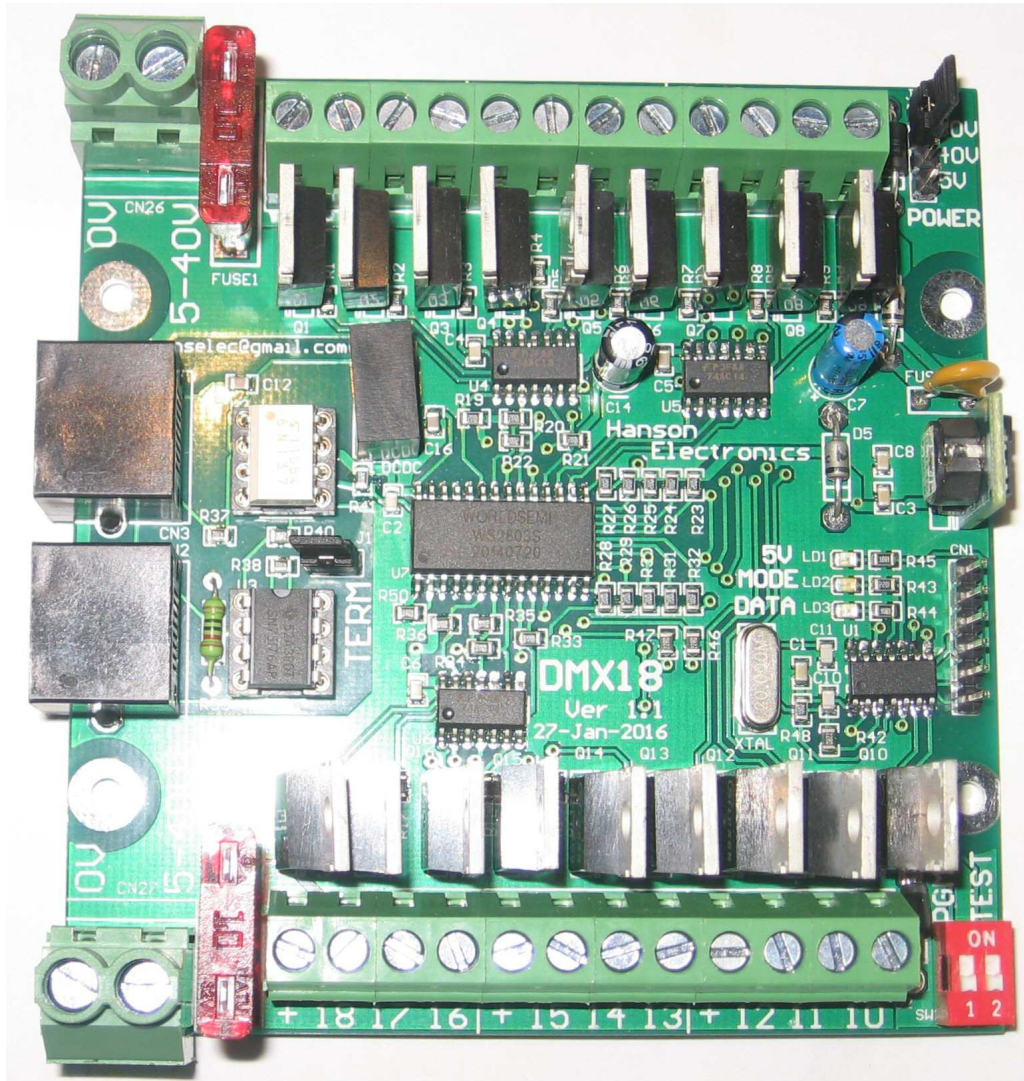


DMX18



USER MANUAL

Features

- The DMX18 controller receives DMX data input and drives 18 DC channels.
 - Dual DC input (5V, 7 - 40V) (large screw terminals)
 - 2x 30A (max) ATO blade fuses (30A overall max per 9 channels). Supplied with 10A fuses
 - 18 DC outputs (5A max per channel). Common anode (common positive) configuration.
 - Output terminals arranged as +, Ch, Ch, Ch (particularly suits RGB)
 - True electrically isolated DMX input with ESTA pinout (2x RJ45 sockets for looping)
 - Remaining zone will continue working if a fuse blows
- PCB size is 91mm x 95mm

Connections

Dmx Data

There are 2 RJ45 dmx sockets on the board. These are designed for loop in and loop out. The DMX18 uses the ESTA pinout. If connecting to a LOR device (dongle or controller) a crossover cable or adaptor will need to be connected in between.

If the DMX18 is the last dmx device on the dmx cable then the signal should be terminated with the termination jumper. Basically if only 1 cable is plugged in to the dmx sockets then the termination jumper should be installed. If both sockets are used then the termination jumper should be left off. ONLY the last board on the daisy chain should have the termination resistor in use.

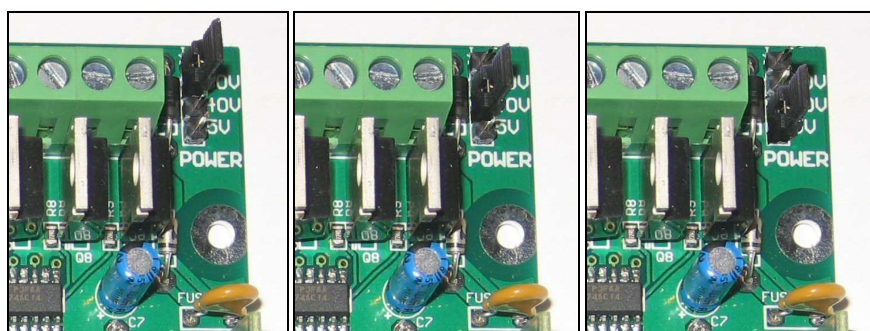
DC Power Input

The 2 large 2 way green connectors are the DC inputs from your power supply. Each of the 2 zones of 9 channels can use a separate power supply or you can feed them both from one common power supply. Separate wiring (back to the power supply) for each of the zones is recommended to minimise voltage drop. The + terminals are positive and the - terminals are negative. The board will run of a DC voltage up to 40V. The negative (-V) terminals are commoned between the 2 zones so this must be taken into account when wiring up to the power supply/supplies. Both of the zones has a standard ATO (automotive) fuse adjacent to the power terminals. The DMX18 comes supplied with 10A fuses fitted. Fuses up to 30A can be used. It is recommended changing the fuse to the closest size for the total current that the zone will be supplying.

Power Selection

At the top right of the pcb there is a jumper for setting the working voltage of the pcb. The jumper should be set according to whatever the highest voltage is that will power the pcb. There are 3 settings for the voltage 5V, 30V and 40V. In the 5V setting both zones should be ran off 5V (or 1 can be a lower voltage if required). The 30V jumper setting should be used if the highest voltage on either zone is in the range 7-30V.

The 40V jumper should be used for voltages in the 30-40V range. The 40V jumper can be used for voltages as low as 20V. **Installing this power jumper on the incorrect voltage setting may damage the pcb.** The DMX18 will have the jumper installed on the 30V jumper by default.



30V power position

40V power position

5V power position

Dimmer Outputs

There are 18 channel outputs; 9 per side. Each side can be run at the same, or a different supply voltage. A DC voltage in the range of up to 40V can be used for each of the banks.

The maximum load per channel is 5 Amps, but the overall limit per bank/zone of 9 outputs is 30 Amps. This means that you can't turn on all 9 outputs of a zone with the maximum load. In reality, this should not be a problem as most loads will be less than 2 Amps.

There are 18 dimmer outputs which are in banks of 9 with each zone of 9 fused separately. Each group of 3 outputs is grouped into 4 terminals. These are the 3 outputs and a common positive. RGB lights with a single common anode should have the common wire connected to the terminal + (the 4 banks have common -ve terminals) and the red, green and blue wires to channels 1,2,3 (or 4,5,6 etc). The order and specific channels is actually dependant on what is configured in your sequencing software. For lights that have single colours (or single channels) per pair of wires then 1 wire gets connected to the + and 1 gets connected to the channel output. For led lights which require the polarity to be around the right way then the anode (positive) gets connected to + and the cathode (negative) goes to the channel. For lights that do not have three channels commoned then 3 wires will be joined and fitted to the + for the 3 channels.

If inserting stripped bare wires into the channel connectors ensure that they aren't too long. If the wires are too long it may be possible to pass a wire completely through the connector and short out electronics on the other side of the connector. Only very fine wire of lengths greater than about 15mm could allow this to occur.

See the Connection Examples section for the various methods of connecting lights.

ICSP Connector

An ICSP (in circuit serial programming) header connector is provided for initial programming of the microprocessor and for program (firmware) updates.

USING THE DMX18

Status Leds

There are 3 small LEDs near the centre of the PCB adjacent to the micro.

Red led:- 5V Power, Blue led:- MODE, Green led:- DATA

-Red led	5V power	
-Blue MODE led flashing slowly.	Green DATA led off.	Test mode
Test mode takes precedence over normal running so errors/status message		other than test mode won't be displayed if in test mode.
-Blue MODE led on solid.	Green DATA led flashing 10 Hz.	Normal run mode. Dmx packets being received
-Blue MODE led on solid.	Green DATA led off.	Normal run mode. No dmx data
-Blue MODE led flashing 10Hz.	Green DATA led off.	PGM/Address setting mode. No valid address yet
-Blue MODE led flashing 10Hz.	Green DATA led on.	PGM/Address setting mode. Valid address received

Start Channel

The start channel is set via the PGM switch and data being sent to the board. DMX addresses can be anywhere between 1 and 512. The address of the DMX18 can be anywhere in the range of 1 to 495 (a start address of 495 uses the addresses from 495 to the maximum 512). If the address is set outside of this range an error is indicated via the 2 status leds. See **Status Leds**. The start channel can be changed at any time by turning on the PGM switch and sending the data. The start address is sent and stored as 2 8 bit numbers. For a start address of 1-255 the 2nd address/channel should be 0. For addresses over 255 (255-495) the 2nd start address channel is set to 1 and the 1st address channel is set to the start address minus 255.

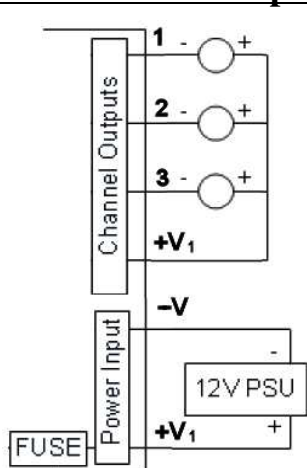
When you receive your DMX18 it will have a DMX start address of 1. That is, it will respond to channels 1 to 18. To change the start address perform the following procedure:

- Power up the DMX18.
- Connect a DMX source of DMX data like a sequencer, test software or dedicated start channel programmer (like da_start from http://www.da-share.com/software/da_start/) etc that you can set at least channels 1 & 2 to a DMX address to the full 0-255 range (not a 0-100% setting)
- Set DMX channel 1 to value 1..255 to the required setting for the new DMX start address
- Set DMX channel 2 to 1 if the new DMX start address is above 255
- Turn on the PGM dipswitch. The MODE led will flash and the DATA led will be off.
- After a valid start address in the range of 1-476 is received the DATA led will turn on. The new DMX start address is then stored in the EEPROM
- Turn off the PGM switch and the DMX18 is ready to use with the new start address.
- If using da_start then ensure DMX18 is selected to allow the correct address range is selectable

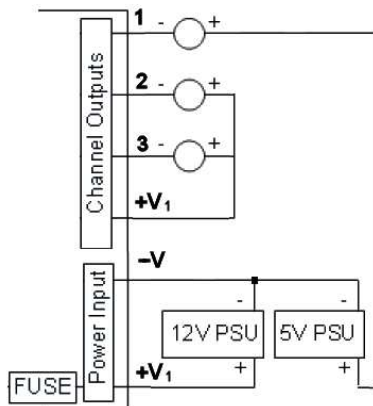
Test Mode

There is a switch which places the control into a test mode. In this mode a test program runs and all 18 outputs are cycled through. This mode allows for soak testing of lights without the need for a source of dmx data. The control will cycle through 12 modes of testing from 1 channel on at a time, through all reds on, all greens etc. A number of the test modes are for RGB 3 channel lights.

Connection Examples



Typical connection arrangement showing 3 leds and a 12V power supply. The lights can be single colour, multicolour, RGB or whatever. For individual lights with 2 wires the positive wires would be joined and connected to the +V terminal.



Connection example showing channel 1 connected to a second power supply. This method is used where lights other than the main power supply voltage is needed. This method can be used for ACL strobes or similar devices. The primary power supply powering the DMX18 needs to be in the range of 5V to 40V DC. The secondary power supply can

be any voltage up to a maximum of 60V DC. This method can also be used if an output is used to control a relay at a voltage other than the supply voltage.

As it possible to run the DMX18 off 2 different power supplies a light on 1 zone can be powered by the supply on another zone.

Connecting DMX boards

DMX is an implementation of an RS485 network. It is commonly connected via Cat5 or Cat6 RJ45 patch cables or 3 core cable with 3 pin or 5 pin Cannon connectors when used for stage equipment. The normal method of connection is from a data source daisy chained from controller to controller before the final board is terminated either via an onboard termination or via a connector with a 120 Ohm resistor in it.

In general most DMX boards will have 2 DMX connectors. These are connected directly in parallel and it doesn't matter which is used for the data in and which is used for the data out. There are 2 exceptions to this general rule. Some cheap Chinese DMX modules only have a single point to connect the DMX data too and it is necessary to tee off at that point to other boards. The other exception is some stage type DMX devices that have a Master and a Slave connector. This is because there is internal electronics that allow the device to generate effects that can be sent downstream to other devices.

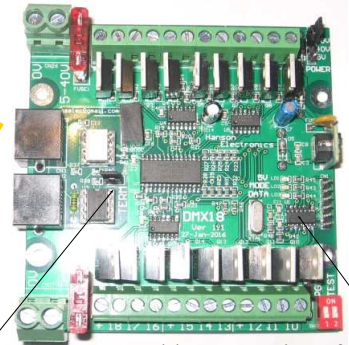
All devices on a DMX cable are on the same DMX universe and that is configured on whatever is sending out the data, not on the devices. All DMX devices have a "start address". This is the 1st address that the device uses and it will use that address and the next "n" data bytes. The cabling order of DMX devices doesn't matter. The only requirement is that the final device is terminated to prevent data issues. Terminating any other device is likely to cause data reliability issues.



USB dongle connects to PC, Pi or BBB

Connection via Cat5 patch cables.
Max 1200m(theoretical)

No termination on these boards



Start address set via software

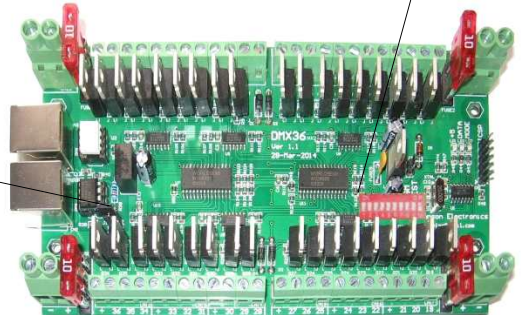


Start address set via dipswitches



Alternately the DMX can be sent from rPi-28D or E1.31 pixel controller that has DMX output/s

This board terminated

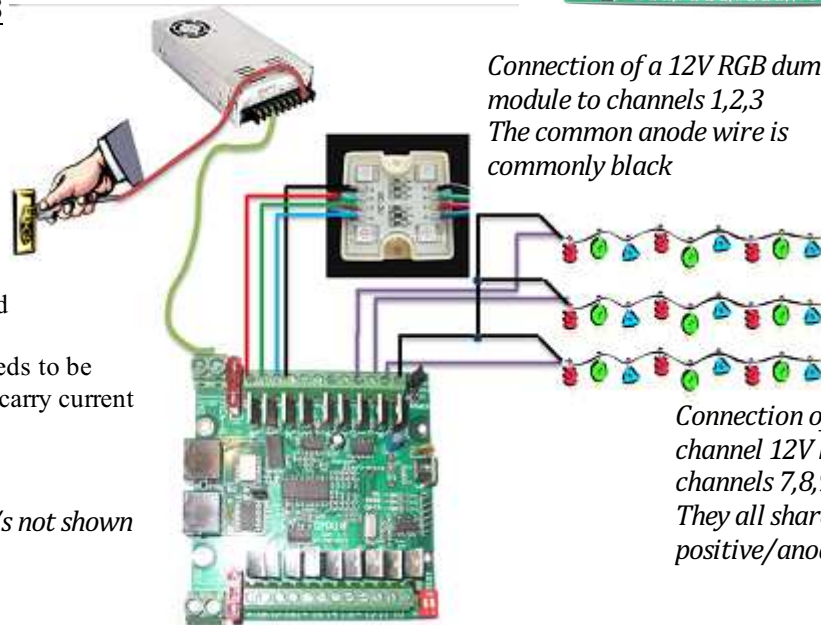


Connecting lights to DMX18

12V DC power supply as this example uses 12V lights. 5V-35V can be used

-V (GND) and +V (power)
Wire size needs to be sufficient to carry current

DMX network connection/s not shown



Connection of a 12V RGB dumb module to channels 1,2,3
The common anode wire is commonly black

Connection of 3 single channel 12V lights to channels 7,8,9
They all share the positive/anode connection

Firmware Updates

Firmware update can be loaded through the ICSP header with a Pickit3 (or PicKit2) pic programmer. Pin 1 of the ICSP header is marked on the pcb and is shown to the left. Ensure the pin 1 (the arrow) of the header is aligned with pin 1 of the programmer.

Via MPLAB

MPLAB must be installed. It is available from microchip.com

Plug your PicKit 3 into a spare USB port, then start MPLAB X IDE (or version 8.84 or whatever). Once it has loaded, click Configure > Select Device to bring up the device selection window. From the device drop-down list, select PIC16F1823 and click OK.

A dialog saying "New firmware must be downloaded for PicKit 3 to work with the part selected." may pop up at this stage. If it does, click OK and wait for MPLAB to download the programming firmware to the Pickit 3. You will see some activity in the PicKit 3 tab of the output window for up to a minute or so. When MPLAB is ready you will see "PicKit 3 Connected" and possibly an error stating "PK3Err0045: You must connect to a target device to use Pickit 3". This is not a problem and just a warning that the PicKit 3 cannot "see" the chip yet.

Then, click File > Import and browse to the DMX18 1.0 HEXFILE.hex file (latest version at time of writing) and click Open. The last line of the build tab of the output window should read "Loaded C:\...DMX18****.HEX."

Now, connect the PicKit 3 the 6 pin ICSP header next to the micro. Make sure the arrows on the Pickit 3 and the 6 pin header are aligned. Then power up the DMX18. The PicKit 3 tab of the output window should now read "Target Detected".

Click Programmer > Program to initiate the ICSP operation. The PicKit 3 tab of the output window will show "Programming...", then "Programming/Verify complete" once it is done. Disconnect the PicKit 3. The PicKit 3 tab of the output window will show "Target Removed".

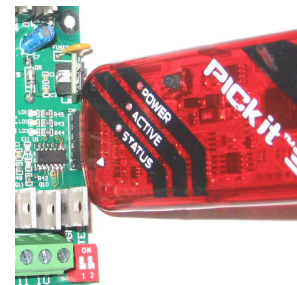
Via "Programmer To Go" feature of PicKit3

If a PicKit 3 has been preprogrammed with firmware then all is required is that the DMX18 board is powered up. Plug the PicKit3 onto the header as shown above. Power the PicKit3 by plugging it into any usb socket. The power led on PicKit will light, the status led will be green and the blue active led will be flashing. Press the pushbutton. The status led will turn red, the active led will turn solid red. When then Status led turns green again and the blue Active led starts flashing the firmware has been updated.

Via "PicKit 3 Programmer" software

The Pickit 3 programmer software can be downloaded at <http://ww1.microchip.com/downloads/en/DeviceDoc/PICKit%203.3.0%20Setup%20A.zip>.

Extract and run in. Select PIC16F1823 as the Device. Select File>Import Hex> and browse to the DMX18 1.2 HEXFILE.hex file (latest version at time of writing) . Plug in the PicKit 3. If the DMX18 is powered then click on write and it will update the firmware. If the board isn't powered then click on the "On" button in the "Target Power" section. The power and mode light on DMX18 should then power up. Click on "Write".



Faultfinding

Fault

Power Led (red led) not lit

Solution/solutions

- Fuse/s blown (note the control only needs power to 1 zone for power led to be on and for that zone to work). Check fuses
- Power supply faulty or not turned on.
- Power supply section of pcb damaged. No user repairable parts. Return for repair
- Power jumper set for too high a voltage for what is powering the pcb

1 or more Zones not working

- Fuse for that zone is blown, power supply powering that Zone is faulty or there is a wiring fault

Channel failing to turn on

- Mosfet transistor has been damaged. Can be replaced but warranty may be voided. The mosfet must be replaced with the exact same type to ensure correct operation
- PCB track has been burnt out. Should be evident if bottom of pcb is inspected

Channel turned on all the time

- Mosfet transistor has been damaged. Can be replaced but warranty may be voided. The mosfet must be replaced with the exact same type to get correct operation

No DMX signal

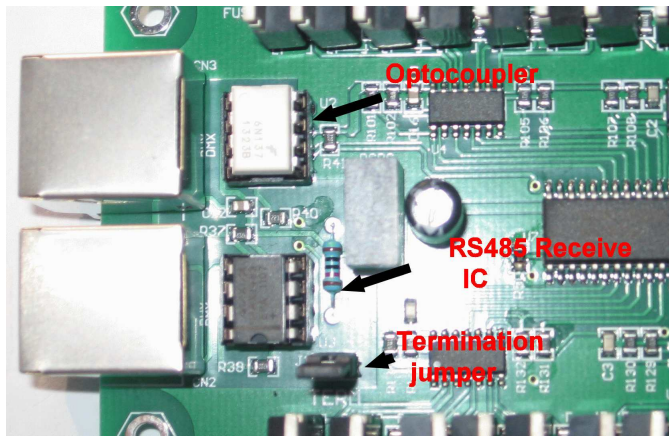
- Termination jumper is installed when both DMX sockets are in use
- No data is being sent. Check software, dongle, cable etc
- DMX (RS485) receive IC is damaged. IC is socketed for easy replacement. It is U3 (a MAX1483 or compatible). Ensure the polarity is correct. A notch or dot on the IC must match the notch in the IC socket
- Optoisolation IC is damaged. This would usually only be caused by applying excessive voltage to the

DMX data line. The IC is socketed for easy replacement. It is U2 (a 6N137). Ensure the polarity is correct. A notch or dot on the IC must match the notch in the IC socket

- Insufficient channels being sent by sequencing/test software

Fuse blowing

- Fuse selection too low for lights that are connected
- 1 or more lights connected have short circuited wires



Warranty

This dmx light controller is covered by a warranty for a period of 12 months from the time of purchase.

The warranty covers only faulty material and workmanship if properly setup and operated in accordance with the specifications and setup sections of this document.

The repair and or replacement of this controller will only be at the workshop of Alan Hanson. The cost of freight to/from will be borne by the user.

The warranty does not cover damage to the controller due to misuse i.e.. shorting of outputs, connecting AC supply, connecting a supply higher than the rated voltage.

The controller is supplied as is. Alan Hanson and Hanson Electronics reserves the right to make changes to the firmware, specifications and the design without notification.

Misuse, using this for other than its designed use, water damage, mechanical damage or attempting to modify or repair your controller will void this warranty.

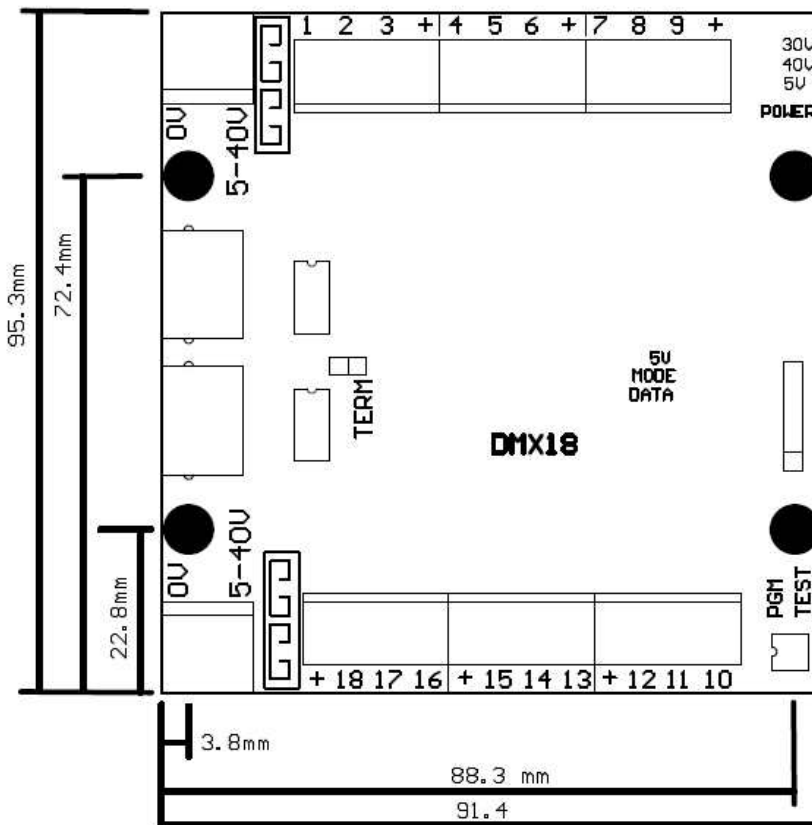
Alan Hanson and Hanson Electronics shall not be liable for any incidental damage, inconvenience, rental, loss of profits or any other loss due to the unsuitability, failure or use of this controller.

If the user does not agree to these terms the cost of the product (minus freight) will be refunded on the return of the product. The controller must be in unused condition and must be returned within 14 days.

Please return this controller with a copy of your invoice if it develops a fault. Any controller returned without a copy of the invoice will be charged at a standard repair rate. The warranty does not cover freight.

Drawings in this manual show typical configurations.

All wiring should be done by competent and/or licenced persons only.



Mounting standoff drilling pattern.
(Scaled. Not 1:1)

Enquiries/Repairs :-
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www.hansonelectronics.com.au