

4/8-Channel, OneTouch, DIN-mount, PWM LED Dimmers: DIM41DIN v2, DIM81DIN v2

- Four or eight independent dimming channels
- Single OneTouch pushbutton for each channel
- Multi-way dimming – dim from multiple locations
- 12V or 24V DC low voltage operation (9 – 32V range)
- Up to 5A load per channel, no minimum load requirement
- Suitable for LEDs, incandescent or halogen lamps
- Suitable for common cathode LED tape/strip
- Drives the lamp on the high (positive) side
- 240Hz high resolution PWM dimming
- Flickerless dimming of lamps and compatible LEDs
- Optional dual power supply operation



Overview

The DIM41DIN v2 and DIM81DIN v2 are self-contained multichannel DIN-mountable dimmers designed to control the brightness of low-voltage incandescent (filament), halogen or LED lamps rated up to 5A per channel. Operating from 12 or 24V DC, and offering a positive (high-side) output, the modules can be used in a wide variety of applications where DC low-voltage brightness control is desired, such as 12V or 24V automotive or marine dash-panels, low voltage architectural lighting, electronic signage, advertising backlighting, hazardous area lighting, etc.

Single Switch “OneTouch” Control Input

Each channel of the dimmers is controlled by a single momentary pushbutton switch. A brief press of the switch will toggle the lamp on or off, and a sustained press will cause the lamp brightness to ramp up or down for as long as the switch is held, repeating until the switch is released at the desired brightness level.

When power to the unit is first applied the last-saved brightness level and on/off state are recalled. This ensures the current brightness level is not lost when power is removed, and any power glitches to the unit will not cause the lamp to suddenly change brightness or on/off state once stable power is restored.

In addition, the brightness ramp direction swaps between switch presses. In other words, if the brightness is currently increasing, the next sustained press of the control switch will cause the brightness to decrease, and vice-versa. This allows the user to adjust the brightness accurately and quickly.

The control pushbutton can be any momentary pushbutton switch, or relay contact. The dimmers are supplied without a switch; a selection of pushbuttons is available separately from Abeltronics.

Multi-way Dimming

An unlimited number of pushbutton switches can be wired in parallel for each channel, allowing full lamp control and dimming from multiple locations in a room.

PWM Dimming

The units employ a very efficient PWM (pulse-width modulation) switching technique to provide excellent operation for high power loads, and the modules will control lamp brightness from 0% (fully off) to 100% (fully on) with no minimum load requirement. The PWM frequency is set at 240Hz, with >30,000 dimming steps.

The PWM output is suitable for constant-voltage (not constant-current) loads. Also, the PWM dimming technique does not change the output voltage: If using 12V LEDs, a 12V power supply will be required.

Please note that the PWM dimming technique may not be suitable for some encapsulated LED lamps containing internal driver circuitry, such as low-energy replacements for dichroic lamps. Also, the modules are not suitable for connection to standard household lighting transformers as these supply AC and not DC voltage.

Dimming Curve

The modules feature our unique cubic-law dimming curve which allows finer control of low brightness levels and compensates for the non-linear response of the human eye. The result is an extremely smooth transition between dimming levels with no visible steps in the dimming response, and the brightness ramp-up and ramp-down is perceived by the eye to be completely linear.

Soft Start

The modules utilise a soft-start feature at power-on, where the lamp brightness increases gradually to the preset brightness setting. This preserves the life of incandescent lamps as the filament is not ‘slammed’ on. The soft-start takes less than half a second.

Mode Input

The ‘Mode’ input controls the operating behaviour of the unit and should be connected during installation. Leaving the Mode terminal unconnected, when the lamp is turned on by a brief press of the control switch it will always initially operate at full brightness. The brightness level can then be changed by a sustained press of the control switch. The lamp will revert to full brightness when the lamp is turned off and back on again.

With the Mode input connected to the +Supply terminal, when the lamp is turned on, the previously stored brightness level is retrieved. The level can then be adjusted with a sustained press of the control switch. When the lamp is turned off, or when power to the module is lost, the current brightness setting is stored for retrieval next time.

Mode Input connected to...	
Unconnected	+Supply
Full brightness at power-on	Previous brightness at power-on

The Mode input affects all channels at the same time – it is not possible to have different channels operating in different modes.

Power

The power supply to the unit typically comes from a suitably rated low-voltage DC supply in the range 9 – 32V which must be fused at the total load current or less to protect the module.

If using switched-mode power supplies, we recommend overrating the power supply by 1.5x. For example, if the total load of all the channels powered by the power supply is 200W, use a 300W power supply. The dimmer connection diagrams are shown on the following pages. Note the multiple cables leading from each +Supply terminal to fuse on the power supply positive output. This is necessary to ensure the dimmers can control the load with maximum efficiency.

The dimmers are suitable for direct connection to automotive or marine systems of 12V or 24V nominal. The configuration is similar to the diagrams below, except the 12V/24V power supply is substituted for the vehicle's, or vessel's, battery.

Dual Power Supplies

The dimmers have split internal construction where two power supplies can be used, each to power half the dimmer. In the case of the DIM41DIN v2, the left-hand +Supply terminal powers channels 1 and 2, and the right-hand +Supply terminal powers channels 3 and 4.

For the DIM81DIN v2, the left-hand pair of +Supply terminals powers channels 1-4 and the right-hand pair of +Supply terminals powers channels 5-8. (This is in contrast to the original version of the DIM81DIN where all four +Supply terminals are internally connected together).

Since the dimmers are capable of significant load currents, this flexibility allows two smaller power supplies to be used in the place of one much larger unit.

Each half of the dimmers can run at a different supply voltage if desired. For example, channels 1-4 of the DIM81DIN v2 can operate from 12V, and channels 5-8 can operate from 24V.

In addition, each half of the dimmers can be powered on or off independently. For example, in an automotive/marine application, channels 1-4 of the DIM81DIN v2 could be connected to a permanent supply, whereas channels 5-8 could be ignition switched.

Fault Protection

The dimmers feature rugged internal overcurrent and over-temperature protection and are fully protected against intermittent output short-circuits, over-temperature, reverse polarity, and input over/under voltage. If the units detect a short-circuit load, the output of the respective channel will switch off for 30 seconds before trying again.

The overcurrent detection response has been specifically designed to allow for the high inrush current of most incandescent lamps, but certain large lamps may cause false triggering of the protection. It is recommended that the load be de-rated under these circumstances.

The units also feature two levels of thermal protection. If the internal channel temperature rises above approximately 80°C the unit will switch off that channel for 30 seconds. If the internal temperature continues to rise above 125°C, the internal thermal fuse will permanently trip, the faulty channel will be permanently deactivated and the dimmer will need to be replaced.

Mounting and Connection Guidelines

The dimmer is packaged in a vented DIN-mount enclosure and will run warm in operation when controlling loads above 3A per channel. It is important therefore to mount the dimmers in a suitably ventilated enclosure, ensuring the module's vent holes are unobstructed during use. The unit should be mounted in a cool location, away from external sources of heat. The unit is not water resistant and should be mounted away from sources of moisture.

Connection terminals are high quality rising-clamp terminal blocks capable of receiving up to 4mm² cable. The connectors are spaced 5mm pitch along opposite sides of the enclosure. To maximise the potential of the dimmers, cable rated at currents exceeding the lamp load by 1.5 times should be used to connect the modules, and the use of a bootlace ferrule at each terminal is strongly recommended.

DIM81DIN v2 Changes Summary

The DIM81DIN v2 is an upgraded version of the DIM81DIN we have sold for many years. The differences are as follows:

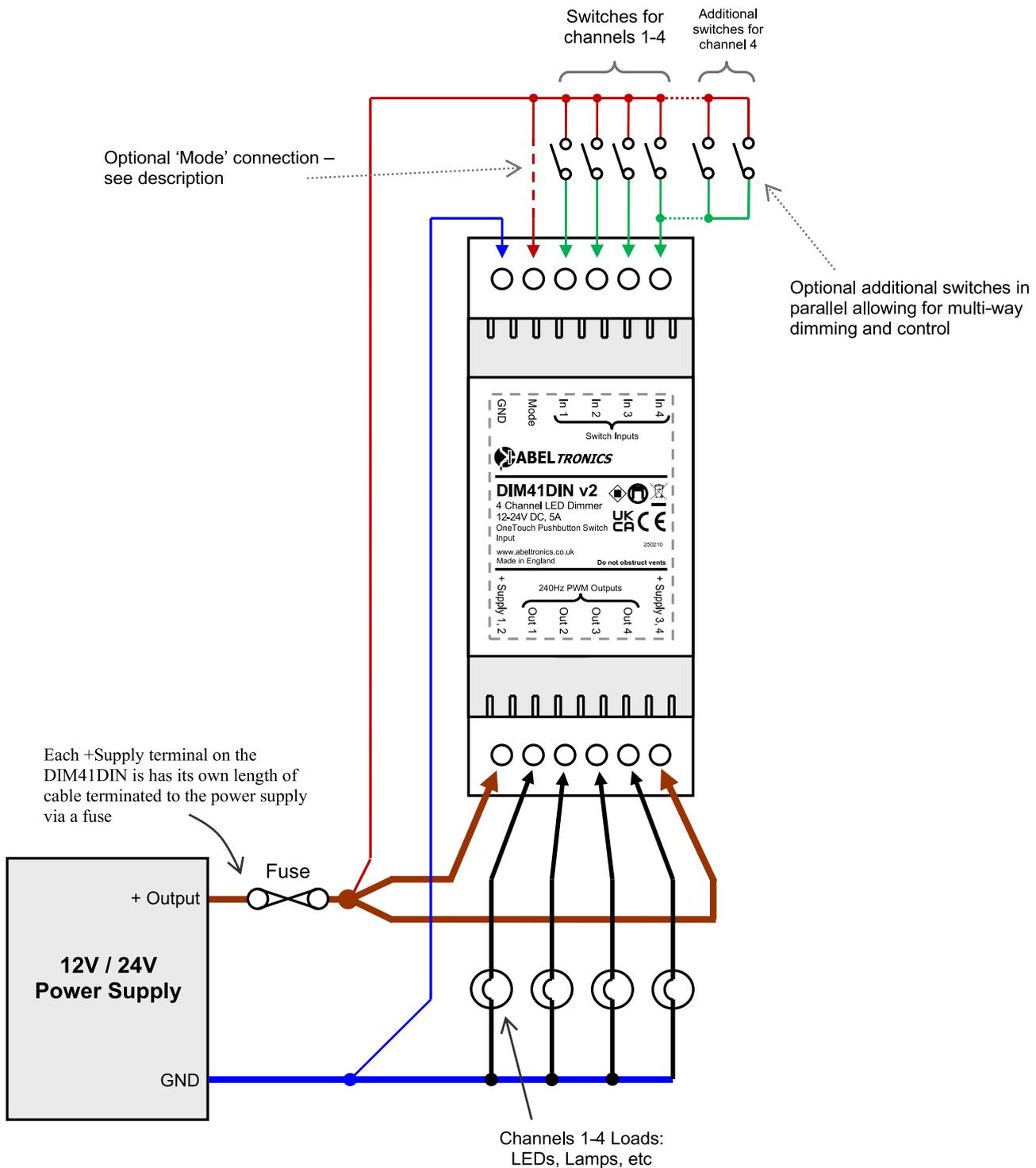
- Split power supply operation – the DIM81DIN v2 can be powered from two independent power supplies
- PWM Synchronisation – each channel's PWM output is synchronised to each other whereas on the original DIM81DIN they were completely independent.
- 'SIG GND' connection – one of the 'Mode' terminals on the original version of the DIM81DIN has been repurposed as a signal ground connection which is internally connected to the GND terminals.

DIM41DIN v2 Connection Drawings

4 Channels, Single Power Supply

Shown below is the connection diagram for the DIM41DIN v2 using a single power supply for all four channels.

The fuse shown in the positive output of the power supply should be rated at the total load of the dimmer.

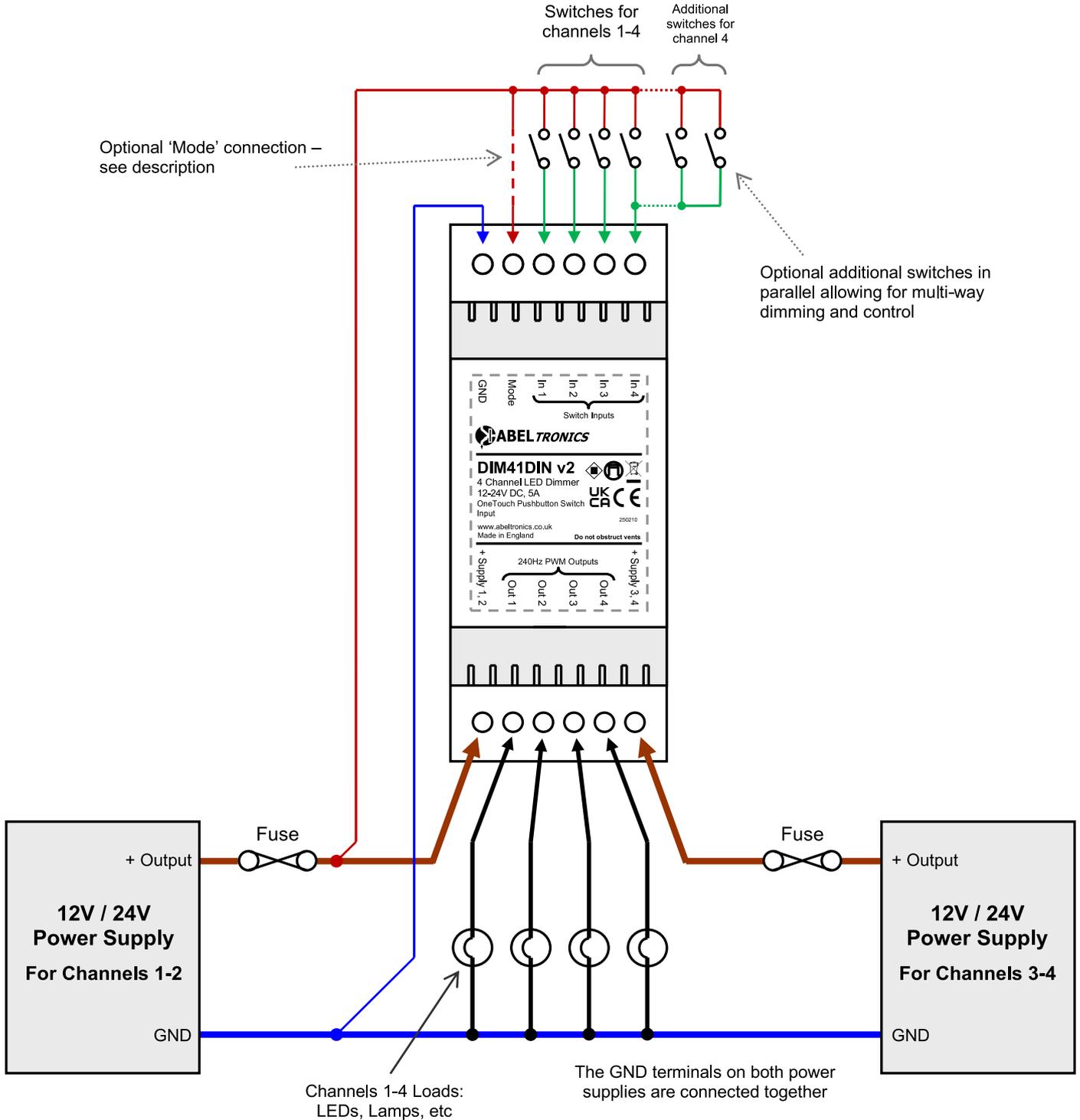


4 Channels, Dual Power Supplies

Shown below is the connection diagram for the DIM41DIN v2 using two power supplies. The total load is therefore split across **both** power supplies.

The fuse shown in the positive output of each power supply should be rated at the total load of the respective half of the dimmer.

The brightness control switches are shown connected to the left-hand power supply, but could be connected to the right-hand power supply instead.

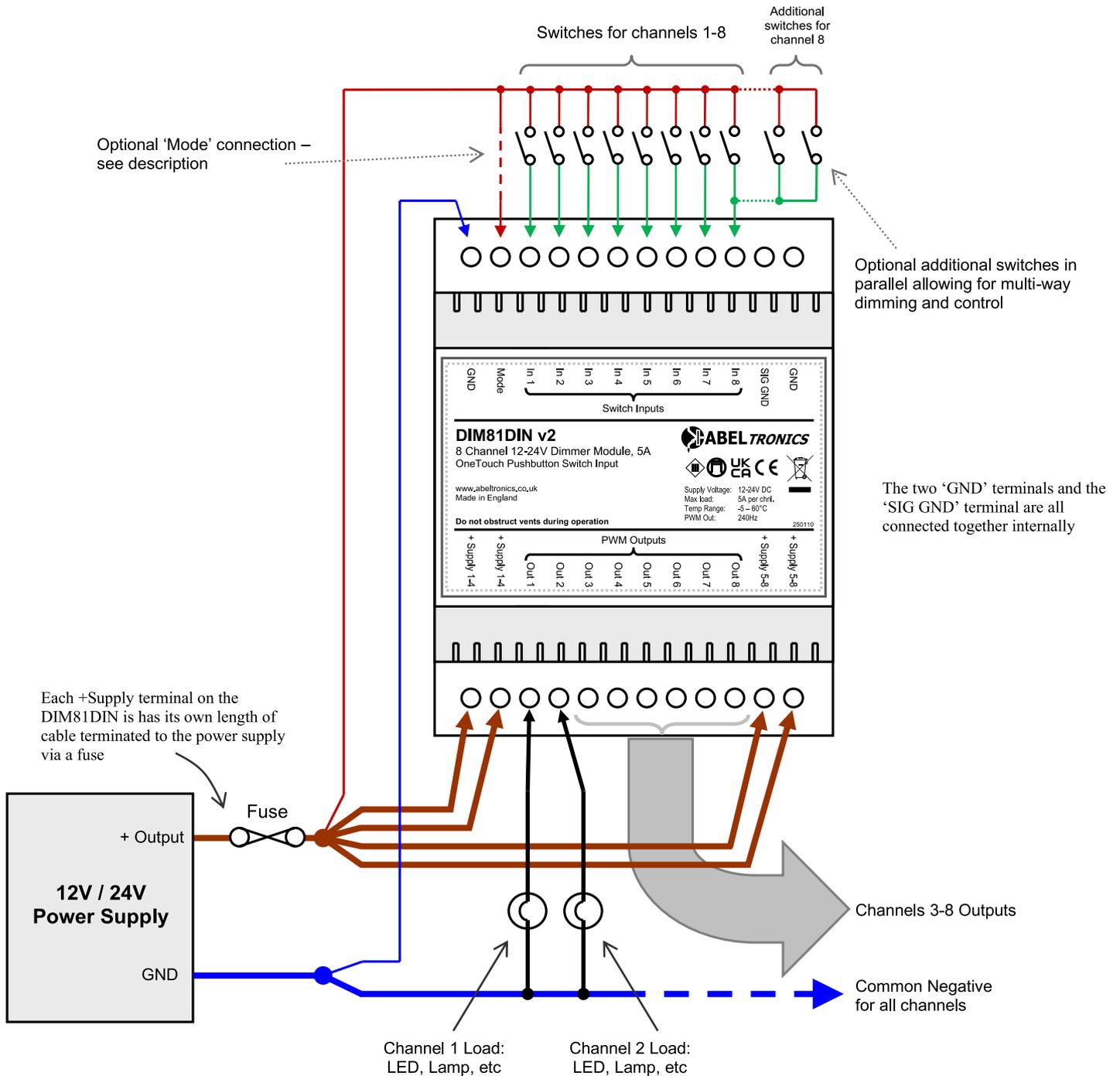


DIM81DIN v2 Connection Drawings

8 Channels, Single Power Supply

Shown below is the connection diagram for the DIM81DIN v2 using a single power supply for all eight channels.

The fuse shown in the positive output of the power supply should be rated at the total load of the dimmer.

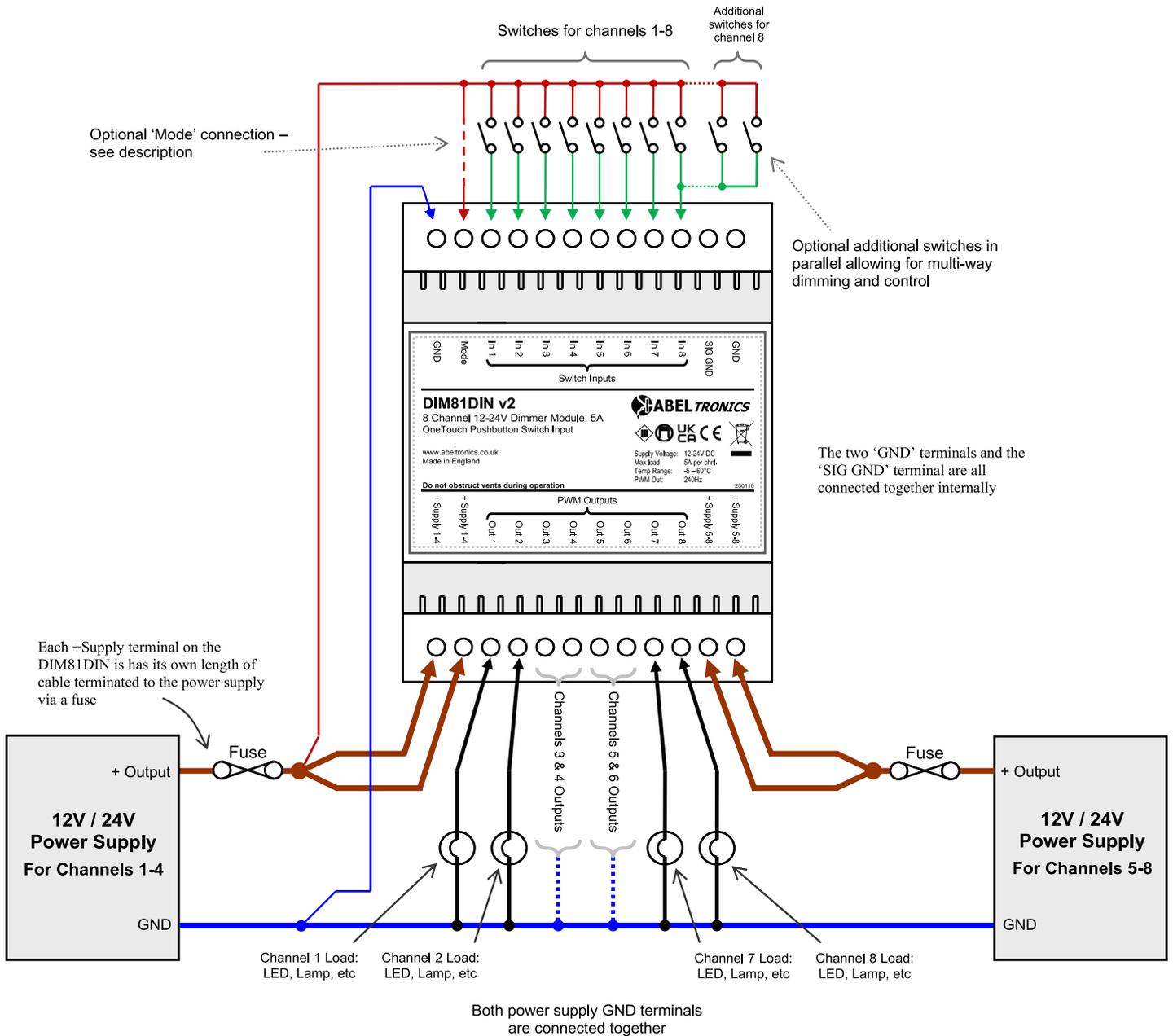


8 Channels, Dual Power Supplies

Shown below is the connection diagram for the DIM81DIN v2 using two power supplies. The total load is therefore split across **both** power supplies.

The fuse shown in the positive output of each power supply should be rated at the total load of the respective half of the dimmer.

The brightness control switches are shown connected to the left-hand power supply, but could be connected to the right-hand power supply instead.

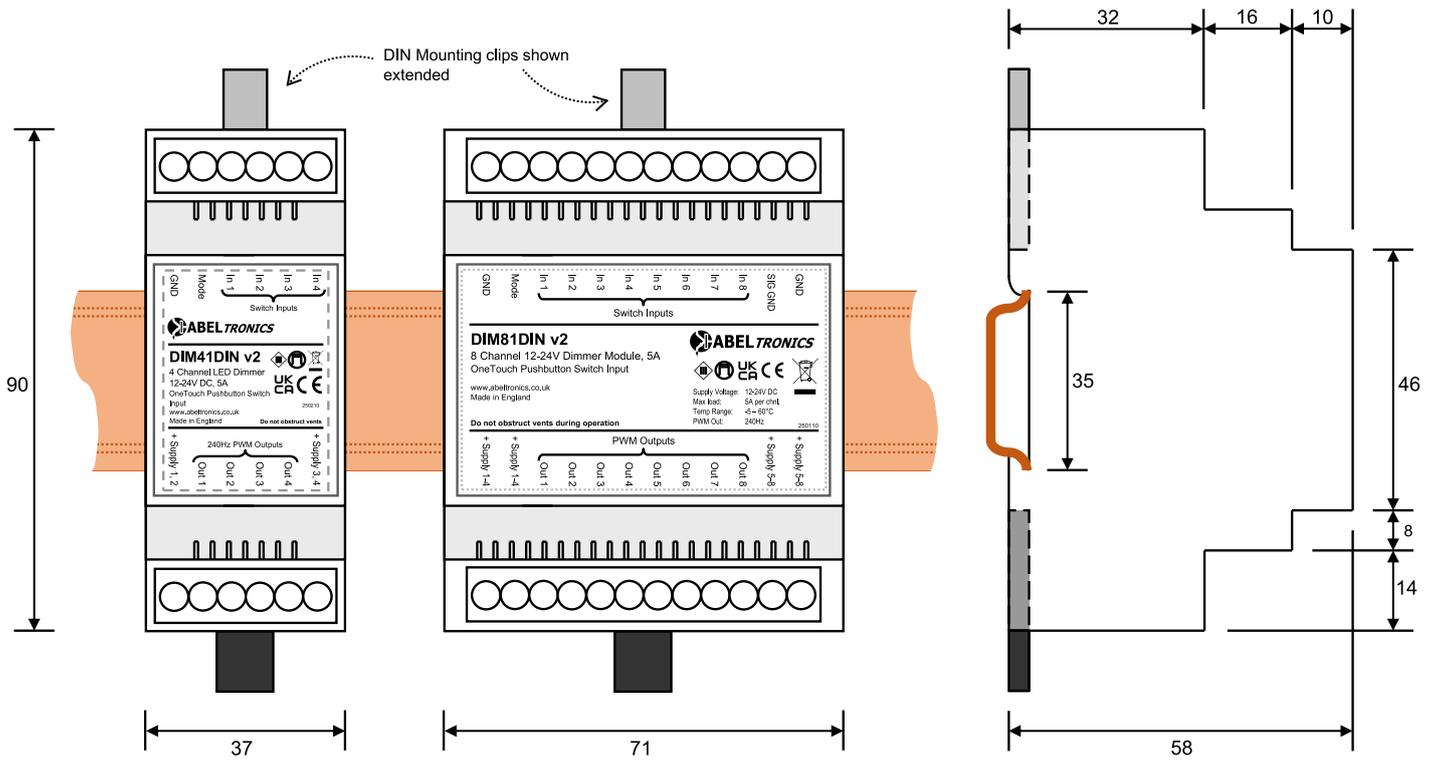


Physical

The units are each supplied in a vented enclosure designed to be mounted to standard 35mm DIN-Rail as per EN 60715. DIM41DIN v2 is supplied in a 2-unit wide enclosure; DIM81DIN v2 is supplied in a 4-unit wide enclosure.

Do not obstruct the vents during operation.

The unit can also be mounted to a flat surface by extending the DIN mounting clips, as shown below, to reveal screw holes.



All dimensions in mm. ± 1mm

Specifications

Parameter	Value	Comments
General		
Nominal Supply Voltage Range	12 – 24V DC (9 – 32V DC Operational Range)	
Peak Supply Voltage Range	5.5 – 40V DC	Operation not guaranteed
Quiescent Current, max	40mA	at maximum operating voltage
Maximum Output Current	5A per channel	at <30°C ambient temperature
Maximum Load Power	60W at 12V supply, 120W at 24V supply, per channel	at <30°C ambient temperature
Peak Output Current	30A per channel	<3sec at nominal operating voltage
Control Input Type	Single Pushbutton Switch – OneTouch	Independent control for all channels
Control Input Impedance	10 kΩ for each ‘Switch’ input >1 kΩ for ‘Mode’ input	Impedance of all control inputs
Efficiency	> 97 %	
PWM Switching Frequency	240 Hz ±3%; 0% – 100% Duty Cycle	
PWM Temporal Resolution	< 200ns	
Physical		
Terminal Cable Acceptance	0.2 – 4.0mm ² (30 – 12AWG)	Rising Clamp Terminal Block
Terminal Torque	0.5Nm	
Enclosure, DIM41DIN v2	2-Unit DIN-Mount Polycarbonate, UL94-V0	Fits 35mm DIN Rail to EN 60715
Enclosure, DIM81DIN v2	4-Unit DIN-Mount Polycarbonate, UL94-V0	
Environmental		
Protection Index	IP20	
Ambient Operational Temperature Range	–40 – 70°C (–40 – 160°F)	Derate loads linearly above 40°C (104°F)
Maximum Humidity	10 – 90%RH non-condensing	
RoHS and REACH Compliant	Yes	

Product Pages

DIM41DIN v2: www.abeltronics.co.uk/products/dim41din

DIM81DIN v2: www.abeltronics.co.uk/products/dim81din

Associated Products:

Single-channel Version: www.abeltronics.co.uk/products/dim11din

10A single-channel Version: www.abeltronics.co.uk/products/dim11

More dimmers: www.abeltronics.co.uk/products/dimmers