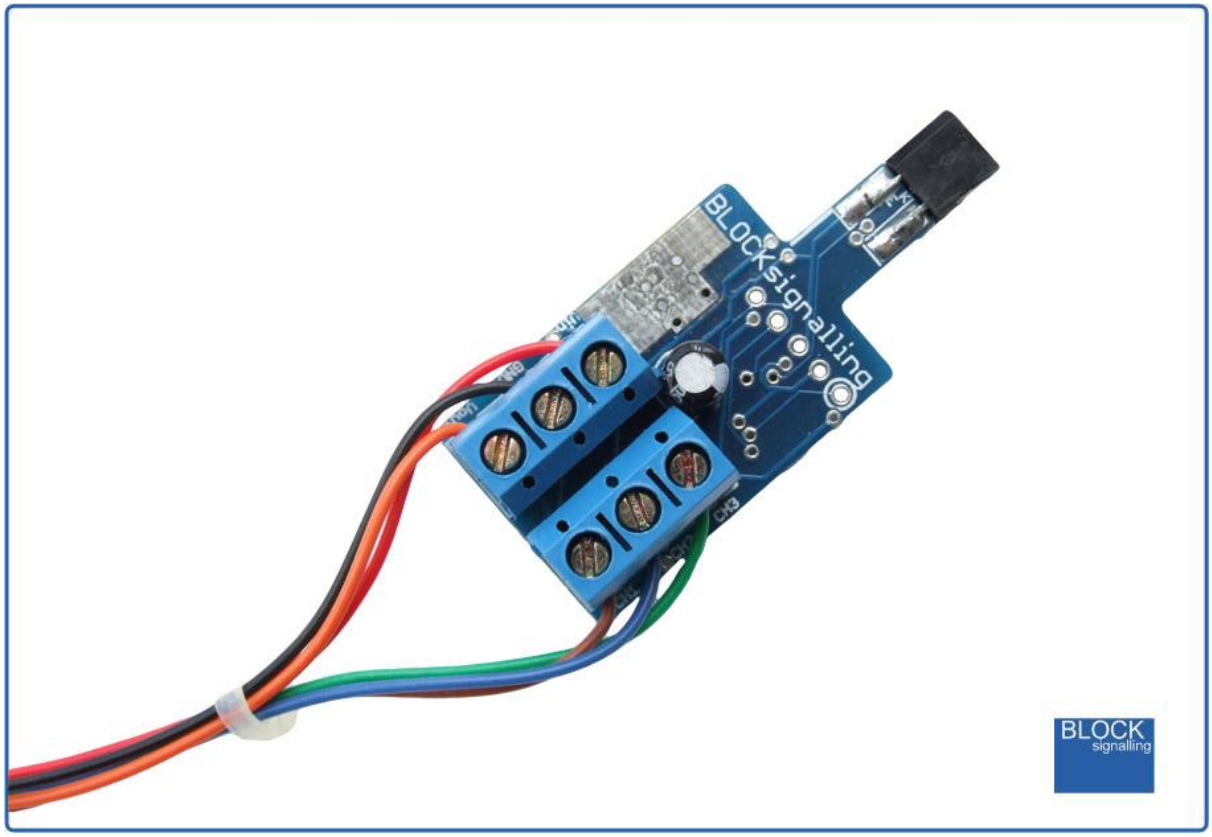
BLOCKsignalling

www.blocksignalling.co.uk



- Quick and easy way to detect trains anywhere on your layout, even in tunnels
- Detects passing trains using its in-built infra-red sensor
- Operates from 12V to 25V DC, 12V to 16V AC, or uses DCC as a power feed and feeds signals at 12V
- Very easy to connect up to simple indications on a control panel or to add as inputs to computer systems
- No soldering required, all components are ready wired
- No programming necessary(but you can adjust all settings if you wish)

We often are asked how to detect trains in tunnels, or on layouts where enthusiasts run their trains in twilight, or even in complete darkness. In these situations, photocell operated detectors will not work, and so you need a detector with a built-in light source.

The BOD2-NS has a built-in infra-red detector which can "see" in the dark and can detect trains in these situations.

Two leds and a small relay can be connected. Normally one of the leds is lit ("NO TRAIN"). When a train crosses the sensor, the first led is extinguished and the second led is lit (and relay, if connected) is energised. These leds can be fixed on a control panel to show a train has crossed the sensor.

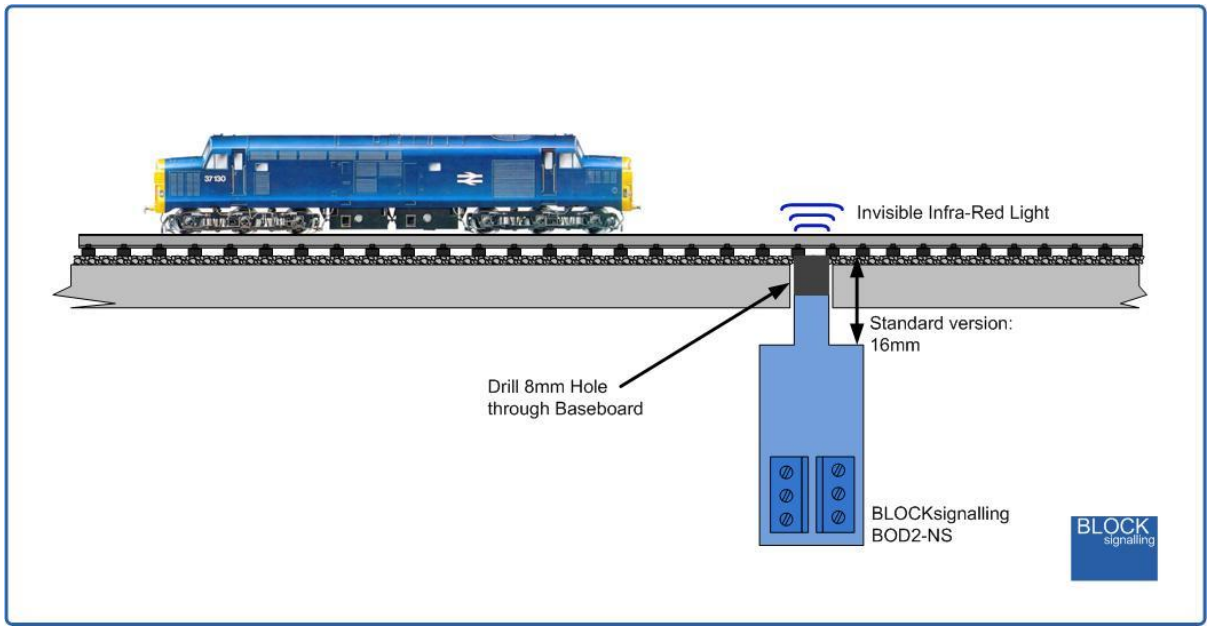
After the train clears the sensor, the module resets to just the first led being illuminated. A delay can be set before this occurs to allow the train indication to remain present for a period, or the indication can immediately reset to the first led being illuminated.

The instantaneous mode is useful for precisely locating a train, for example for uncoupling, whereas the delayed mode gives a train present indication and ignores the gaps between the carriages.

You can power the module from 12V-25V DC, 12V to 16V AC, or from a DCC bus feed. The module reduces the supply voltage down to 12V to feed the signals and external resistors are not required as these are built into the module.

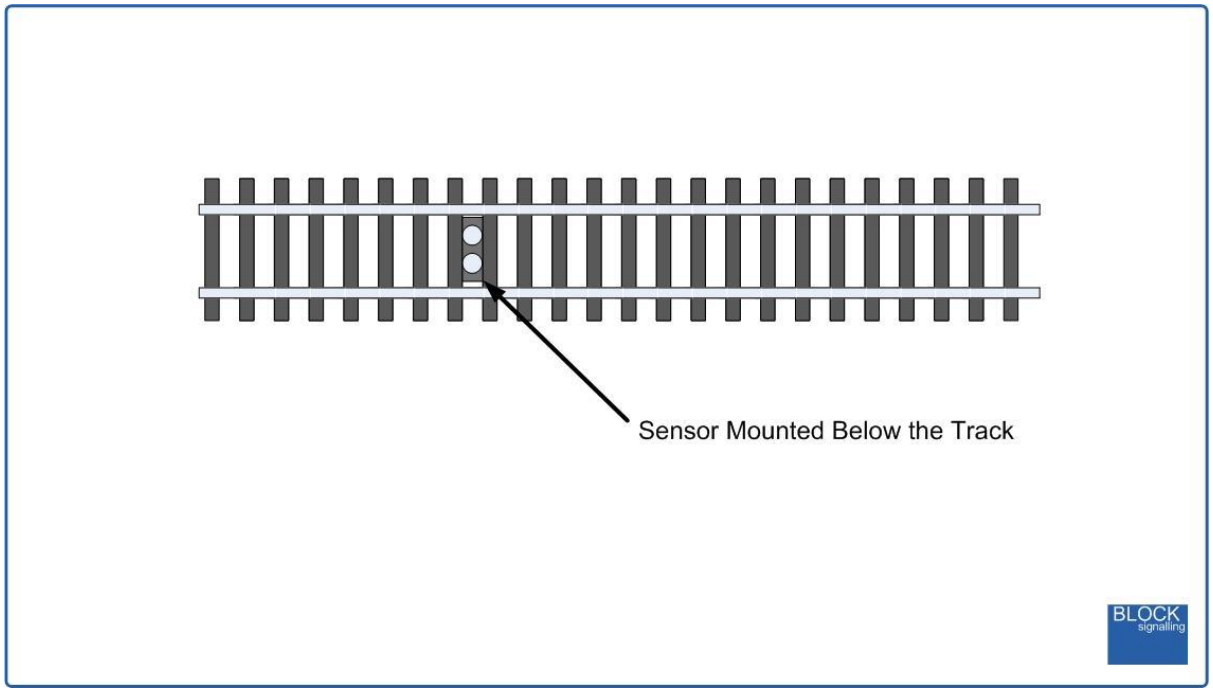
Installation

Simply drill an 8mm hole through the baseboard between the sleepers and insert the sensor from below.



If required, the sensor can be held in place using a small amount of blutack, expanded polystyrene or similar.

The led diameter is 2.2mm, so on smaller scales the leds can still have a clear view between the sleepers.



Power Supply

The module will operate reliably with a power supply in the range of 12V to 25V DC, or 12V to 16V AC, or a DCC feed from the track for example.

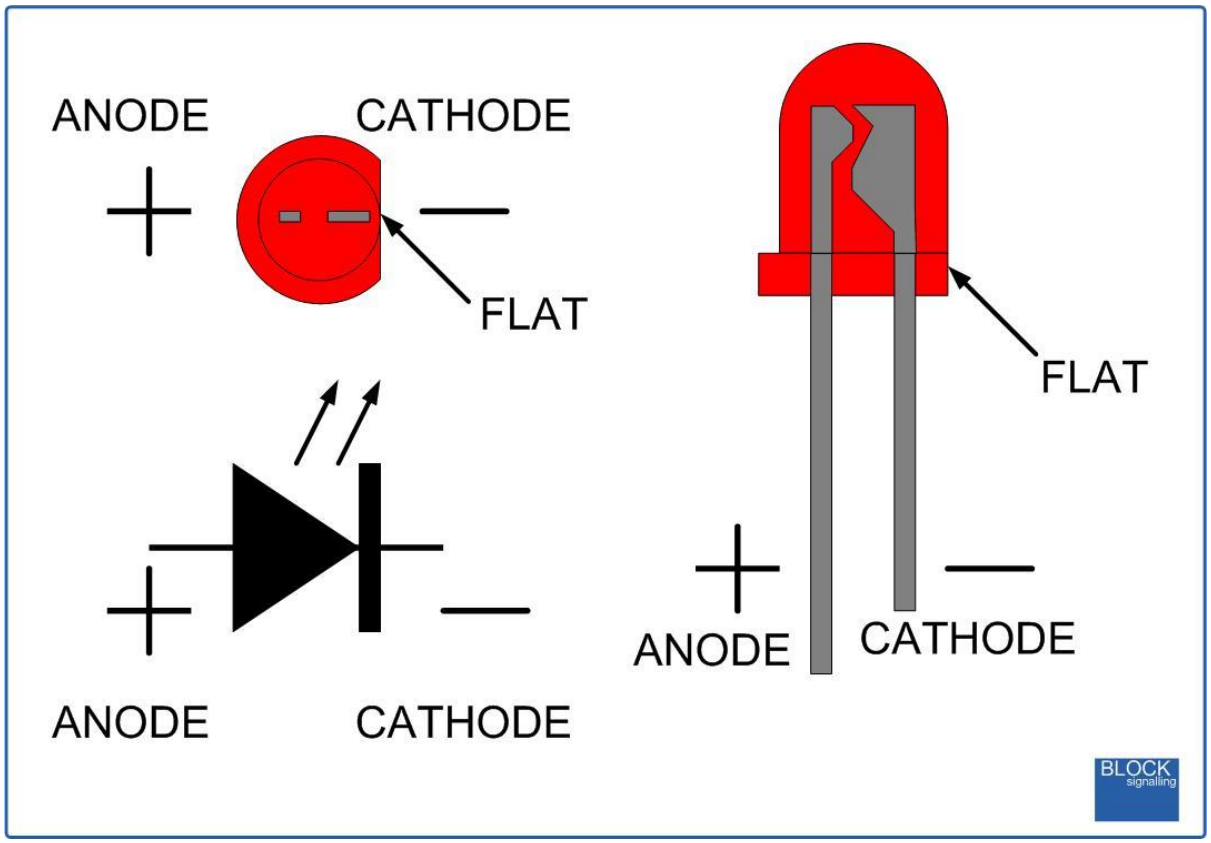
When connecting a DC supply, connect the negative to the GND terminal and the positive to the Vin terminal. If the connections are accidentally reversed, the module will not function, but no damage will result.

When connecting AC or DCC, the connections can be made either way around.

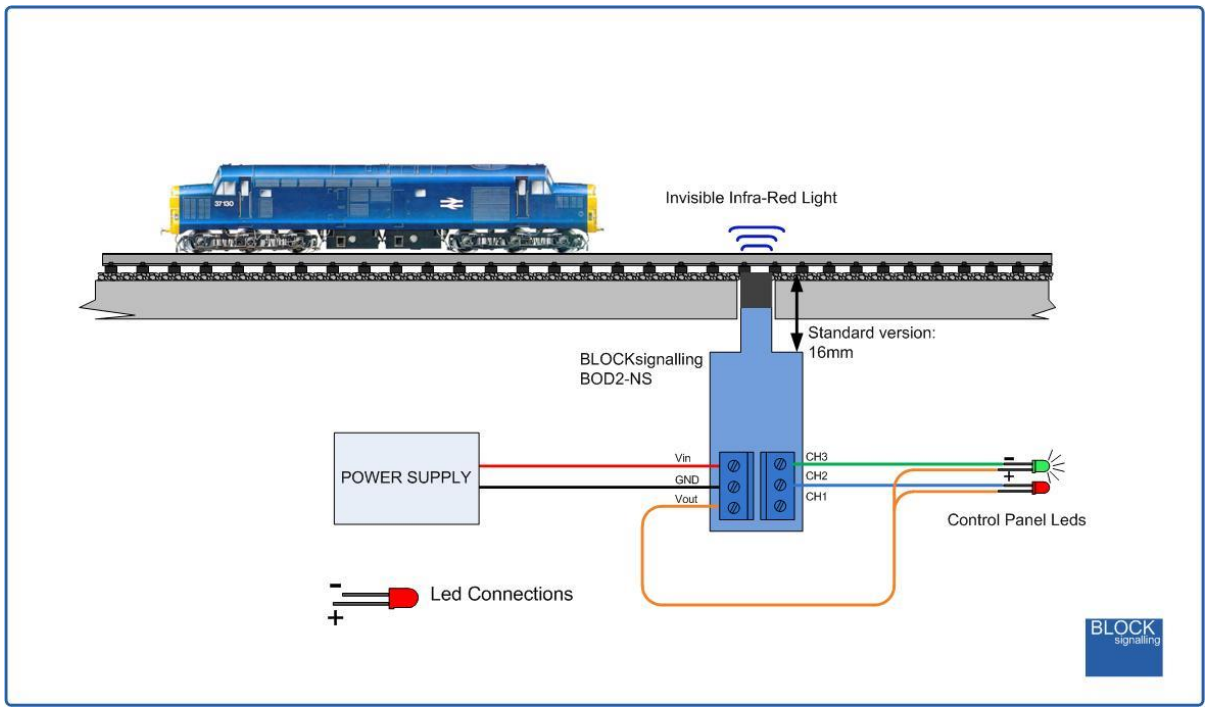
Led Connection

When using leds it is important to connect them the right way around.

The negative lead (cathode) is identified by a flat on the side of the led body, and by having a shorter lead.



Wiring the Module



The module has six terminals.

Vin This is one side of the AC or DCC supply input feeding the module (or the positive feed if a DC supply is being used)

GND This is the other side of the AC or DCC supply input feeding the module (or the negative feed if a DC supply is being used). It is also the signal common wire.

Vout This is a regulated +12V DC output which can be used to feed connected leds and the relay.

CH1 The terminal is grounded to activate the attached relay.

CH2 The terminal is grounded to activate the attached led. This is the "TRAIN DETECTED" led.

CH3 The terminal is grounded to activate the attached led. This is the "NO TRAIN" led.

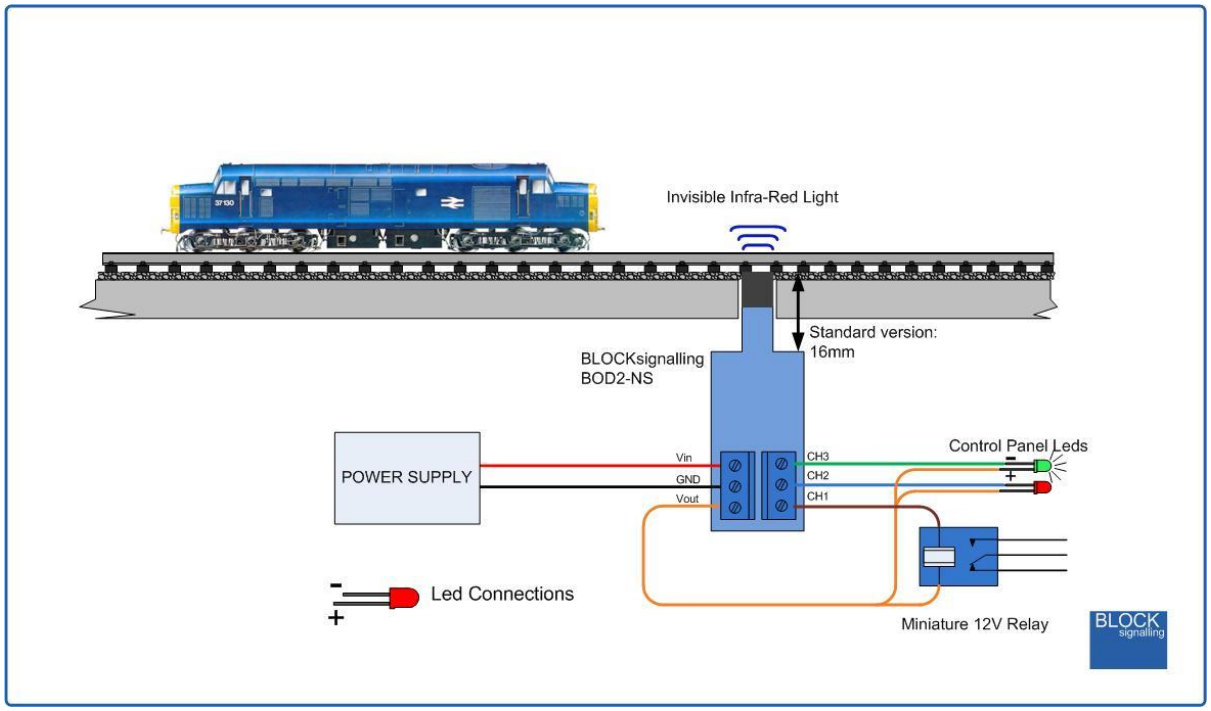
Resistors are built into the module for terminals CH2 and CH3, so no external resistors are necessary. If you already have resistors wired in to your leds, then they can be left in place if you wish, although the led brightness may be slightly diminished.

Connecting a Relay

A miniature relay can be connected to the CH1 terminal.

It is important to use a 12V relay with a coil resistance of at least 400 ohms. Using a relay with lower resistance may cause damage to the module.

It is not necessary to use a diode across the relay coil as one is built in to the module.



Operation

This section describes how the module will operate as supplied, or following a factory reset (see below).

With the power switched on, if the front of the sensor is clear then the red led on the PCB should flicker rapidly. The led connected to CH3 will be lit.

If a train now passes over the sensor, or you place your hand close to the sensor, the led connected to CH3 will extinguish. At the same time the led connected to CH2 will light, and if a relay is connected to CH1 then it will be energised.

As long as there is an object in front of the sensor, the outputs will stay in this condition.

When the object is removed, the led connected to CH2 will extinguish, and if a relay is connected to CH1 then it will be de-energised. At the same time the led connected to CH3 will light.

If the module has been set for delayed operation, then it will operate as follows:

With the power switched on, if the front of the sensor is clear then the red led on the PCB should flicker rapidly. The led connected to CH3 will be lit.

If a train now passes over the sensor, or you place your hand close to the sensor, the led connected to CH3 will extinguish. At the same time the led connected to CH2 will light, and if a relay is connected to CH1 then it will be energised.

As long as there is an object in front of the sensor, the outputs will stay in this condition.

If the object is removed for more than 4 seconds then the led connected to CH2 will extinguish, and if a relay is connected to CH1 then it will be de-energised. At the same time the led connected to CH3 will light.

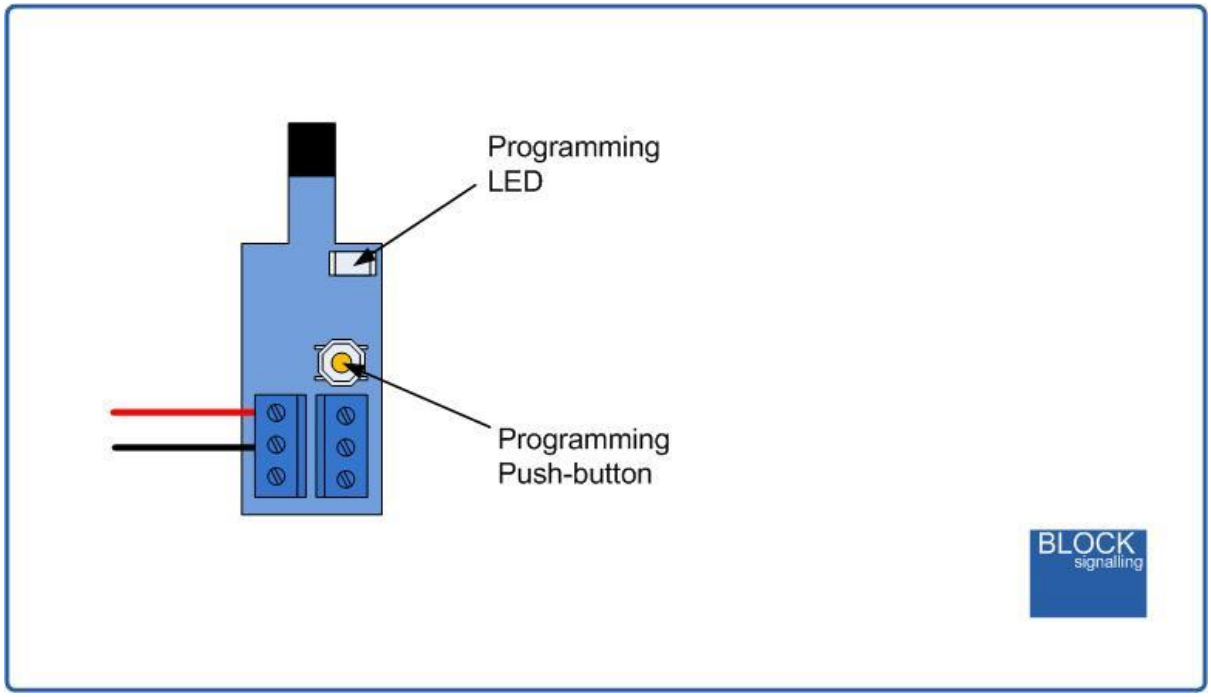
The minimum time the sensor needs to be clear is adjustable.

Programming

The module will operate the signal straight out of the packet.

The default program is to operate in the instantaneous mode, so if you want the delayed mode, you will need to reprogram the module.

Programming is performed holding down the Push Button when switching on the power.



The red led on the PCB flashes at 1 second intervals. When the required number of flashes is seen (see later for the list of possible choices) the button is released to store the first value. At this point the led comes on for five seconds to confirm the value is stored.

The led then starts flashing again, and this time the button needs to be pressed to store the second value.

Once the two values to be stored are entered, the led flashes 10 times rapidly, and the module starts operating.

Most values entered can range between 1 and 255 (see below for limits). If more are seen, or the programming is aborted by switching off, then the programming must be repeated.

Factory Reset

To reset the module back to factory settings, switch off the power to the module and hold down the Push Button. Apply the power and continue holding the push button until **1 flash** of the led is seen. At this point, release the button. You will see a long flash of five seconds.

The led will begin flashing again. When you have seen **1 flash** press the button. You will see a long flash of five seconds and then 10 rapid flashes. The reset procedure is then complete and the module will restart with factory settings, and run in instantaneous mode. If you make a mistake programming, simply repeat the process.

Sensitivity Setting

The module is supplied with the sensitivity pre-set to suit most installations and should not need adjustment.

The sensitivity is factory set to 5, and can be adjusted from 1 to 10 (with 1 being the most sensitive and 10 being the least sensitive).

	Trigger Threshold					
	2	**3**	**4**	**5**	**6**	**7**
Aluminium Foil (shiny side)	170mm	125mm	100mm	95mm	90mm	85mm
A4 White Paper	100mm	65mm	50mm	45mm	40mm	35mm
Matt Black Card	55mm	35mm	30mm	25mm	20mm	15mm
Shiny Black Plastic	45mm	30mm	25mm	20mm	18mm	15mm

To change the sensitivity, switch off the power to the module and hold down the Push Button. Apply the power and continue holding the Push Button until **9 flashes** of the led are seen. At this point, release the button. You will see a long flash of five seconds.

The led will begin flashing again. When you have reached the desired number of flashes to set the new sensitivity, press the button. You will see a long flash of five seconds and then 10 rapid flashes. The programming is then complete and the module will restart. If you make a mistake programming, simply repeat the process.

Performing a factory reset will reset the sensitivity setting back to 5.

Program 1 (LED Test Mode)

This mode can be used to check infra-red sensor, PCB push button and connected leds.

To select this program, switch off the power to the module and hold down the Push Button. Apply the power and continue holding the push button until **2 flashes** are seen. At this point, release the button. You will see a long flash of two seconds and then the led will begin flashing again.

When **1 flash** has been seen press and hold the button. You will see a long flash of five seconds and then 10 rapid flashes. The button can now be released and the programming is complete. The module will start running the program. If you make a mistake programming, simply repeat the process.

After programming, the module tests the infra-red sensor. If there is no object in front of the sensor, the red led on the PCB flashes for approximately 10 seconds. If during this time an object is brought close to the sensor, the flashing rate increases. Once 100 flashes have been signalled the test moves to the next section, below. This part of the test is cleared very quickly if an object is placed before the sensor.

The module will run a sequence as follows:

1. CH1 on, CH2 on, CH3 on.
2. CH1 off, CH2 off, CH3 off.
3. CH1 on, CH2 off, CH3 off.
4. CH1 off, CH2 on, CH3 off.
5. CH1 off, CH2 off, CH3 on.
6. Repeat sequence from 1.

Finally, pressing the push button on the PCB causes this sequence to be cycled at double the rate.

Program 2 (Instantaneous Mode)

When supplied, or following a factory reset, the module operates in this mode. If you have reprogrammed the module to a different mode, then it can be set to instantaneous mode as follows.

To select this program, switch off the power to the module and hold down the Push Button. Apply the power and continue holding the push button until **2 flashes** are seen. At this point, release the button. You will see a long flash of two seconds and then the led will begin flashing again.

When **2 flashes** have been seen press and hold the button. You will see a long flash of five seconds and then 10 rapid flashes. The button can now be released and the programming is complete. The module will start running the program. If you make a mistake programming, simply repeat the process.

Program 3 (Delayed Mode)

When supplied, or following a factory reset, the module operates Instantaneous Mode.

To select this program, switch off the power to the module and hold down the Push Button. Apply the power and continue holding the push button until **2 flashes** are seen. At this point, release the button. You will see a long flash of two seconds and then the led will begin flashing again.

When **3 flashes** have been seen press and hold the button. You will see a long flash of five seconds and then 10 rapid flashes. The button can now be released and the programming is complete. The module will start running the program. If you make a mistake programming, simply repeat the process.

In delayed mode, the holdover time (the time the module ignores gaps between carriages) and the final delay (the time before the module resets back after the holdover has expired) are adjustable.

Holdover Time

As carriages pass over the sensor, there are gaps between carriages which to the module appear as the end of the train. By setting the holdover time, the module will ignore gaps of less than the holdover time, and so ignore the gaps between the carriages.

After the final carriage of the rake passes, the holdover time expires, and the module can then reset after the final delay.

By default, this time is set to 4 seconds which should suit most purposes, but can be adjusted to between 1 second and 255 seconds if required.

Final Delay

After the final carriage of the rake passes, the holdover time expires. There is then a final delay before the module resets.

This is set to 2 seconds, but if necessary it can be adjusted to between 1 and 255 seconds.

A typical use of this delay would be if you had some simple 2-aspect signals connected to the module (green to CH3 and red to CH2). Then when a train passed, the signal would switch to red.

Each time a carriage passed, the holdover time would prevent the signal returning to green.

Finally, when the whole train has passed, and the holdover time has expired, the final delay can be set to provide a realistic period before the signal returns to green again.

Program Flow Diagram

The diagram below shows all the programming options.

Programming is performed by holding down the Push Button when switching on the power.

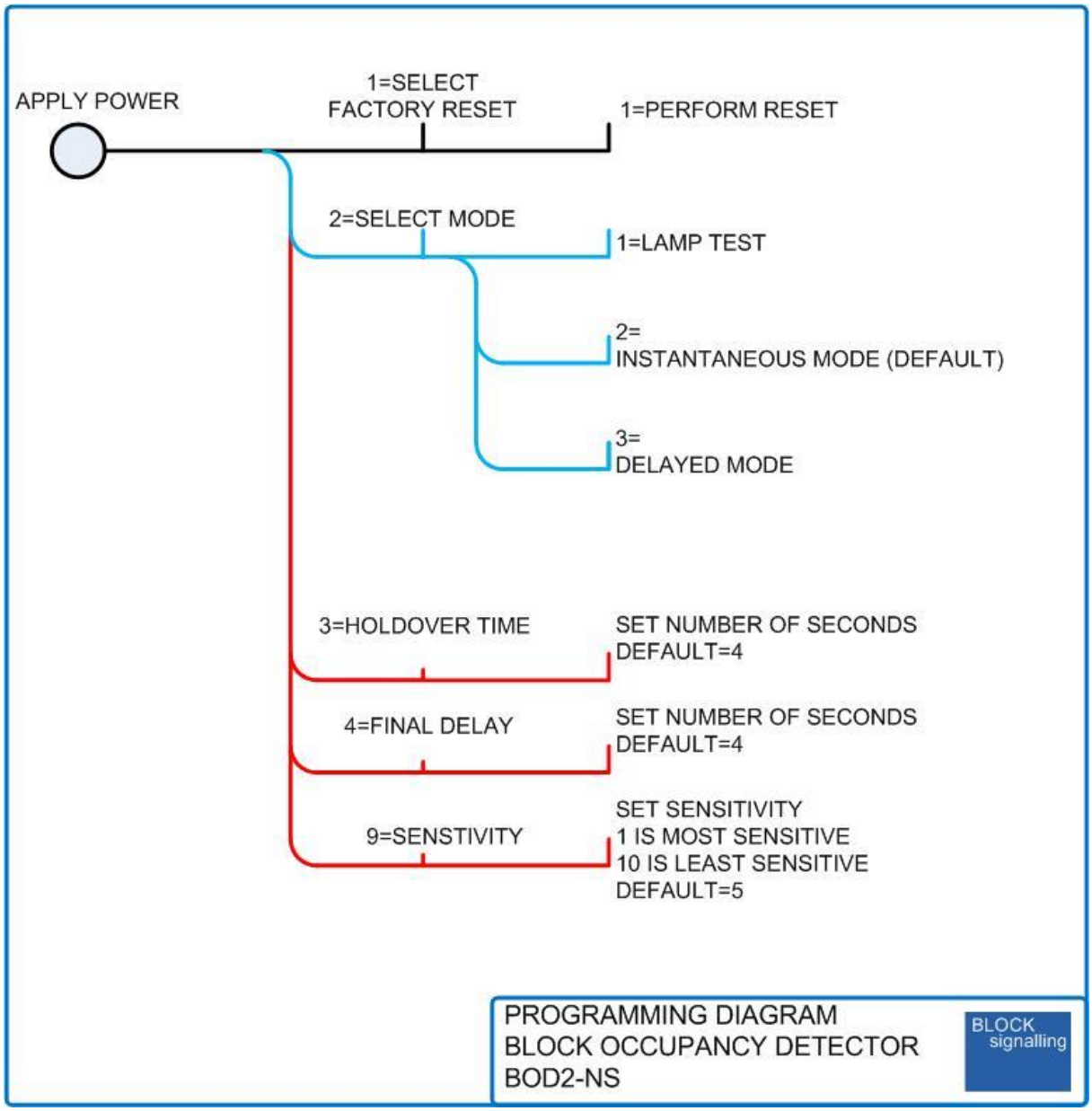
The red led on the PCB flashes at 1 second intervals. When the required number of flashes is seen (see later for the list of possible choices) the button is released to store the first value. At this point the led comes on for five seconds to confirm the value is stored.

The led then starts flashing again, and this time the button needs to be pressed to store the second value.

Once the two values to be stored are entered, the led flashes 10 times rapidly, and the module starts operating.

Most values entered can range between 1 and 255 (see below for limits). If more are seen, or the programming is aborted by switching off, then the programming must be repeated.

Following the diagram is a detailed explanation of all the settings.



Any leds and relays show in diagrams and photos are only to illustrate connections and are not included with the module.