSTALLATION INSTRUCTIONS



10-Channel Easyfit Transmitter shown

Easyfit Transmitter is supplied preassembled and configured to your specification.

The Easyfit Transmitter is pre-drilled to support standard 50 to 50.8mm, 70mm and 74mm PCD steering wheel bosses. The rear plate can be detached from the Transmitter and used as a guide to gently drill through the spacer disk, if required. Use a 6mm HSS drill bit with light pressure and low speed, with the parts securely clamped.

### PIGTAILED TRANSMITTER INSTALLATION INSTRUCTIONS

Use of good quality, IP67 rated OFF / [ON] momentary switches is recommended, such as Multicomp's MCPAS6B2M1CE7, available from Farnell. Illuminated switches are not supported.

#### 1. Wiring

**DO NOT solder the switches while the Transmitter battery is fitted, as damage may occur.**

The switches are all made to a common ground, so you can connect the ground wires as you wish.

**If used**, Left / Right Indicators, Main Beam, Fog and Rainlight **MUST** be connected to the wires shown because this is matched by the control software. See Figure 1 and Figure 2 for suggested indicator and main beam wiring diagrams.

When stripping the outer insulation, please take care not to damage the wires inside. Leave sufficient wire for future soldering of unused channels, and cover with heat-shrink.

#### 2. Nut Covers (if supplied)

Fit the nut covers to the rear of the switches. It is deliberately a tight, push fit. The covers can be secured in place with a little hot melt glue **once all testing is complete**.

#### 3. Attach the Transmitter to the Steering Wheel

The Transmitter can be easily attached to the reverse of the wheel or button plate using hook-and-loop pads or servo tape.

Wire Colour	Function
BLACK	Ground
ORANGE	3V Potentiometer Live Ref
RED	Ch1 or L Indicator
GREEN	Ch2 or R Indicator
BLUE	Ch3 or Main Beam
BROWN	Ch4 or Fog
GREY	Ch5
PINK	Ch6
CYAN	Ch7
PURPLE	Ch8 or Rainlight
YELLOW	Ch9 Pot1 Signal
WHITE	Ch10 Pot2 Signal

**Transmitter wiring key**

### TRANSMITTER BATTERY & TESTING INSTRUCTIONS

#### 1. Battery Fitting and Removal

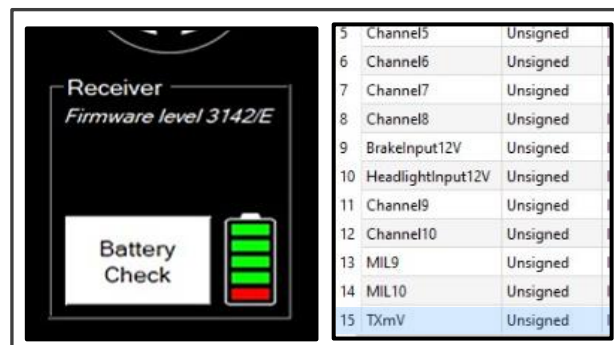
Fit the CR2 battery to the transmitter battery housing, noting that the '+' end of the battery is nearest to the LED. As the battery is deliberately tightly fitted in the holder, exercise care when removing.

#### 2. IMPORTANT - Transmitter Testing

Follow the Receiver Configuration Software instructions to connect the Receiver to your Windows PC or laptop and to verify that your button presses for each channel are being sent by the Transmitter.

#### 3. Battery Voltage

With the Receiver connected to your Windows PC or laptop and communication with the Transmitter established, approximate battery strength can be checked using the Receiver Configuration Software. Optionally, a more precise voltage can be obtained from the CAN signal in message TXmV, within the All\_Compact\_U8 frame in Byte 6 (scaling x10, offset 1000mV). The default is 3000mV until active communication starts. A suitable alarm value is 2700mV.



## RECEIVER CONFIGURATION SOFTWARE

### INSTALLATION AND USAGE INSTRUCTIONS

NOTE: DO NOT disconnect the USB power during programming or the chip memory may corrupt!

#### 1. Software Installation

Connect the Receiver USB cable to the Windows PC. Windows 7, 8 and 10 are supported. Windows will auto-detect and install the FTDI Driver.

In the event the PC does not self-install the FTDI driver, download and install FTDI's VCP Virtual COM Port driver from <http://www.ftdichip.com/Drivers/VCP.htm>

#### 2. Identify the correct COM port used by FREEWheel

Open Windows Device Manager [**Start .. Run .. or Search ..** and enter '**Device Manager**']. The port will disappear and reappear as you remove and insert the Receiver USB lead.

Download, extract to Desktop and run the FREEWheel.exe program from the Downloads page at <https://www.blinkstop.co.uk/shop/downloads>

#### 3. Using the Software

Choose the correct COM port from the available drop list and click 'Connect'. The existing channel configuration and virtual relay states will be displayed (physical relays are not powered by USB).

Pressing steering wheel buttons connected to the Transmitter will illuminate the corresponding buttons and toggle or flash the virtual relay states on the software.



### CHANNEL MAPPING CONFIGURATION (WHERE AVAILABLE)

#### 4. Select the Input Sources tab to map the channels

Follow the on-screen instructions to assign channels to individual buttons.

### CHANNEL BEHAVIOUR CONFIGURATION

#### 5. Select the Control Functions tab to set the channel behaviours

Select the desired smart functions by checking the tick boxes and adjusting the duration sliders. Unchecking the tick boxes will allow a free choice of momentary or latching behaviour. Details of individual features can be found towards the end of these instructions.

Once done, click 'Program'. When successful, you will see 'Success' displayed.

To disconnect the Receiver from the USB software, press 'Disconnect' then 'Close'. Now you can safely disconnect the USB cable.

Proceed to Solid-State Receiver Installation.

### SOLID-STATE RECEIVER INSTALLATION

#### SPECIFICATION

Weight with/without 0.7m wiring loom: 285g/120g. Wiring loom uses 23-pin sealed, genuine TE connector and 18AWG heat resistant, high temperature, thin wall wires with tinned copper.

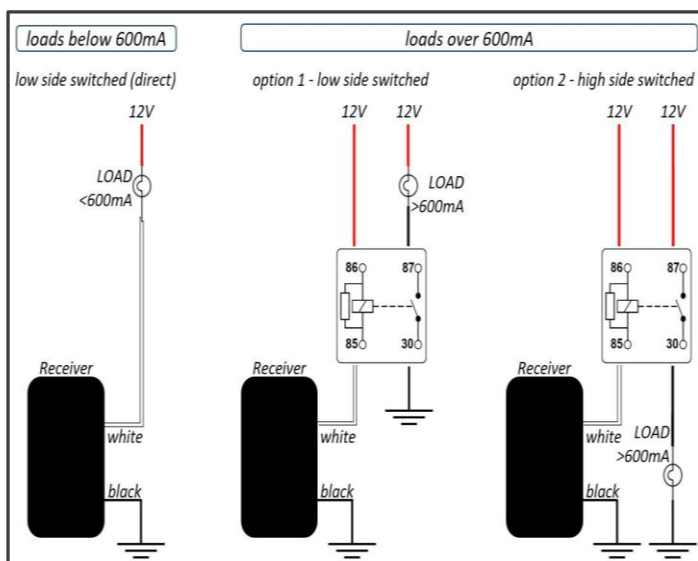
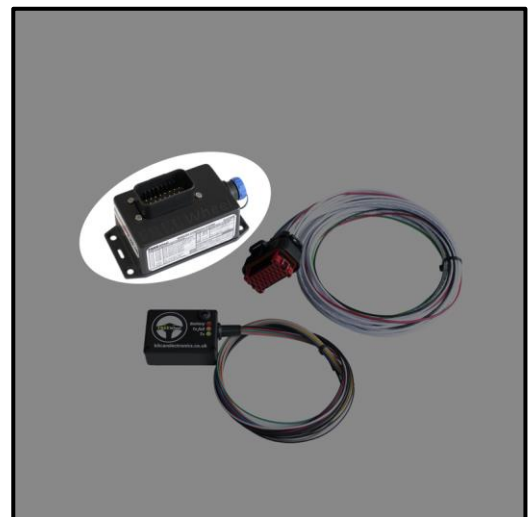
The Solid-State Receiver provides eight, independent, low-side drive channels of 0.6A capability, with in-built short circuit / overcurrent protection, open circuit detection and flyback voltage clamping for inductive loads. These channels can ground switch typical automotive relay coil circuits directly, or low current loads with no further isolation required.

Channels are open circuit by default at ignition ON and are switched by the Transmitter.

Digital channels 1 - 8 are configured using the FREEWheel USB software and have behaviour options of:

- ALL: momentary [ON] (Transmitter button follower)
- ALL: latching [ON] / OFF with each separate Transmitter button press
- Channels 1 & 2: indicator control
- Channel 3: high and low beam function with Flash-to-Pass feature
- Channel 4: IVA fog function
- Channels 5, 6: inverted momentary function
- Channel 5: single button hazard function
- Channel 6: intermittent wiper function
- Channel 7: flash function
- Channel 8: rainlight race function

Channels 9 & 10, if supplied, are variable (0 to 4.7V) signals.



The FREEWheel Receiver contains the grounding switch circuits. Each circuit can sink up to 600mA and has an internal, self-resetting fuse. Externally, there is a white wire for each channel which is to be connected to the ground side of any load. The Receiver controls the load by connecting the white wire directly to 'ground'. Circuits below 600mA can be switched directly (e.g., certain LED lighting circuits).



### SOLID-STATE RECEIVER

#### SOLID-STATE RECEIVER INSTALLATION INSTRUCTIONS

##### 1. Wiring

Identify a fused, ignition-switched circuit that can be used for the power supply to FREEWheel. The FREEWheel Receiver draws little current (<500mA typically), so will not increase the circuit load significantly.

Identify a suitable Ground connection, ideally direct to the vehicle chassis. Identify the existing circuits and schematics. These will be critical to successful installation.

See Figure 1 and Figure 2 for suggested indicator and main beam wiring diagrams. Some vehicles as standard do not provide high beam flashing unless headlamps are ON (e.g., Westfields), so use the elements of the diagrams applicable to your vehicle.

Choose a cool location for the Receiver inside the car, with minimal (metal) obstructions between Receiver and Transmitter. Behind the dashboard is normally an ideal place.

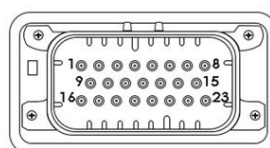
**With the vehicle battery disconnected,** connect Receiver Power and Ground to the previously identified wires.

##### 2. Receiver Testing

Re-connect the vehicle battery. Check that the Transmitter light is reliably GREEN on button presses and continues to flash twice a second while ignition is ON. ORANGE means that there is a probable obstruction to two-way communication. You can test the range of the system using this light for indication.

Once you have reliable communication between Transmitter and Receiver, connect the Windows PC to the USB connector and use the FREEWheel software to configure the channels, if you have not already done so (see Receiver Configuration Software). The software will show the live state of the switching and button presses and the Transmitter battery voltage status.

Now **disconnect the vehicle battery** and complete the installation of the desired integrated functions.



**23-PIN AMPSEAL CONNECTOR  
PIN-OUT DIAGRAM**

PIN	COLOUR	FUNCTION / CHANNEL
1	WHITE	CH1 or LEFT INDICATOR GND SW
2	WHITE	CH2 or RIGHT INDICATOR GND SW
3	WHITE	CH3 or HIGH(MAIN) BEAM GND SW
4	WHITE	CH4 or FOG GROUND SWITCH
5	WHITE	CH5 GROUND SWITCH
6	WHITE	CH6 GROUND SWITCH
7	WHITE	CH7 GROUND SWITCH
8	WHITE	CH8 or RAINLIGHT GROUND SWITCH
9	-	-
10	RED	12V IGNITION POWER
11	BLACK	VEHICLE GROUND
12	GREEN	BRAKE LIGHT 12V SENSE
13	BLUE	HEADLIGHT 12V SENSE
14	WHITE	CH9 ANALOGUE OUT 0-5V (RACE-10)
15	WHITE	CH10 ANALOGUE OUT 0-5V (RACE-10)
16	-	-
17	-	-
18	-	-
19	-	-
20	-	-
21	-	-
22	WHITE	CAN LOW (OPTIONAL)
23	WHITE	CAN HIGH (OPTIONAL)

**Solid-State Receiver wiring key**

### INTEGRATED BlinkSTOP FUNCTION

CHANNELS 1 AND 2 SET TO [INDICATORS]



#### INSTRUCTIONS FOR OPERATION

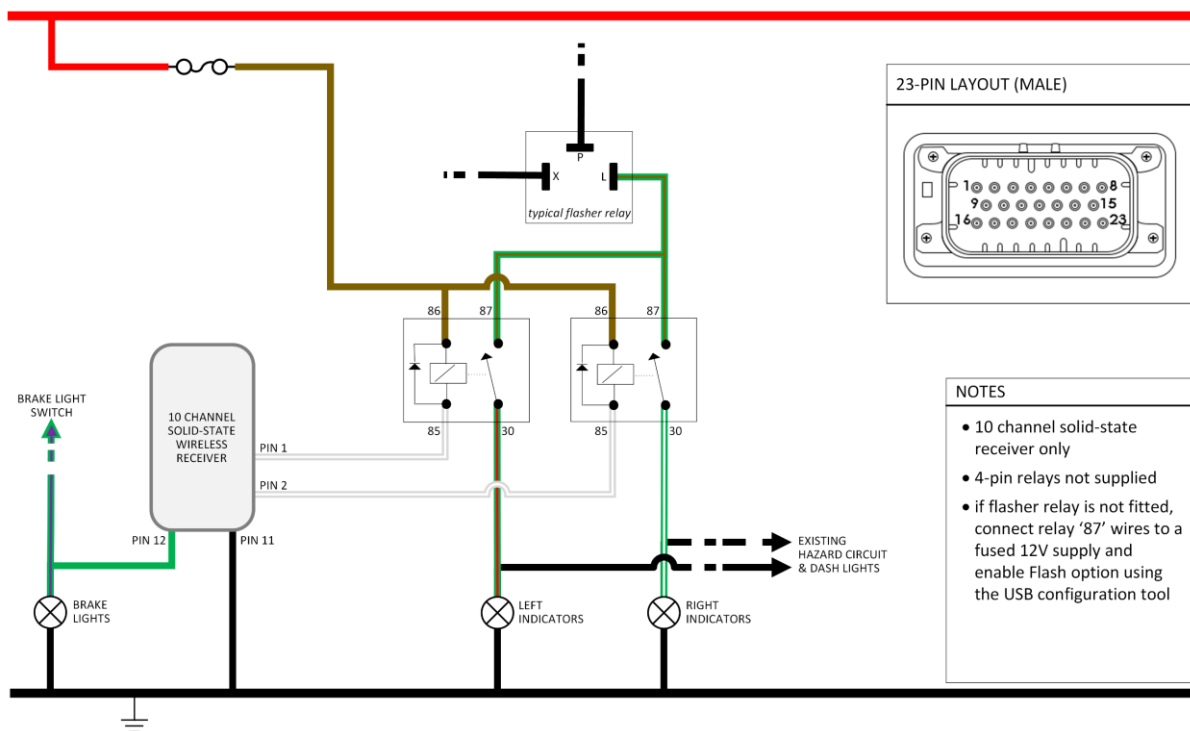
An indicator can be toggled ON and OFF with each press of a button. Flash rate can be controlled by FREEWheel to 60, 75, 90, 105 or 120 flashes per minute or by your flasher relay (user-configurable).

Toggling to ON begins a cancel timer. Indicating will auto-cancel once the timer has elapsed (6 to 30 seconds, user-configurable). Indicator auto-cancelling is inhibited while the brakes are pressed, and afterwards for a short time so that the indicators can remain ON in traffic or while waiting to turn.

To change indicator, push the opposite button once. The current indicator will cancel, and the opposite indicator will toggle to ON and begin flashing. The cancelling timer will reset.

To use the Hazard function, push both buttons together at the same time. To cancel, press either button.

#### FIGURE 1 // SUGGESTED INDICATOR WIRING PLAN





### INTEGRATED BeamSTOP HEADLIGHT FUNCTION

CHANNEL 3 SET TO [MAIN]



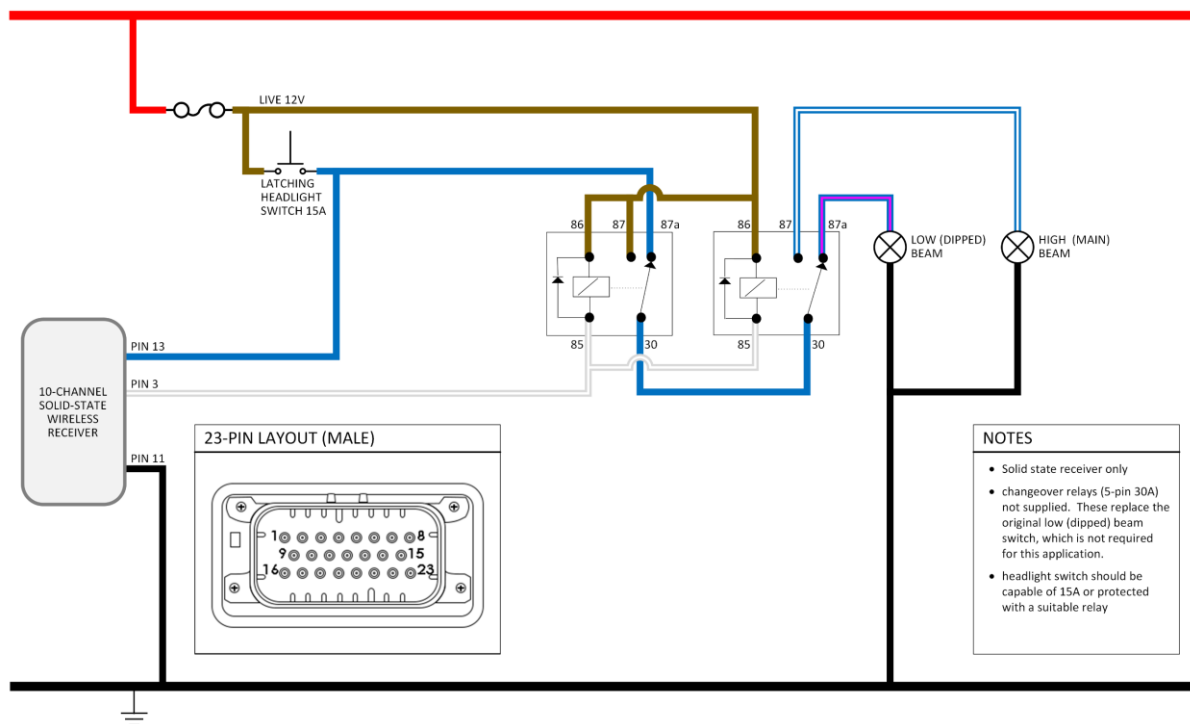
#### INSTRUCTIONS FOR OPERATION

BeamSTOP allows full control of headlight main (high) beam and dipped (low) beam.

If the headlights are OFF, the main beam will light for the duration of the button press. If the headlights are ON, BeamSTOP allows each button press to alternate between latched-dipped and latched-main beam.

If Flash-to-Pass is enabled, a half-second press will trigger 5 seconds of rapid flashing of the main beam.

#### FIGURE 2 // SUGGESTED MAIN BEAM WIRING PLAN



### INTEGRATED FOG LIGHT 'IVA' FUNCTION

CHANNEL 4 SET TO [FOG]



#### INSTRUCTIONS FOR OPERATION

Channel 4 can be used as an auto-cancelling fog light channel. When suitably connected and the headlights are OFF, the fog light will automatically cancel and is inhibited from operation by button press.

**WIRING:** Connect the blue wire from pin 13 to the headlight switch, as shown in Figure 2.

### HAZARD FUNCTION

CHANNEL 5 SET TO [HAZARD]



#### INSTRUCTIONS FOR OPERATION

Channel 5 can be used as a single button hazard channel and requires channels 1 and 2 to be configured for the BlinkSTOP indicator function. A single button press will cause the indicator outputs to be live; flash rate can be controlled by FREEWheel to 60, 75, 90, 105 or 120 flashes per minute, or by your flasher relay.

NOTE: To comply with UK MOT/IVA requirements, hazard lights should be operable by a single lit button when the ignition is off, therefore this feature is recommended for off-road use.

### WIPER FUNCTION

CHANNEL 6 SET TO [WIPER]



#### INSTRUCTIONS FOR OPERATION

A short press will toggle between [OFF] and latched [ON]. A one-second press will trigger an intermittent [ON]/[OFF] with the durations configurable to 250ms, 500ms, 1s, 2s, 4s, 7s and 10s. A subsequent one-second press will cancel the intermittent mode and return to the previous state.

WIIRING: Connect the Receiver channel wire to the wiper's low speed and park circuit.

### INVERTED MOMENTARY FUNCTION

CHANNELS 5 AND / OR 6 SET TO MOMENTARY [INVERTED]



#### INSTRUCTIONS FOR OPERATION

Channels 5 and 6 can be used as inverted momentary channels, i.e., normally closed. The channel will be open at power up with normally closed behaviour starting once power-on checks are completed (<50ms).

### FLASH FUNCTION

CHANNEL 7 SET TO [FLASH]



#### INSTRUCTIONS FOR OPERATION

A short press will trigger a 1Hz flashing mode. A subsequent press cancels and returns to the previous state.

### INTEGRATED RAINLIGHT RACE FUNCTION

CHANNEL 8 SET TO [RAINLIGHT]



#### INSTRUCTIONS FOR OPERATION

Channel 8 can be used as a racing mode rainlight. A short press of the steering wheel button will latch the rainlight ON and a longer, one-second press will trigger the 'Rain Hazard' 4Hz flashing mode. A subsequent one-second press will cancel the Rain Hazard mode and return to the previous state.

**WIRING:** Connect the Receiver channel wire to the rainlight's relay coil circuit Ground, or directly to the rainlight Ground if 600mA or less.

### POTENTIOMETER CHANNELS

CHANNELS 9 AND 10 (RACE 10 SYSTEMS ONLY)



#### INSTRUCTIONS FOR OPERATION

The Transmitter supports 2Hz sampling of two independent 10k $\Omega$  potentiometers.

Initial voltage output is 0V at power-up, until two-way communication is established. Ensure that this is considered in the final intended switching design.

With ignition ON, pressing any of the channels 1 to 8 momentary switches initiates communication, and the green Transmitter LED will flash at 2Hz to show successful two-way messaging. The eight, grounding, momentary channels will each trigger a transmission immediately on button press, independently of the 2Hz potentiometer transmission frequency.

The Transmitter LED will automatically power down when the vehicle ignition is powered OFF.

**WIRING:** Fit a 10k $\Omega$  potentiometer or a Kit Car Electronics' Mil-spec rotary switch to each Transmitter potentiometer channel as illustrated.

The Receiver unit will output an analogue (0 to 4.7V) voltage proportional to the position of the potentiometer.

Connect each analogue output to a high impedance input sampling circuit (typically > 50k $\Omega$  impedance) to ensure the voltage is not reduced.



3V – orange (REF)  
channel 9 or 10 – yellow or white (SIG)  
ground – black (GND)



**GUARANTEE**

All our products come with a two-year guarantee, except our batteries which have a five-year guarantee.

**RETURNS & EXCHANGES**

You can return many of our products within 14 days from delivery, however customised goods and bespoke hardware, firmware and software cannot be returned or exchanged.

**GOT A PROBLEM OR CHANGED YOUR MIND?**

In all cases, we will be reasonable and responsive and will endeavour to give an excellent service. Please see [blinkstop.co.uk/shop](http://blinkstop.co.uk/shop) for further details.

# **BlinkSTOP.co.uk**

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**Kit Car Electronics Limited**

