



## SYSTEM 3

Programmable DC Load Control System

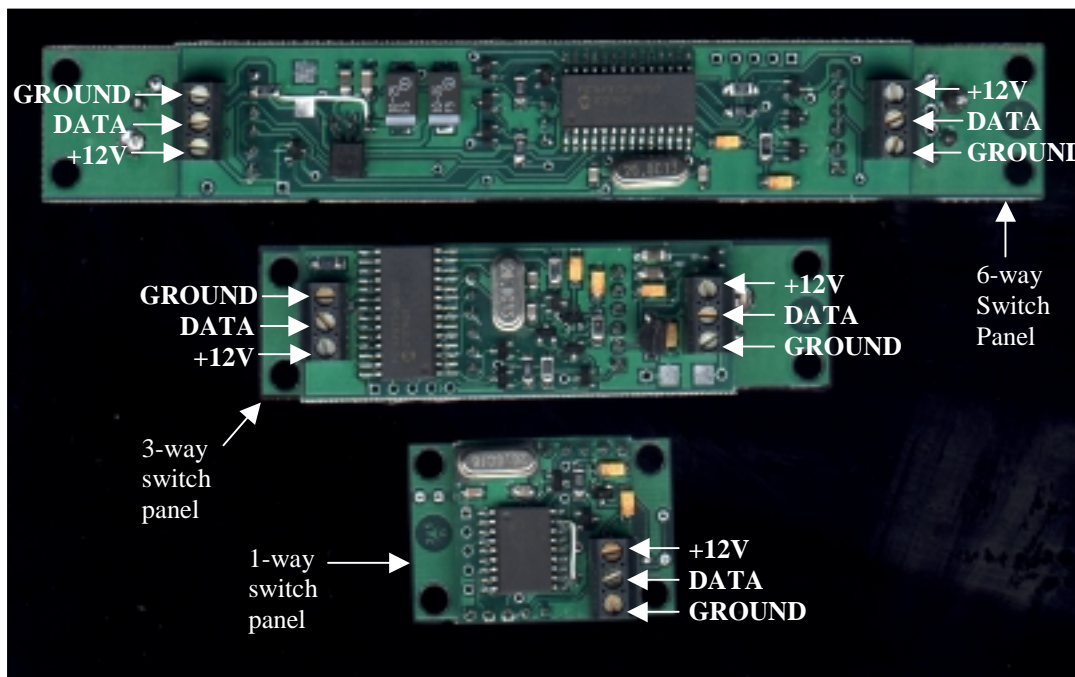
By

Ultimate Source Communication

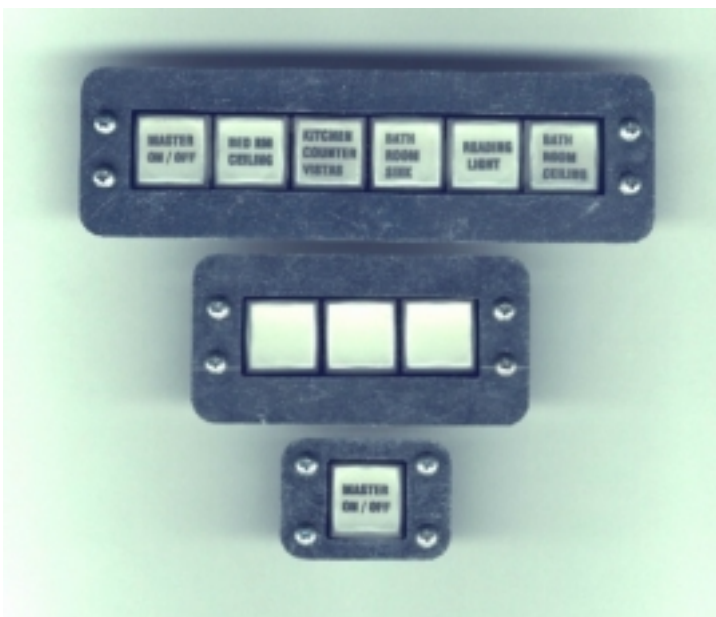
## SYSTEMS MANUAL

## Switch panel Setup and Test Procedure

The switch panels have 3 conductor terminal block style connectors. The switch panels must be connected properly. The proper connections are shown in figure 1 below. If the switch panel is connected improperly it will not function, but no damage will result due to misconnection. The 3-way and 6-way switch panels have two 3-conductor connectors each. This is to allow for easy chain connections, one connector is in and the other out ready for the next switch panel. The 1 way switch panels only provide 1- 3 conductor connector. When all switch panels are installed and all connections have been verified. The system is ready to have power applied. This should be done with two people, one to watch the switch panels and one to apply the power to the DSMM racks. If the wiring is correct the system should come to life. The switch panels should show back-lights when a button is pressed on any of the panels. If no backlights show on some or all of the panels then remove power and check the wiring again.



Figures 1 and 2 are Front and Rear views of switch panels.



## Power Networking System configuration

The networking power distribution system must be configured before the system can be put into service. The system configuration is a 2-step process. The first step is configuring the switch panel addresses. To configure the switch panel addresses simply have a person find a 6-way switch panel press and hold 3 buttons for 10 seconds as shown in figure 3. Watch the panel, all the switches on that panel should flash on and off at a very fast rate followed by a slow steady continuous flash. When you see the slow steady flashing, you have just entered address configuration mode. You now have two options.

Option 1: Press and hold the left most button as shown in figure 4. The panel will flash 10 times rapidly. This means that the switch panel is finding a unique address automatically.

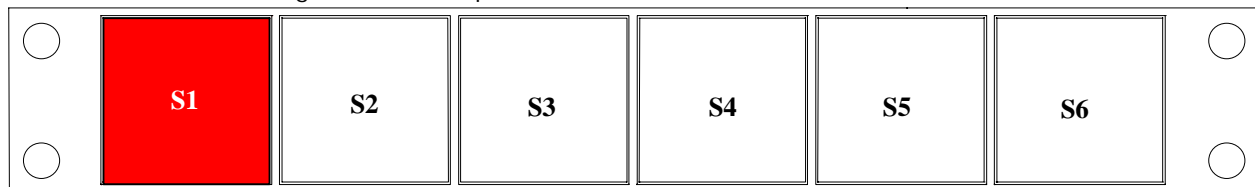
Option 2: Press and hold the 2 center buttons as shown in figure 5. This allows you to configure all the switch panels, and motor control modules in the system. The panel will flash very rapidly again, and then all of the switch panels in the system should start flashing red slowly.

When all the switch panels are flashing red slowly you are ready to set the switch panel addresses. The switch panel addresses are unique to each switch panel type. 1-way panels (address 1 – 30), 3-way panels (address 1 - 30), and 6-way panels (addresses 1 – 30). The switch panel addresses are assigned in sequential order starting with address #1. Have a person walk through the coach and press and hold the left most buttons on all of the 6-way switch panels in the order you wish to have them addressed. Each time the left most button on each panel is pressed and held the panel will flash rapidly. Release the button when you see the rapid flash start. This rapid flash means that the panel is finding an address automatically. When the panel finishes the 10 rapid flashes it is finished, and has found an address and stored it. Follow this procedure for each of the 6-way panels until finished with all 6-way panels. When finished the first panel that was pressed will have address #1 and each 6-way panel pressed after will have the next higher address. Remember to write down the order you pressed the left panel buttons. This will be your record for future reference. The same procedure is applied to the 3-way, 1-way switch panels, and motor control modules to set addresses. When all the switch panels and modules have stopped flashing you're finished with step 1 and you are ready for step 2.



Figure 3.

To enter address configuration mode press and hold the three buttons shown in red for 10



seconds

Figure 4.

To set a single switch address, press the button shown then release. The panel should flash red rapidly 10 times.

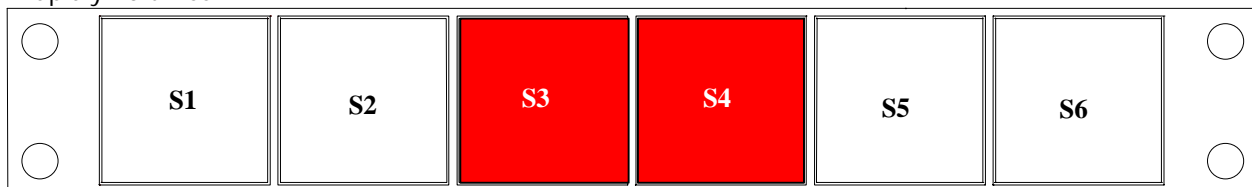


Figure 5. While the switch panel is flashing slowly press and hold the buttons shown. The panel should flash very rapidly for several seconds, and then all the switch panels in system should start to flash slowly. This indicates that all switch panels and motor control boards are ready to configure.

The second step sets up the specific settings for each switch and module using a special configuration box. The configuration module is a black box with a PC serial cable and Data bus cable/connector. The configuration box is connected to a PC or laptop computer using the serial cable and connected to the system with the data bus cable/connector at a spare rack unit - bus connector. The configuration box receives its power via the system data bus. The configuration is preformed on the PC using a terminal program like HyperTerminal or Pro Comm Plus. The terminal program needs to have the serial port settings as follows:

2400,N,8,1 The 2400 is the Baud rate. The N stands for No Parity. The 8 stands for 8 Data bits. The 1 stands for 1 Stop bit.

With the serial port settings correct, You are ready for system configuration. To start configuration press and hold the shift key and quickly press the @/2 key twice. You should see a short menu appear in the terminal window. The menu should look like the one shown below.

```
ULTIMATE SOURCE COMMUNICATIONS
SYSTEM CONFIGURATION ROUTINE
REVISION 1.0A
WRITTEN BY: MICHAEL SCHUCKEL
DATE: 02-15-02
```

```
PLEASE SELECT THE UNIT TYPE YOU WISH TO CONFIGURE
(0) - CONFIG DSM MODULE/S
(1) - 1 WAY SWITCH PANEL/S
(2) - 3 WAY SWITCH PANEL/S
(3) - 6 WAY SWITCH PANEL/S
ENTER YOUR SELECTION (0-3)
```

The menu is divided into 4 module types. Each module type is configured separately and returns to the start when finished. Enter a number between 0 and 3 to start the configuration process. I recommend starting with 0 and work your way through the menus until finished.

After a "0" is entered the configuration box will pole the entire system and store the settings of all the modules that it finds. The terminal will display the poling process and then prompt you when it is finished with the results of the modules it found and questions about editing the settings. The prompts should look like those shown below.

```
UNIT TYPE----- 00
ADDRESS----- 01
GLOBEL CONTROL--- 00
INFERRED CONTROL-- 00
DIM ENABLE----- 00
UNIT SETTING----- 004
FAULT STATUS----- 00
WOULD YOU LIKE TO EDIT THIS CONFIGURATION? (Y/N) "Y"
```

The configuration box will go through the modules it found in sequential order and will prompt you with a message and question for each module it found. If you need to edit the configuration of the first module found simply enter "Y" If "Y" is entered the configuration box will prompt you with questions that you must answer. The question prompts and some typical answers I entered are shown below.

```
EDIT CONFIGURATION FOR DSM #-01
ENABLE GLOBEL CONTROL (Y/N) ----- "Y"
GLOBEL CONTROL ENABLED.
ENABLE INFERRED CONTROL (Y/N) ----- "Y"
INFERRED CONTROL ENABLED.
ENABLE DIMMING CONTROL (Y/N) ----- "Y"
DIMMING CONTROL ENABLED.
PLEASE SELECT DIM SETTING (0 - 255) ----- "128" (128 sets the dim value to half)
DIM SETTING = 128
IS THIS DIM SETTING CORRECT (Y/N) ----- "Y"
UNIT 01 CONFIGURATION COMPLETE!
```

The remaining DSM modules configure in the same manner. When the configuration is complete the configuration box sends the new configuration data to the modules and returns to the start.

To continue system configuration press and hold the shift key and quickly press the @/2 key twice.

This will start the configuration routine again.

Enter a "1" and the configuration box will pole the system to look for all the 1-way switch panels and store the results. You will then be prompted with the results and questioned as to whether to edit or not.

The results and questions with my answers are shown below.

```
S1 ADDRESS = 96
WOULD YOU LIKE TO EDIT THIS CONFIGURATION? (Y/N) ----- "Y"
S1 ADDRESS = 96
WOULD YOU LIKE S1 TO HAVE GLOBAL CONTROL (Y/N) ----- "Y"
UPLOADING SWITCH PANELS.
@0201FF80#60
ROUTINE FINISHED
```

The 1-way switch panel can be set to any address between 1 and 60 for normal operation, momentary, and polarity or be set to "96" for global operation. The menu prompts, questions, and my answers for normal operation are shown below.

```
S1 ADDRESS = 96
WOULD YOU LIKE TO EDIT THIS CONFIGURATION? (Y/N) ----- "Y"
S1 ADDRESS = 96
WOULD YOU LIKE S1 TO HAVE GLOBAL CONTROL (Y/N) ----- "N"
ENTER NEW ADDRESS FOR S1 (1-60).----- "01"
S1 ADDRESS = 01
IS THIS ADDRESS CORRECT (Y/N) ----- "Y"
UPLOADING SWITCH PANELS.
@0201FF80#01
ROUTINE FINISHED
```

Make sure when entering an address less than 10 to enter a 0 and the number. (Example "03")

To continue system configuration press and hold the shift key and quickly press the @/2 key twice.

This will start the configuration routine again.

Enter a "2" and the configuration box will poll the system to look for all the 3-way switch panels and store the results. The 3-way switch panel has 3 separate switches that can be set to any address between 1 and 60 for normal, momentary, and polarity operation. The first switch in the 3-way switch panel (switch on the left with panel facing you) is the only switch on the panel that can be set for global control. All three switches can be programmed as standard, momentary, and polarity types. A typical result prompt, questions, and my **answers** are shown below.

```
PANEL ADDRESS = 02
S1 ADDRESS = 96 - MASTER
S2 ADDRESS = 01 - POLARITY
S3 ADDRESS = 02 - MOMENTARY
WOULD YOU LIKE TO EDIT THIS CONFIGURATION? (Y/N) -----"Y"
PANEL ADDRESS = 02
S1 ADDRESS = 96
WOULD YOU LIKE S1 TO HAVE GLOBAL CONTROL (Y/N) -----"Y"
PANEL ADDRESS = 02
ENTER NEW ADDRESS FOR S2 (1-60) -----"01"
S2 ADDRESS = 01 - POLARITY
IS THIS ADDRESS CORRECT (Y/N) -----"Y"
PANEL ADDRESS = 02
S2 ADDRESS = 01
WOULD YOU LIKE S2 TO BE A MOMENTARY SWITCH (Y/N) -----"N"
PANEL ADDRESS = 02
S2 ADDRESS = 01
WOULD YOU LIKE S2 TO BE A POLARITY SWITCH (Y/N) -----"Y"
PANEL ADDRESS = 02
ENTER NEW ADDRESS FOR S3 (1-60) -----"02"
S3 ADDRESS = 02 - MOMENTARY
IS THIS ADDRESS CORRECT (Y/N) -----"Y"
PANEL ADDRESS = 02
S3 ADDRESS = 02
WOULD YOU LIKE S3 TO BE A MOMENTARY SWITCH (Y/N) -----"Y"
UPLOADING SWITCH PANELS.
@0302FF80A#6001020402A
ROUTINE FINISHED
```

Make sure when entering an address less than 10 to enter a 0 and the number. (Example "03")

To continue system configuration press and hold the shift key and quickly press the @/2 key twice.

This will start the configuration routine again.

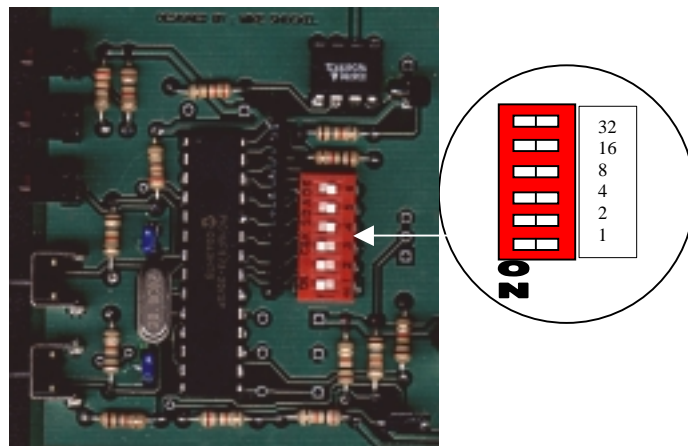
Enter a "3" and the configuration box will poll the system looking for all the 6-way switch panels and store the results. The 6-way switch panel has 6 separate switches that can be set to any address between 1 and 60 for normal, momentary, and polarity operation. The first switch in the 6-way switch panel (switch on the left with panel facing you) is the only switch on the panel that can be set for global control. A typical result prompt, questions, and my **answers** are shown below.

PANEL ADDRESS = 02  
S1 ADDRESS = 96 - MASTER  
S2 ADDRESS = 01 - MOMENTARY  
S3 ADDRESS = 01 - POLARITY  
S4 ADDRESS = 01  
S5 ADDRESS = 02 - MOMENTARY  
S6 ADDRESS = 02  
WOULD YOU LIKE TO EDIT THIS CONFIGURATION? (Y/N) "Y"  
PANEL ADDRESS = 02  
S1 ADDRESS = 96  
WOULD YOU LIKE S1 TO HAVE GLOBEL CONTROL (Y/N) "Y"  
PANEL ADDRESS = 02  
ENTER NEW ADDRESS FOR S2 (1-60) -----"01"  
S2 ADDRESS = 01 - MOMENTARY  
IS THIS ADDRESS CORRECT (Y/N) -----"Y"  
PANEL ADDRESS = 02  
S2 ADDRESS = 01  
WOULD YOU LIKE S2 TO BE A MOMENTARY SWITCH (Y/N) -----"Y"  
PANEL ADDRESS = 02  
ENTER NEW ADDRESS FOR S3 (1-60) -----"01"  
S3 ADDRESS = 01 - POLARITY  
IS THIS ADDRESS CORRECT (Y/N) -----"Y"  
PANEL ADDRESS = 02  
S3 ADDRESS = 01  
WOULD YOU LIKE S3 TO BE A MOMENTARY SWITCH (Y/N) -----"N"  
PANEL ADDRESS = 02  
S3 ADDRESS = 01  
WOULD YOU LIKE S3 TO BE A POLARITY SWITCH (Y/N) -----"Y"  
PANEL ADDRESS = 02  
ENTER NEW ADDRESS FOR S4 (1-60) -----"01"  
S4 ADDRESS = 01  
IS THIS ADDRESS CORRECT (Y/N) -----"Y"  
PANEL ADDRESS = 02  
S4 ADDRESS = 01  
WOULD YOU LIKE S4 TO BE A MOMENTARY SWITCH (Y/N) -----"N"  
PANEL ADDRESS = 02  
S4 ADDRESS = 01  
WOULD YOU LIKE S4 TO BE A POLARITY SWITCH (Y/N) -----"N"  
PANEL ADDRESS = 02  
ENTER NEW ADDRESS FOR S5 (1-60) -----"02"  
S5 ADDRESS = 02 - MOMENTARY  
IS THIS ADDRESS CORRECT (Y/N) -----"Y"  
PANEL ADDRESS = 02  
S5 ADDRESS = 02  
WOULD YOU LIKE S5 TO BE A MOMENTARY SWITCH (Y/N) -----"N"  
PANEL ADDRESS = 02  
S5 ADDRESS = 02  
WOULD YOU LIKE S5 TO BE A POLARITY SWITCH (Y/N) -----"Y"  
PANEL ADDRESS = 02  
ENTER NEW ADDRESS FOR S6 (1-60) -----"03"  
S6 ADDRESS = 03  
IS THIS ADDRESS CORRECT (Y/N) -----"Y"  
PANEL ADDRESS = 02  
S6 ADDRESS = 03

WOULD YOU LIKE S6 TO BE A MOMENTARY SWITCH (Y/N) -----"N"  
PANEL ADDRESS = 02  
S6 ADDRESS = 03  
WOULD YOU LIKE S6 TO BE A POLARITY SWITCH (Y/N) -----"N"  
UPLOADING SWITCH PANELS.  
@0402FF80A#6001010102030204A  
ROUTINE FINISHED

When you finish configuration on all the modules in the system the system is ready for operation.

## Dimmer/Switch/Momentary Module (DSMM) Dipswitch Setup

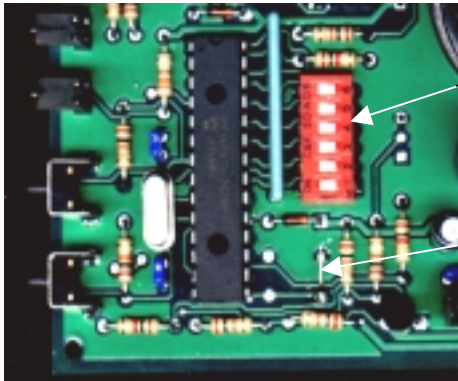


Each module has a 6 pole dip switch that is used to give each module a unique address. The figure above shows the location, and orientation of the dipswitch. Each of the 6 switches represents a number value. The expanded view in the figure above shows the number value assigned to each switch. The unit address is determined by turning on and off different combinations of switches. The number values are selected by turning the respective switch on. To find what the address for a specific switch equals, simply add the number values that are assigned to the switches that are on. The dip switch address setting can also be determined by using chart 1 below.

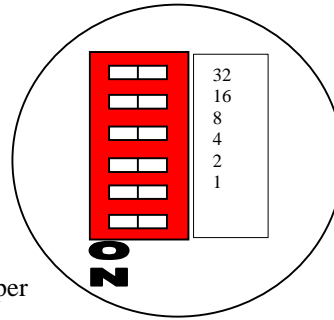
The DSMM module can also be configured to operate as a momentary switch module. To set up a module for momentary operation a jumper needs to be installed as shown in the picture below. With the jumper installed the module is now a momentary module. Momentary modules have no need to be configured to operate in the Power Networking System. Simply set the address dipswitch as you would for the DSMM module. The address selected can be the same as the



DSMM address. The system knows the difference between momentary, polarity, and standard DSMM modules. All three modules may have the same address and still operate independently of each other.



Momentary jumper Location.



With a momentary jumper installed the module will now operate as a momentary module only. The dip switch address setting is unique from any other address. So if the DSMM address is "1" and the momentary jumper is installed then the momentary address is also "1" but will not respond to the DSMM address "1". This segregation of module types allows for all module types to have the same addresses without affecting each other. (I.e. in a typical system you can have a DSMM module address #1, a momentary module address #1, a polarity module address #1, 1-way switch address #1, 3-way switch address #1, and 6-way switch address #1). All will operate separately respect to each other. Segregation of module types allows for a maximum number of addresses for each module type with a small dipswitch.

CHART 1

Address Value	1	2	4	8	16	32
1	on	off	off	off	off	off
2	off	on	off	off	off	off
3	on	in	off	off	off	off
4	off	off	on	off	off	off
5	on	off	on	off	off	off
6	off	on	on	off	off	off
7	on	on	on	off	off	off
8	off	off	off	on	off	off
9	on	off	off	on	off	off
10	off	on	off	on	off	off
11	on	on	off	on	off	off
12	off	off	on	on	off	off
13	on	off	on	on	off	off
14	off	on	on	on	off	off
15	on	on	on	on	off	off
16	off	off	off	off	on	off
17	on	off	off	off	on	off
18	off	on	off	off	on	off
19	on	in	off	off	on	off

20	off	off	on	off	on	off
21	on	off	on	off	on	off
22	off	on	on	off	on	off
23	on	on	on	off	on	off
24	off	off	off	on	on	off
25	on	off	off	on	on	off
26	off	on	off	on	on	off
27	on	on	off	on	on	off
28	off	off	on	on	on	off
29	on	off	on	on	on	off
30	off	on	on	on	on	off
31	on	on	on	on	on	off
32	off	off	off	off	off	on
33	on	off	off	off	off	on
34	off	on	off	off	off	on
35	on	in	off	off	off	on
36	off	off	on	off	off	on
37	on	off	on	off	off	on
38	off	on	on	off	off	on
39	on	on	on	off	off	on
40	off	off	off	on	off	on
41	on	off	off	on	off	on
42	off	on	off	on	off	on
43	on	on	off	on	off	on
44	off	off	on	on	off	on
45	on	off	on	on	off	on
46	off	on	on	on	off	on
47	on	on	on	on	off	on
48	off	off	off	off	on	on
49	on	off	off	off	on	on
50	off	on	off	off	on	on
51	on	in	off	off	on	on
52	off	off	on	off	on	on
53	on	off	on	off	on	on
54	off	on	on	off	on	on
55	on	on	on	off	on	on
56	off	off	off	on	on	on
57	on	off	off	on	on	on
58	off	on	off	on	on	on
59	on	on	off	on	on	on
60	off	off	on	on	on	on

# DC Motor Control Board with Current Profiling Overview

The Current Profiling DC Motor Control board is a “one board” solution for bi-directional DC motor control. This new DC Motor Control board measures and stores the run time required for both directions of travel. Then on the next run in each direction a 50 point current profile is created for each direction of travel. The current profiles are stored permanently in memory and used as a relative reference for over current shut down. The current profile acts as an accurate record of the power with respect to time required to run the motor through each direction of travel. The current profiles are shown in Fig. 1 and 2

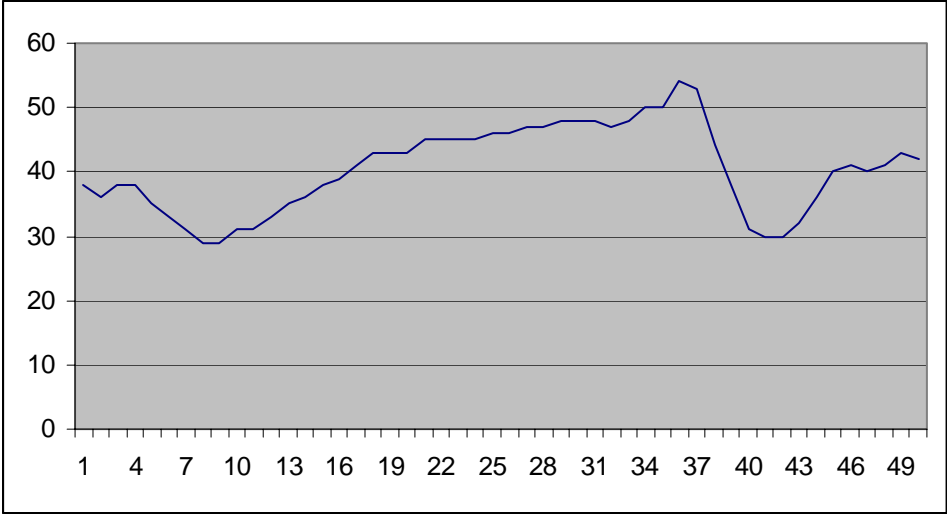


Figure 1

Figure 1 shows the amount of current used by a DC motor with respect to time to close a TV lift.

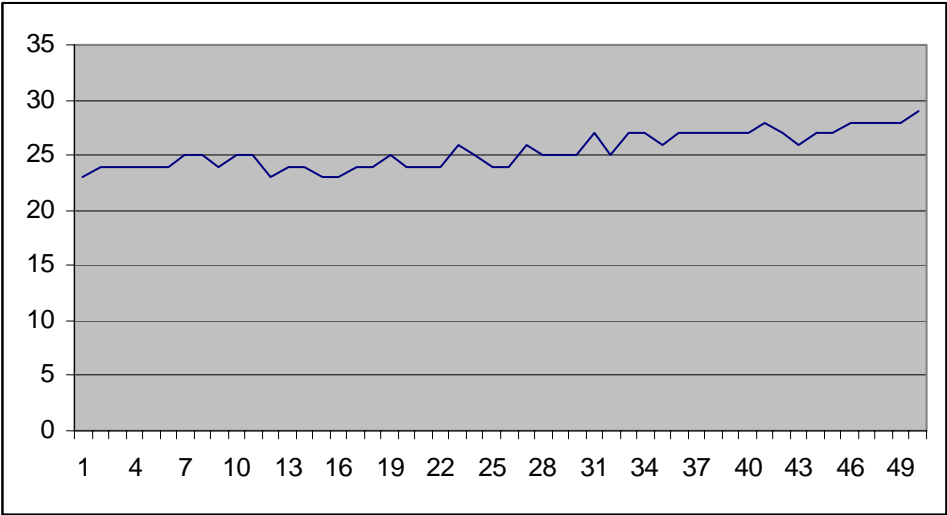


Figure 2

Figure 2 shows the amount of current used by a DC Motor with respect to time to open a TV lift. The two current profiles look very different. This is due to the fact that the TV lift requires a lot more current to close then to open. This characteristic is recorded by the profiles shown in figures 1 and 2. The controller board then sets relative over current shut down points that follow

the current profiles. The relative over current shut down points with respect to the current profile are shown in figures 3 and 4.

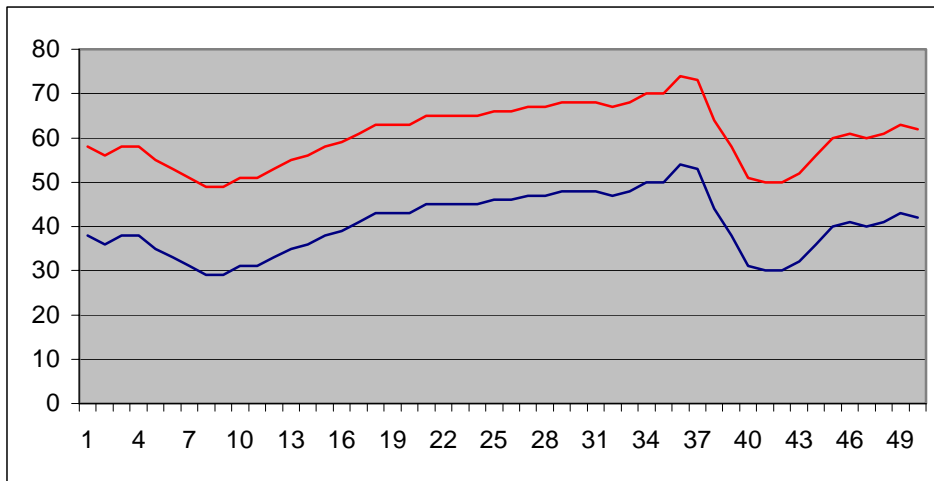


Figure 3

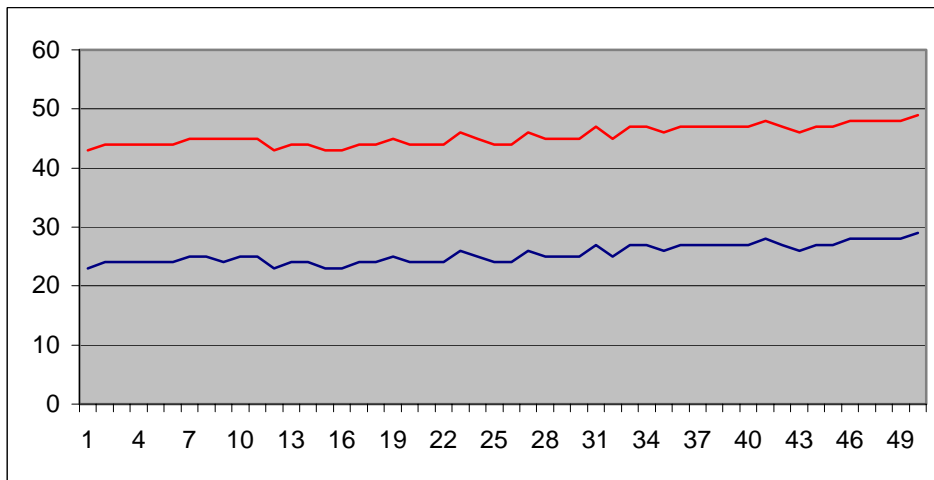


Figure 4

The relative over current shut down points (shown in red) show the response of the controller board to changing currents required by the DC motor with respect to time. The relative value for the over current shut down points is adjustable via a 6-pole dipswitch on the controller board. The adjustment allows the user to set the controller board to be as sensitive as possible without sacrificing system performance. This ability to track the changing currents and compare them to a known profile allows the controller board to be very sensitive to changes in motor load current and shut down quickly without sacrificing reliability. The current profiling system thus creates an intelligent method to control bi-directional DC motor systems without the need for remote feedback sensors.

The profiling controller board is specifically designed for use in motor control system that allows for motor free run at the end of travel in each direction. The free run is essential for proper operation of this controller and use of this controller in systems without free run capability is not recommended.

The profiling controller also has several features that are explained below.

1. Soft start for the motor in either direction. The soft start is a Pulse Width Modulated startup ramp that gradually brings the motor up to speed at the start of motion in each direction. The soft start feature extends motor life and provides smoother system performance.
2. On the fly storage of system control settings. This simply means that once the system is setup, it should never need to be changed again due to power outages. The controller remembers all control states and values so if power is removed the controller picks up where it left off before power was removed. Note: as a safety feature, the controller will never power up in motion. The control button must be pressed after power is reapplied and the controller will return to the direction it came from and is ready for service again. In a worse case scenario, if the power is removed during the easy or low power portion of travel. When power is restored and the control button is pressed the controller will run a short distance in the direction it came from and trip the over current shut down. The shut down is another safety feature that ensures that while in a high current load situation at mid travel, this insures that the way is clear before returning. Press the control button again and the motor will travel in the reverse direction again returning to the end position in the direction it was originally traveling before power was removed.
3. The controller stores the setback values if tripped during motion. This feature allows for the power to be shut off after an over current shut down. This would allow for the obstruction to be removed, power reapplied, and the controller would remember that an over current shut down had accrued and would return to the direction it came from without losing track of where it was. This feature makes the controller nearly bullet proof.

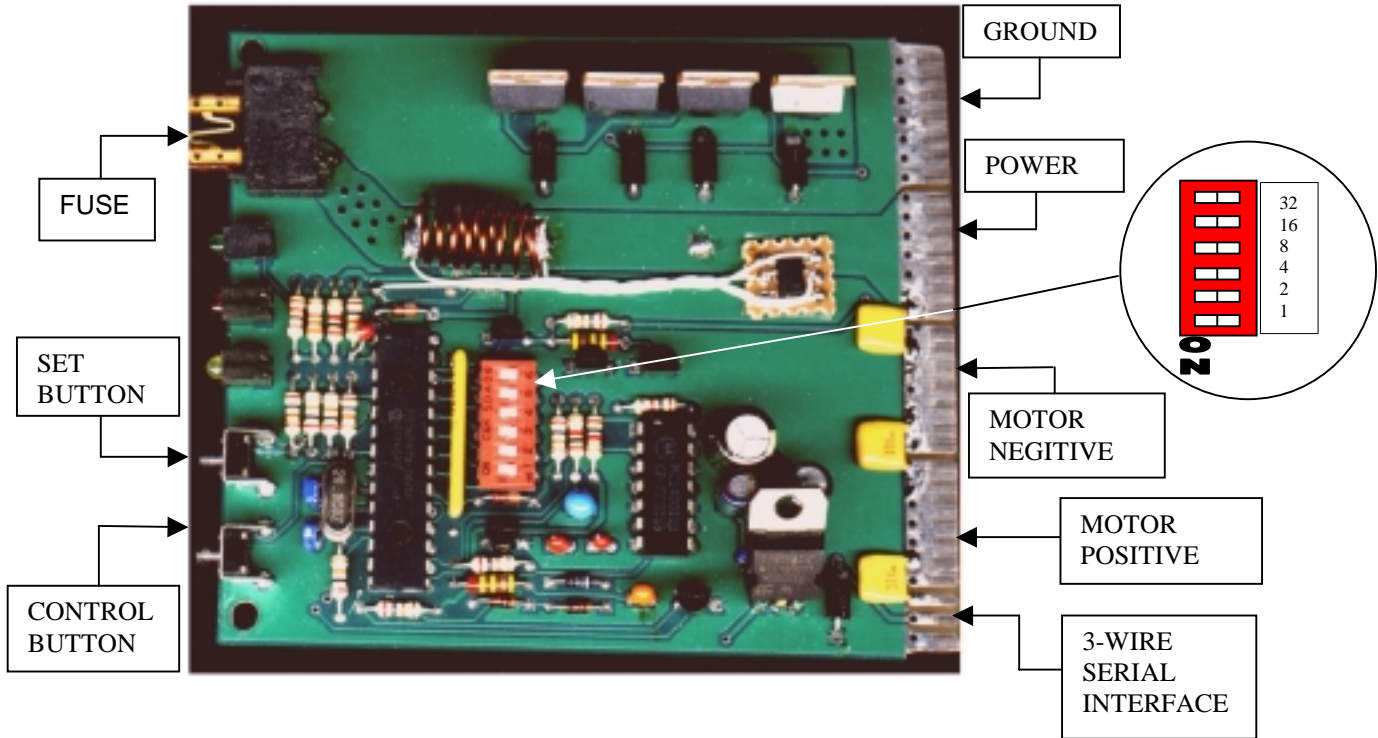
## Setup Procedure

The power networking system can operate a total of 60 motor control modules. Each motor control module sets its own address just like the switch panels. The address can be set two ways. The first way is to press and hold the control button while cycling power to the module. The yellow and red LED's will flash slowly to indicate that the module is in address configuration mode. Press the control button again and the LED's should flash 10 times rapidly. The 10 rapid flashes indicate that the module is locating it's own address automatically. When the flashing stops the module is finished and will have an address value stored once and for all. The modules locate and assign addresses automatically. The assignments are in sequential order starting with address #1 and counting up from there. The second method to set the address is to use the 3-way or 6-way switch panels to send a system wide configure address command. (See the switch panel section for details.) Having sent the system wide configure address command, all the switch panels and motor control modules will be flashing slowly. Press the control buttons on each motor control module in the order you wish to have the address set and watch for the 10 rapid flashes on each module before moving to the next module. When all modules and switch panels have been set (no more flashing anywhere) the system is ready for computer configuration to assign switches to modules.

The controller is very easy to initially setup. Simply connect the controller to power and the motor. Then press and hold the set button then press and hold the control button. If the motor travels in the wrong direction let go of the two buttons and press them again in the same sequence. The motor should now move in the proper direction. Hold the two buttons until the motor has run the desired distance. Release the two buttons and press and hold them again. The motor should now travel in the other direction. Hold the two buttons until the motor has traveled the desired distance then release the two buttons. You have now completed the travel time setup for both directions of travel. Next press the control button and the motor will start and run to one extreme and stop. Press the control button again and the motor will run to the other extreme and stop. The run out and back created current profiles for both directions and stored them. This completes the setup procedure. The controller is now ready for service and should not need setup again. If the drive system is changed or you desire to change the setup simply press the control button and wait for the motor to finish running in either direction then follow the above procedure again. If the controller has tripped due to an over current shut down and you

wish to setup the controller again you must make sure that the controller has returned to either extreme before performing setup procedure again.

The controller board is shown in figure 5 below. There is a 6-pole dipswitch that is used to set the over current trip threshold. The trip threshold is adjustable from 0 to 255 in increments of 4. This allows you to set the trip threshold as close to or far away as you desire from the current profile. Simply stated the trip threshold setting varies the sensitivity of the control board.



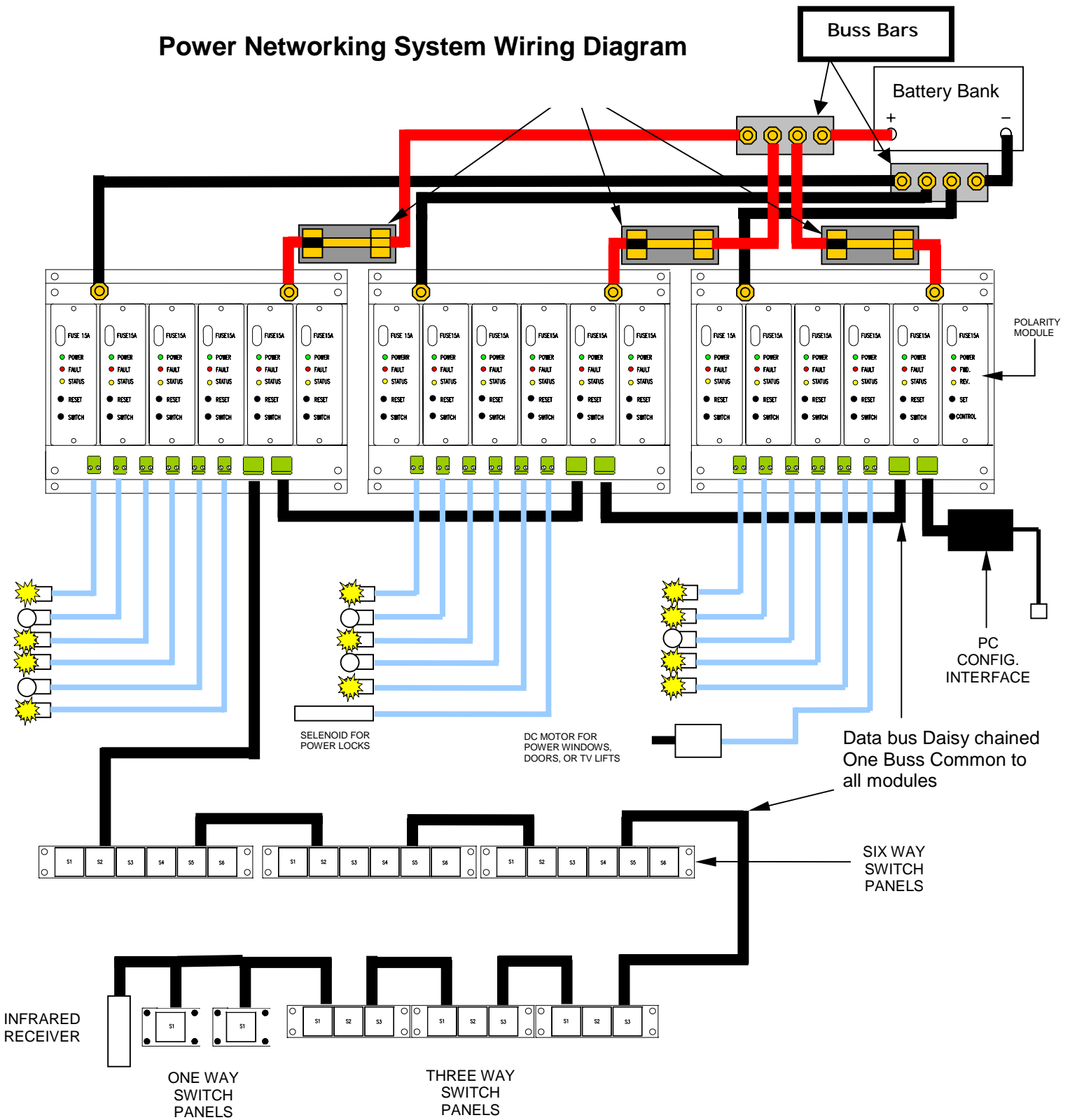
The dipswitch settings are shown in CHART 2 below.

CHART 2

Dipswitch. value	Trip Value	1	2	4	8	16	32
1	4	on	off	off	off	off	off
2	8	off	on	off	off	off	off
3	12	on	on	off	off	off	off
4	16	off	off	on	off	off	off
5	20	on	off	on	off	off	off
6	24	off	on	on	off	off	off
7	28	on	on	on	off	off	off
8	32	off	off	off	on	off	off
9	36	on	off	off	on	off	off
10	40	off	on	off	on	off	off
11	44	on	on	off	on	off	off
12	48	off	off	on	on	off	off
13	52	on	off	on	on	off	off
14	56	off	on	on	on	off	off
15	60	on	on	on	on	off	off

16	64	off	off	off	off	on	off
17	68	on	off	off	off	on	off
18	72	off	on	off	off	on	off
19	76	on	in	off	off	on	off
20	80	off	off	on	off	on	off
21	84	on	off	on	off	on	off
22	88	off	on	on	off	on	off
23	92	on	on	on	off	on	off
24	96	off	off	off	on	on	off
25	100	on	off	off	on	on	off
26	104	off	on	off	on	on	off
27	108	on	on	off	on	on	off
28	112	off	off	on	on	on	off
29	116	on	off	on	on	on	off
30	120	off	on	on	on	on	off
31	124	on	on	on	on	on	off
32	128	off	off	off	off	off	on
33	132	on	off	off	off	off	on
34	136	off	on	off	off	off	on
35	142	on	in	off	off	off	on
36	146	off	off	on	off	off	on
37	150	on	off	on	off	off	on
38	154	off	on	on	off	off	on
39	158	on	on	on	off	off	on
40	162	off	off	off	on	off	on
41	166	on	off	off	on	off	on
42	170	off	on	off	on	off	on
43	174	on	on	off	on	off	on
44	178	off	off	on	on	off	on
45	182	on	off	on	on	off	on
46	184	off	on	on	on	off	on
47	188	on	on	on	on	off	on
48	192	off	off	off	off	on	on
49	196	on	off	off	off	on	on
50	200	off	on	off	off	on	on
51	204	on	in	off	off	on	on
52	208	off	off	on	off	on	on
53	212	on	off	on	off	on	on
54	216	off	on	on	off	on	on
55	220	on	on	on	off	on	on
56	224	off	off	off	on	on	on
57	228	on	off	off	on	on	on
58	232	off	on	off	on	on	on
59	236	on	on	off	on	on	on
60	240	off	off	on	on	on	on
61	244	on	off	on	on	on	on
62	248	off	on	on	on	on	on
63	252	on	on	on	on	on	on

# Power Networking System Wiring Diagram

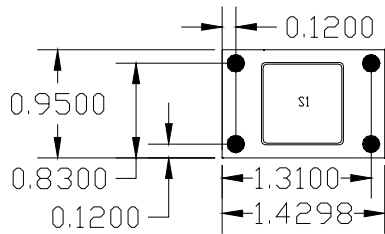




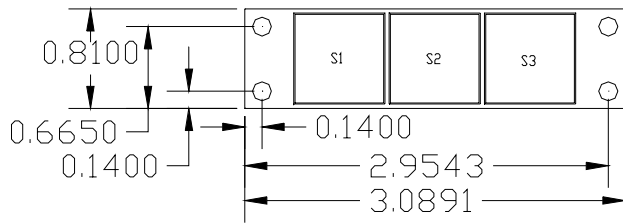
# Networking DC power distribution system

## Mechanical specifications

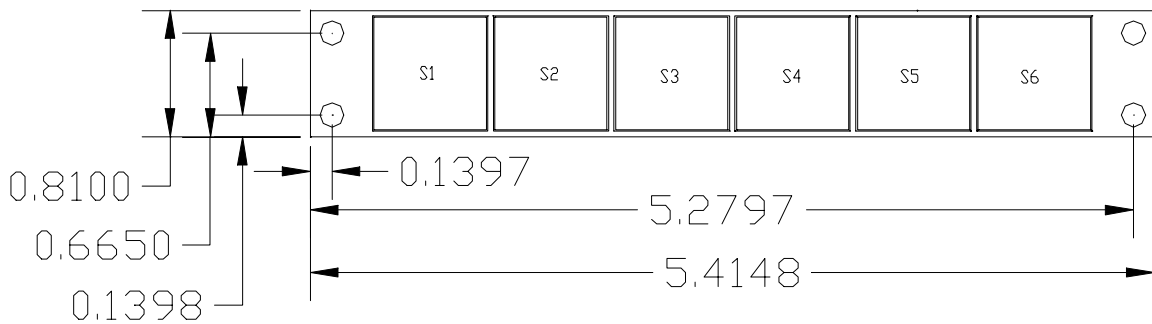
1-way switch panel dimensions

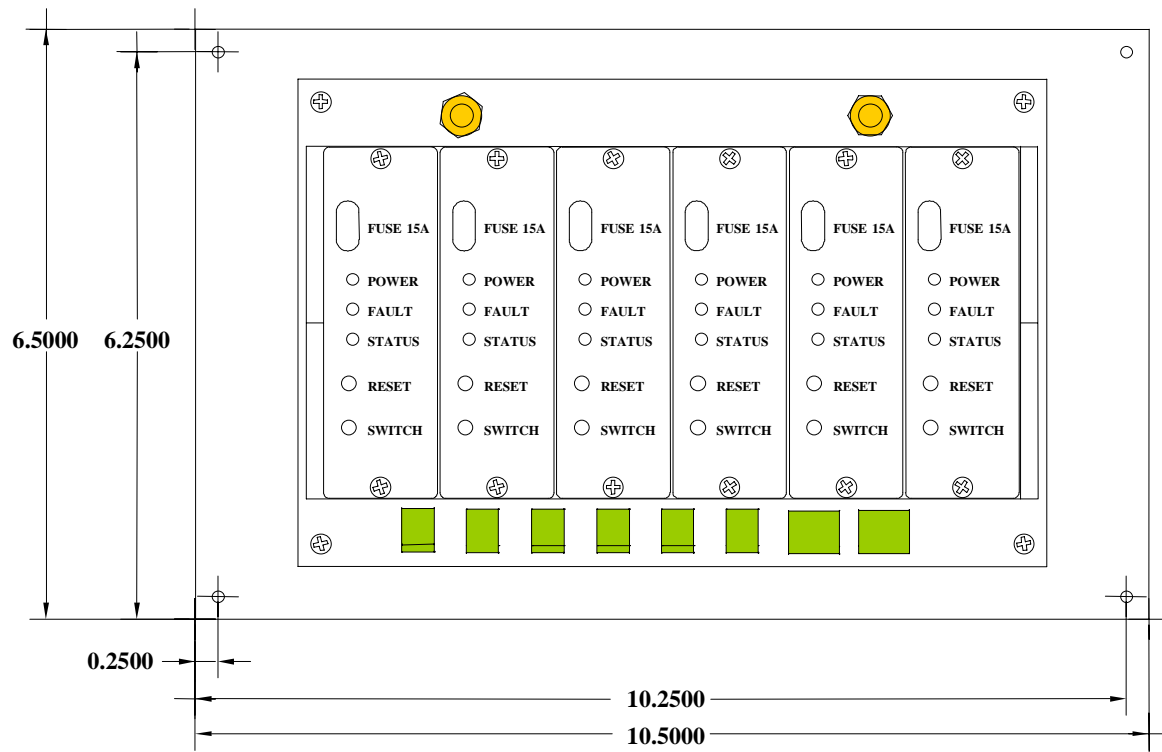


3-way switch panel dimensions



6-way switch panel dimensions





Rack unit mounting hole dimensions

## Electrical Specifications

### Switch Panels

#### 6-Way

Voltage input: 8 – 28V DC  
Power Input: 70mA MAX

#### 3-Way

Voltage input: 8 – 28V DC  
Power Input: 45mA MAX

#### 1-Way

Voltage input: 8 -- 28V DC  
Power Input: 20mA MAX

### DSMM Module

Voltage input: 11 – 16VDC  
Power Input: 20.1 Amp MAX  
Rated Switching Current: 20 Amp MAX  
Dimming method: Filtered Pulse Width Modulation @ 35Khz

### Rack Unit

Voltage Input: 11 – 16VDC  
Power Input: 92 Amps Max  
Rated Switching Current: 90 Amps Max  
Rated current per. Circuit per. Rack) 20 Amps Max (Total for 6 Circuits combined < 90 Amps

### DC Motor Control Module

Voltage Input: 11 – 16VDC  
Power Input: 5 Amps Max (0 – 5 Amp version)  
10 Amps max (0 – 10 Amp version)  
20 amps Max (0 – 20 Amp version)

Maximum travel time  
Each direction 2 minutes  
Minimum travel time  
Each direction 3.5 seconds  
Current tests each direction 50 equal-distant tests each direction  
Dynamic sensitivity Adjustable 63 steps