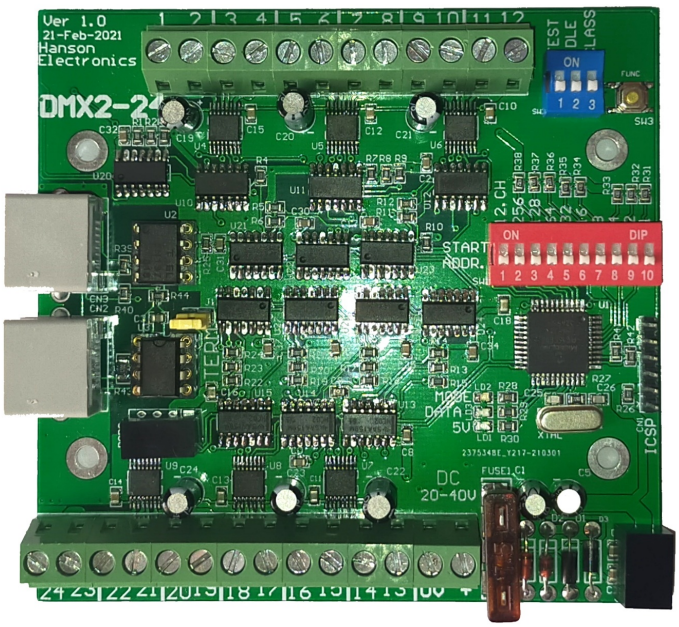
DMX2-24
USER MANUAL

DMX controller for 2 wire 2 channel LED strings



Features

-The DMX2-24 controller accepts DMX data input and drives 12 2 channel, 2 wire led strings.
-DC input (20 - 40V)
-15A (max) ATO blade fuse
-24 DC outputs for 12 2 channel, 2 wire led strings
-True electrically isolated DMX input with ESTA pinout (2x RJ45 sockets for looping)
-Dipswitch selectable start address
PCB size is 100.6 mm x 95 mm

Manual Revision 1.0
Suits PCB revision 1.0
2 April 2021

Connections

Dmx Data

There are 2 RJ45 dmx sockets on the board. These are designed for loop in and loop out.

If the DMX2-24 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.

The DMX2-24 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.

DC Power Input

The board will control any DC voltage between 20 and 40V . The DMX2-24 comes supplied with a 10A fuse fitted. Fuses up to 15A can be used. It is recommended changing the fuse to the closest size for the total current that the board will be supplying.

Dimmer Outputs

There are 24 channel outputs for controlling 12 2 channel 2 wire led strings. A DC voltage in the range of 20 to 40V can be used.

The maximum load per string is 2 Amps, but remember that the overall limit for the board is 15 Amps. This means that you can't turn on all 12 strings with the maximum load.

See the Connection Example section for the method 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 DMX2-24

Status Leds

There are 3 small LEDs at the right of the PCB adjacent to the micro.
Red led-5V Power, Blue led-MODE, Green led-DATA

-Red led	5V power	
-Blue MODE led on solid.	Green DATA led flashing	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.	Address setting error
-Blue MODE led flashing slowly.	Green DATA led off.	Test mode
-Blue and Green leds flashing at the same time		Classic multifunction mode
-Blue and Green leds alternating		No DMX data, running in Classic idle mode

Test mode takes precedence over normal running so errors/status message other than test mode won't be displayed if in test mode.

12 CH

There is a switch that allows the DMX2-24 to work in 12 channel (12 CH) mode. This means that both channels of a string will be dimmed at the same setting. Using the DMX2-24 in this mode only 12 DMX addresses are used. The switch is at the leftmost position of the 10 way dipswitch that is for setting the DMX start address.

Start Channel

The start channel is set via 9 dipswitches. The channel is set in binary by turning on the relevant switches. DMX addresses can be anywhere between 1 and 512. The address of the DMX2-24 can be anywhere in the range of 1 to 489 (a start address of 489 uses the addresses from 489 up 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.
The start address can be calculated by adding up the totals for the switches that are on. For example 64 + 16 + 1 would give a start address of 81. A table is provided later in the manual that lists the dmx start addresses.

When you receive your DMX2-24 it will have a DMX start address of 1. That is, it will respond to channels 1 to 24.

Test Mode

There is a switch which places the control into a test mode. In this mode a test program runs and all 24 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 the modes of testing from 1 channel on at a time, 1 string at a time, 1 half of all strings, other half of all strings etc.

Idle Mode

There is a switch (between Test and Class(ic)) marked as Idle. Turning on this switch allows the DMX2-24 to default back to running in the classic multifunction mode (see below) when there is no DMX data being received. This would mean that when there is no data being sent to the board the selected multifunction mode would run across all 24 channels (12 strings) but as soon as data is sent it would change to computer control.

Classic Mode

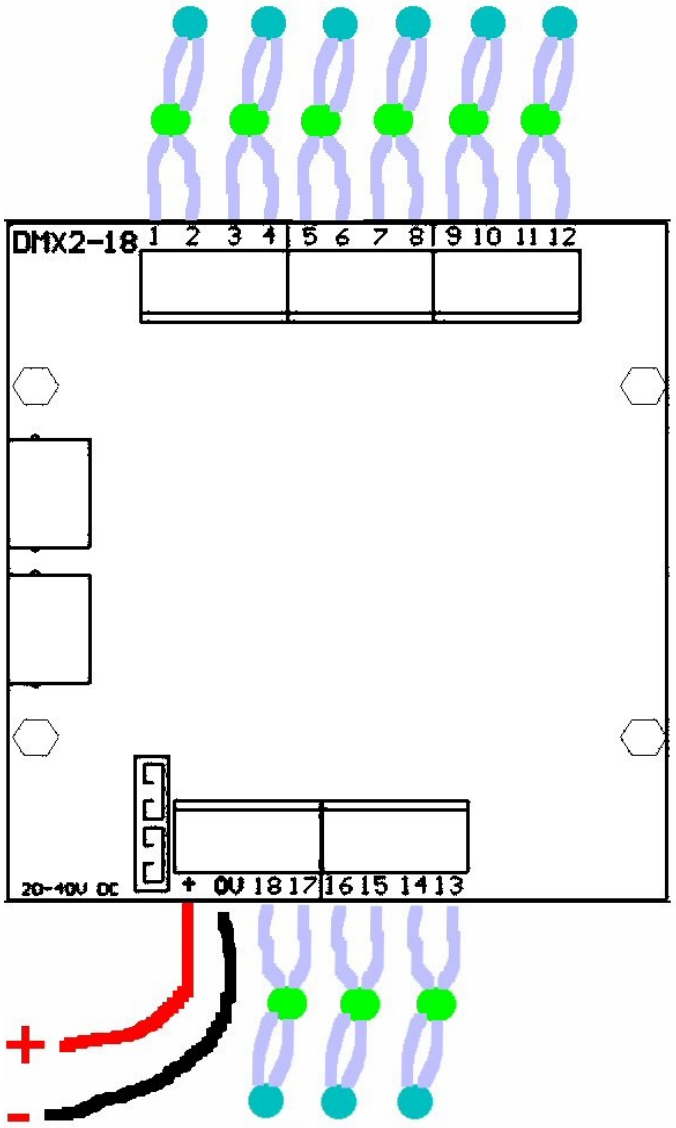
The DMX2-24 can be used to control led strings without connection to a computer or other source of DMX data. If the CLASS. (classic) switch is turned on the 12 strings connected will be controlled in the same way as the traditional multifunction controllers that are typically supplied with these lights. There is a small pushbutton marked FUN (function) at the top right of the DMX2-24 pcb. Pressing the button changes the mode. The mode can only be changed while running the lights in classic multifunction mode

Multifunction modes

1. Combination	cycles through the 7 actual modes
2. In Waves	toggles 1 half followed by other at about 5hz
3. Sequential	toggles 1 half followed by other half at about 1hz
4. "Slo Glo"	ramps 1 half up then down followed by the other. about 5s up, 5s down
5. Chasing /Flash	toggles 1 half followed by the other half about 3 times at 5hz followed by 1 half flashing 3 times at 5 hz then the other 3 times.
6. Slow Fade	ramps all up followed by all down. about 5s each way
7. Twinkle / Flash	flashes 1 half twice then other half twice
8. Steady On	lights on 100%

Connection Example

Typical connection arrangement showing 2 wire 2 channel led strings. The strings connect between channels 1 and 2 for string 1, 3 and 4 for string 2 etc. The order of the lights on the 2 channel 2 wire lights can be changed by swapping the pairs of wires from 1 and 2 to 2 and 1. As the leds on a string are typically relatively closely spaced the difference probably isn't noticeable or worth the effort. The exceptions to this are for strings with different colours in the alternate halves and lights like stars where 1 half of the string is 1 star and the other half is another star.



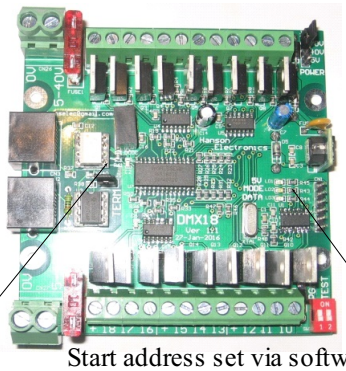
Connecting DMX boards

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 cabing 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.

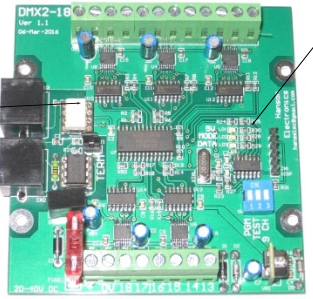
USB dongle connects to PC, Pi or BBB



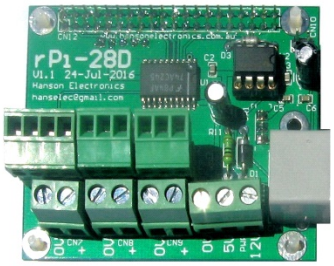
Start address set via software

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

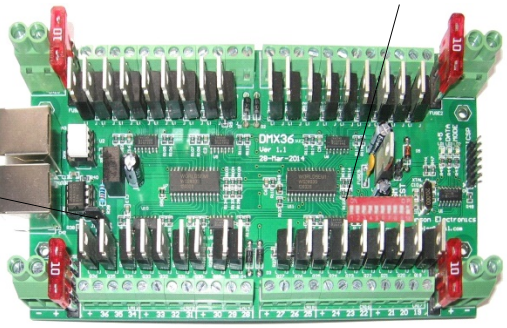
No termination on these boards



Start address set via dipswitches



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



This board terminated

Dmx start address table for DMX2-24. Address switches are from left to right (on Dipswitch they are labelled as 2 to 10, on PCB they are marked 256, 128 ..... 1 in binary address sequence). Zeroes indicate the switch is off (down). Ones indicate the switch is on (up). First column is the start address and the second column is the 9 address switches.

1	000000001	65	001000001	129	010000001	193	011000001	257	100000001	321	101000001	385	110000001	449	111000001
2	000000010	66	001000010	130	010000010	194	011000010	258	100000010	322	101000010	386	110000010	450	111000010
3	000000011	67	001000011	131	010000011	195	011000011	259	100000011	323	101000011	387	110000011	451	111000011
4	000000100	68	001000100	132	010000100	196	011000100	260	100000100	324	101000100	388	110000100	452	111000100
5	000000101	69	001000101	133	010000101	197	011000101	261	100000101	325	101000101	389	110000101	453	111000101
6	000000110	70	001000110	134	010000110	198	011000110	262	100000110	326	101000110	390	110000110	454	111000110
7	000000111	71	001000111	135	010000111	199	011000111	263	100000111	327	101000111	391	110000111	455	111000111
8	000001000	72	001001000	136	010001000	200	011001000	264	100001000	328	101001000	392	110001000	456	111001000
9	000001001	73	001001001	137	010001001	201	011001001	265	100001001	329	101001001	393	110001001	457	111001001
10	000001010	74	001001010	138	010001010	202	011001010	266	100001010	330	101001010	394	110001010	458	111001010
11	000001011	75	001001011	139	010001011	203	011001011	267	100001011	331	101001011	395	110001011	459	111001011
12	000001100	76	001001100	140	010001100	204	011001100	268	100001100	332	101001100	396	110001100	460	111001100
13	000001101	77	001001101	141	010001101	205	011001101	269	100001101	333	101001101	397	110001101	461	111001101
14	000001110	78	001001110	142	010001110	206	011001110	270	100001110	334	101001110	398	110001110	462	111001110
15	000001111	79	001001111	143	010001111	207	011001111	271	100001111	335	101001111	399	110001111	463	111001111
16	000010000	80	001010000	144	010010000	208	011010000	272	100010000	336	101010000	400	110010000	464	111010000
17	000010001	81	001010001	145	010010001	209	011010001	273	100010001	337	101010001	401	110010001	465	111010001
18	000010010	82	001010010	146	010010010	210	011010010	274	100010010	338	101010010	402	110010010	466	111010010
19	000010011	83	001010011	147	010010011	211	011010011	275	100010011	339	101010011	403	110010011	467	111010011
20	000010100	84	001010100	148	010010100	212	011010100	276	100010100	340	101010100	404	110010100	468	111010100
21	000010101	85	001010101	149	010010101	213	011010101	277	100010101	341	101010101	405	110010101	469	111010101
22	000010110	86	001010110	150	010010110	214	011010110	278	100010110	342	101010110	406	110010110	470	111010110
23	000010111	87	001010111	151	010010111	215	011010111	279	100010111	343	101010111	407	110010111	471	111010111
24	000011000	88	001011000	152	010011000	216	011011000	280	100011000	344	101011000	408	110011000	472	111011000
25	000011001	89	001011001	153	010011001	217	011011001	281	100011001	345	101011001	409	110011001	473	111011001
26	000011010	90	001011010	154	010011010	218	011011010	282	100011010	346	101011010	410	110011010	474	111011010
27	000011011	91	001011011	155	010011011	219	011011011	283	100011011	347	101011011	411	110011011	475	111011011
28	000011100	92	001011100	156	010011100	220	011011100	284	100011100	348	101011100	412	110011100	476	111011100
29	000011101	93	001011101	157	010011101	221	011011101	285	100011101	349	101011101	413	110011101	477	111011101
30	000011110	94	001011110	158	010011110	222	011011110	286	100011110	350	101011110	414	110011110	478	111011110
31	000011111	95	001011111	159	010011111	223	011011111	287	100011111	351	101011111	415	110011111	479	111011111
32	000100000	96	001100000	160	010100000	224	011100000	288	100100000	352	101100000	416	110100000	480	111100000
33	000100001	97	001100001	161	010100001	225	011100001	289	100100001	353	101100001	417	110100001	481	111100001
34	000100010	98	001100010	162	010100010	226	011100010	290	100100010	354	101100010	418	110100010	482	111100010
35	000100011	99	001100011	163	010100011	227	011100011	291	100100011	355	101100011	419	110100011	483	111100011
36	000100100	100	001100100	164	010100100	228	011100100	292	100100100	356	101100100	420	110100100	484	111100100
37	000100101	101	001100101	165	010100101	229	011100101	293	100100101	357	101100101	421	110100101	485	111100101
38	000100110	102	001100110	166	010100110	230	011100110	294	100100110	358	101100110	422	110100110	486	111100110
39	000100111	103	001100111	167	010100111	231	011100111	295	100100111	359	101100111	423	110100111	487	111100111
40	000101000	104	001101000	168	010101000	232	011101000	296	100101000	360	101101000	424	110101000	488	111101000
41	000101001	105	001101001	169	010101001	233	011101001	297	100101001	361	101101001	425	110101001	489	111101001
42	000101010	106	001101010	170	010101010	234	011101010	298	100101010	362	101101010	426	110101010	490	111101010
43	000101011	107	001101011	171	010101011	235	011101011	299	100101011	363	101101011	427	110101011	491	111101011
44	000101100	108	001101100	172	010101100	236	011101100	300	100101100	364	101101100	428	110101100	492	111101100
45	000101101	109	001101101	173	010101101	237	011101101	301	100101101	365	101101101	429	110101101	493	111101101
46	000101110	110	001101110	174	010101110	238	011101110	302	100101110	366	101101110	430	110101110	494	111101110
47	000101111	111	001101111	175	010101111	239	011101111	303	100101111	367	101101111	431	110101111	495	111101111
48	000110000	112	001110000	176	010110000	240	011110000	304	100110000	368	101110000	432	110110000	496	111110000
49	000110001	113	001110001	177	010110001	241	011110001	305	100110001	369	101110001	433	110110001	497	111110001
50	000110010	114	001110010	178	010110010	242	011110010	306	100110010	370	101110010	434	110110010	498	111110010
51	000110011	115	001110011	179	010110011	243	011110011	307	100110011	371	101110011	435	110110011	499	111110011
52	000110100	116	001110100	180	010110100	244	011110100	308	100110100	372	101110100	436	110110100	500	111110100
53	000110101	117	001110101	181	010110101	245	011110101	309	100110101	373	101110101	437	110110101	501	111110101
54	000110110	118	001110110	182	010110110	246	011110110	310	100110110	374	101110110	438	110110110	502	111110110
55	000110111	119	001110111	183	010110111	247	011110111	311	100110111	375	101110111	439	110110111	503	111110111
56	000111000	120	001111000	184	010111000	248	011111000	312	100111000	376	101111000	440	110111000	504	111111000
57	000111001	121	001111001	185	010111001	249	011111001	313	100111001	377	101111001	441	110111001	505	111111001
58	000111010	122	001111010	186	010111010	250	011111010	314	100111010	378	101111010	442	110111010	506	111111010
59	000111011	123	001111011	187	010111011	251	011111011	315	100111011	379	101111011	443	110111011	507	111111011
60	000111100	124	001111100	188	010111100	252	011111100	316	100111100	380	101111100	444	110111100	508	111111100
61	000111101	125	001111101	189	010111101	253	011111101	317	100111101	381	101111101	445	110111101	509	111111101
62	000111110	126	001111110	190	010111110	254	011111110	318	100111110	382	101111110	446	110111110	510	111111110
63	000111111	127	001111111	191	010111111	255	011111111	319	100111111	383	101111111	447	110111111	511	111111111
64	001000000	128	010000000	192	011000000	256	100000000	320	101000000	384	110000000	448	111000000		

Note 1:- Many DMX devices use the reverse order. The DMX2-24 uses the order as would be converted and shown on a calculator, computer etc.
Note 2:-Dipswitch 1 is used to turn on and off the 12 channel mode.
Note3: Addresses 0 and 490-511 are invalid for DMX2-24

Firmware Updates

See http://www.hansonelectronics.com.au/product/dmx2-24/ for firmware updates and procedure.

Faultfinding

Fault	Solution/solutions
Power Led (red led) not lit	-Fuse/s blown (Check fuse) -Power supply faulty or not turned on. -Power supply section of pcb damaged. No user repairable parts. Return for repair
Led string failing to turn on	-Driver IC has detected an overload and has turned off. Cycling the power should reset it. Too long a string attached to a channel or a shorted string are the likely causes
Half of LED string turned on all the time	-Driver IC may be damaged
No DMX signal	-Termination jumper is installed on a board in the DMX daisychain 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) -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 -Power polarity is/was incorrect

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.

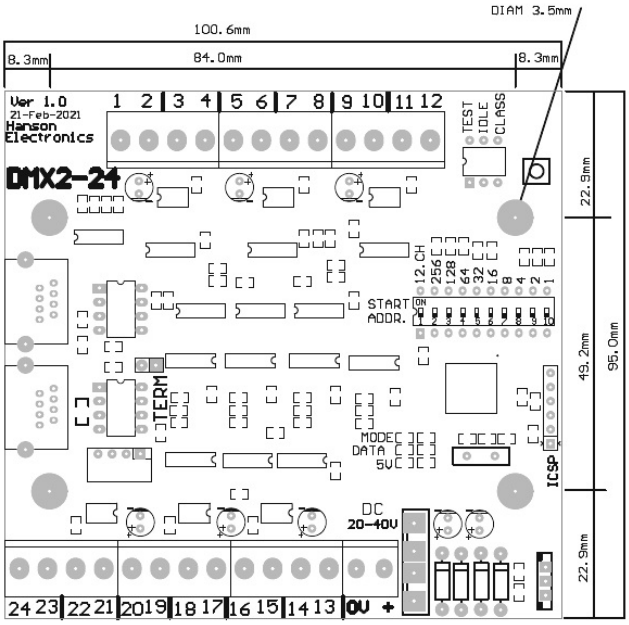
The controller is supplied as is. Alan Hanson and Hanson Electronics reserves the right to make changes to the firmware, specifications and the design without notification.

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.

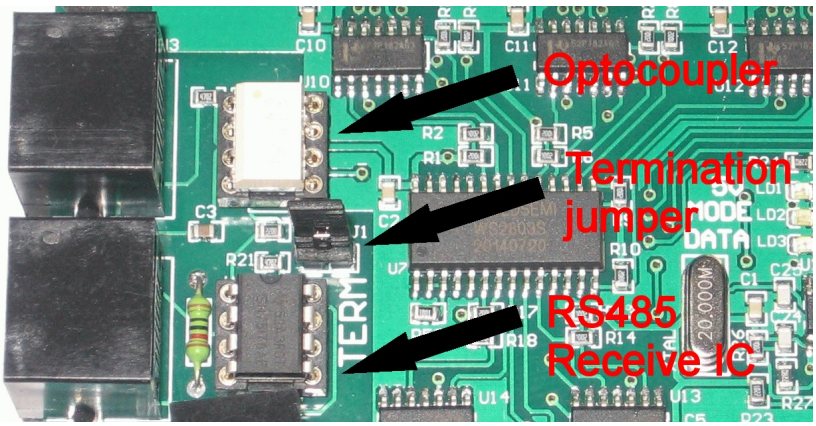
Alan Hanson and Hanson Electronics shall not be liable for any incidental damage, inconvenience, rental, loss of profits or any other loss due to the unsuitability, failure or use of this controller.

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.



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



Enquiries/Repairs :-Hanson Electronics
Alan Hanson
16 York St
Eaglehawk Victoria Australia 3556
Mobile 0408 463295
email hanselec@gmail.com
www.hansonelectronics.com.au
www.facebook.com/HansonElectronicsAustralia