THE S&S4

OWNER'S MANUAL

Version 1.02

TABLE OF CONTENTS

INTRODUCTION

Congratulations on your purchase of a Spectrum S624 dimmer. The S624 is a rugged and versatile dimmer designed to provide years of flawless performance. Some of the features include:

* 6 channels @ 2400 Watts each
* Field configurable for either single or three phase
* Extensive front panel indicators displaying channel levels and system status
* All external connections located on the rear of the dimmer
* 0-10 V Analog and DMX-512 control inputs merged in a highest-takes-precedence or pile-on manner
* Solid State Relays using back to back SCR's
* Toroidal chokes with a rise time of 400 microseconds
* Focus check buttons

Note: This manual will reference the model number option codes. An "x" signifies a letter that doesn't matter for the specific situation. Ex: S624-xxD refers to any S624 with DMX-512. See appendix A for the model number assignments.

SYSTEM CONSIDERATIONS

Mounting and Cooling

A thermostat controls the fan on the left side. Whenever the internal temperature exceeds approximately 30^{0}C/85^{0}F, the fan will switch on. Because the dimmer uses forces air cooling, you must allow a sizable path for air to enter and exit the unit.

Over-temperature

If the internal temperature reaches an unsafe level (90^{0}C/195^{0}F), the S624 will temporarily shut itself down. When the unit cools to a safe temperature, it will restart--automatically. Unless the fan fails or something severely restricts the airflow, the S624 will operate at full load indefinitely without reaching the over-temperature level.

INPUT POWER CONNECTIONS

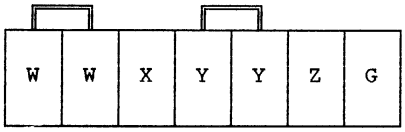
The S624 can operate from single or three phase power. For models S624-Uxx and S624-Vxx just plug the appropriate power connector to the back of the dimmer. For all other models read the following sections. But first, here's the emphatic warning in capital letters:

BEFORE ATTEMPTING TO CONNECT OR SERVICE THE S264, MAKE SURE THAT YOU SHUT OFF THE POWER FOR THE DIMMER. OTHERWISE YOU MAY RECEIVE A HARMFUL OR DEADLY ELECTRICAL SHOCK!

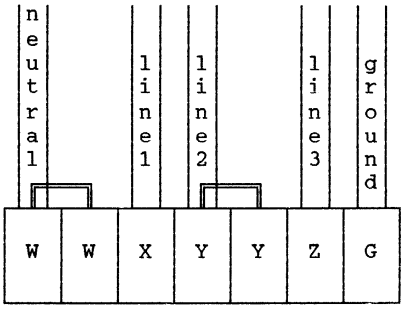
Three Phase Power

This arrangement has 5 wires: 3 hots, 1 neutral, and 1 ground. To configure the dimmer for three phase power do this:

1) Arrange the jumpers on the main terminal block like this:

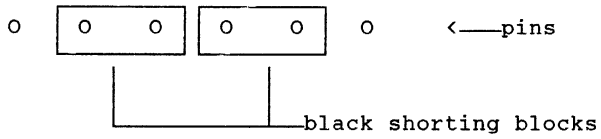


2) Attach the wires from the input like this: (the standard wire colors for lines 1, 2, & 3 are red, blue, and black. The neutral is white, the ground is green.)



3) Locate the control phase jumpers. They are on the back of the Printed Circuit Board (PCB) that is mounted to the front panel. You can easily switch these jumpers using needle-nose pliers. For models S624-xxD, the control jumpers are sandwiched between the two PCB's. You can still see and switch them.

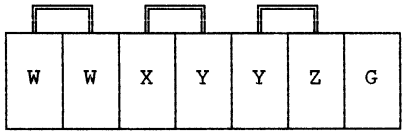
4) Set them like this:



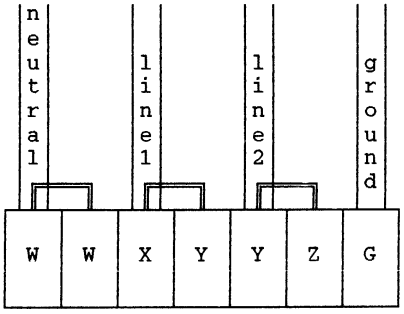
Single Phase Power

This arrangement has 4 wires: 2 hots, 1 neutral, and 1 ground. To configure the dimmer for single phase power do this:

1) Arrange the jumpers on the main terminal block like this:

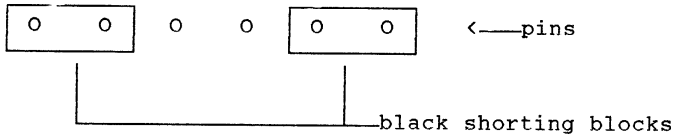


2) Attach the wires from the input like this: (the standard wire colors for lines 1 & 2 are red, blue, and black. The neutral is white, the ground is green.))



3) Locate the control phase jumpers. They are on the back of the Printed Circuit Board (PCB) that is mounted to the front panel. You can easily switch these jumpers using needle-nose pliers. For models S624-xxD, the control jumpers are sandwiched between the two PCB's. You can still see and switch them.

4) Set them like this:



OUTPUT POWER AND CONTROL CONNECTIONS

Determining the Load

A load can either be expressed in Amps or Watts. With a line voltage of 120 Volts, Amps & Watts are related like this:

Amps = Watts / 120

Watts = Amps x 120

The S624 can handle no more than 2400 Watts or 20 Amps per channel. So, when you connect lighting or equipment to the dimmer, be careful not to exceed this limit.

Output Power Connections

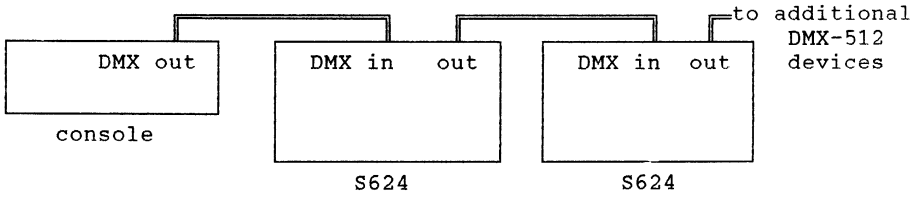
On all but the S624-xTx, simply plug your lighting instruments or devices into the appropriate channel receptacle.

For models S624-xTx, you will need to connect the load wiring to the internal terminal block. The hot and neutral wires attach to the 12-circuit terminal block, which is located behind the chokes. You can connect the ground wires from the load circuits to the main terminal block.

Control Connections

All models have three connectors for the 0-10V control signal. Keep in mind, that the three connectors for the analog input are wired together. So, if you want to control two dimmer packs with the same analog signals, you can use the extra connectors for distribution.

For models S624-xxD, there are two more connectors on the back panel. The DMX-512 IN receives the control signal from the console. The DMX-512 out port is a copy of the input signal. This port will pass the DMX-512 signal on to the next dimmer. The output port works even if the S624 is off. To connect dimmers using DMX-512, follow this diagram.



You can find the pin assignments for the control connectors in Appendix A.

SYSTEM OPERATION

Front Panel Indicators

L1 - This LED indicates that the phase X (Line 1) AC input is live.

L2 - For the 3 phase configuration, this LED indicates that the phase Y (Line 2) AC input is live. For single phase applications, the LED will behave the same as L1 does.

L3 - This LED indicates that the phase Z (Line 3) AC input is live.

+15 VDC - This LED shows that the internal power supply is working. The internal electronics are powered from line 1 (L1). This is Phase X on the main terminal block.

OT - This LED will light when an Over Temperature conditions occurs. When the S624 exceeds the maximum allowable temperature, it will shut itself down and light the OT LED. Once the dimmer reaches a more appropriate temperature, the S624 will resume normal operation.

DMX-512 - (With the DMX-512 option) When the S624 receives a valid DMX-512 signal, it will light this indicator.

Front Panel Controls

Circuit breakers - These 20 Amp circuit breakers protect the dimmer from shorts or overloads on the channel outputs. They also serve as channel disconnects.

Fuseholder - This fuse protects the fan, internal circuitry, and the timing circuit on Line 1. Replace only with a 2A 250V fuse.

Focus Check Buttons - The six latching buttons toggle each channel from normal operation to full on.

LOW - this control is recessed beneath the surface of the front panel. It controls the amount of preheat for all of the dimmers. (Preheat is a low trim adjustment. See Appendix B to learn how to trim the dimmer.)

High trims - There are three pots recessed beneath the front panel for high trimming each phase. They are factory calibrated.

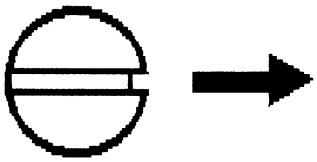
Address high & low - (optional) you can select the dimmer assignment for the DMX-512 control input. For a full explanation see the next section.

Setting the Address switches (with the DMX-512 option)

DMX-512 gets it's name from the ability to control 512 dimmers through a Digital MultipleX. Meaning, a single control link contains level information for 512 dimmers. As a result, you must tell the S624 which dimmer levels it should use.

By setting the DMX address, you are specifying which DMX dimmer signal will control dimmer #1 on the S624. From there, the next 5 DMX dimmer signals control S624 dimmers #2 through #6, respectively.

The DMX address is a two digit hexadecimal number. This means that each of the digits could be 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, or F. You select the DMX address with the two switches above the DMX-512 LED. The upper address switch is the first digit, the lower is the second. Look closely at the screwdriver slot in the white address switch. The diagram below shows how to tell which way the switch is pointing. Table 1 shows the relation between the DMX address and the dimmer assignment.



Example:

Suppose you want the S624 to act as dimmers 31 through 36 on the DMX-512 link. To do this you would look at table 1 and find that dimmer 31 corresponds to address 1E. Then you would set the upper address switch to 1, and the lower switch to E.

Table 1: Starting Dimmer versus Address Number

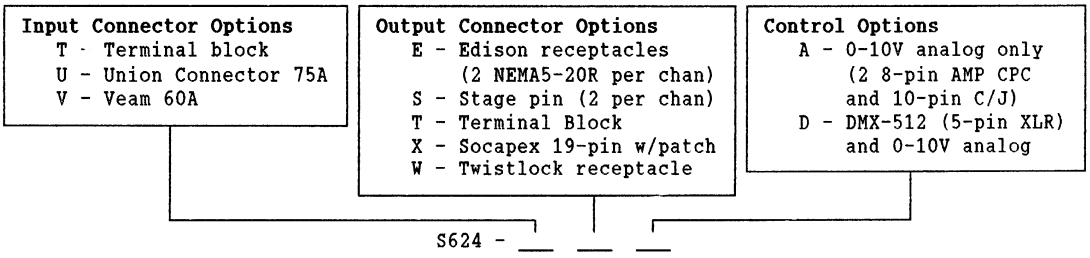
Dim#	Addr#	Dim#	Addr#	Dim#	Addr#	Dim#	Addr#	Dim#	Addr#
1	00	53	34	105	68	157	9C	209	D0
2	01	54	35	106	69	158	9D	210	D1
3	02	55	36	107	6A	159	9E	211	D2
4	03	56	37	108	6B	160	9F	212	D3
5	04	57	38	109	6C	161	A0	213	D4
6	05	58	39	110	6D	162	A1	214	D5
7	06	59	3A	111	6E	163	A2	215	D6
8	07	60	3B	112	6F	164	A3	216	D7
9	08	61	3C	113	70	165	A4	217	D8
10	09	62	3D	114	71	166	A5	218	D9
11	0A	63	3E	115	72	167	A6	219	DA
12	0B	64	3F	116	73	168	A7	220	DB
13	0C	65	40	117	74	169	A8	221	DC
14	0D	66	41	118	75	170	A9	222	DD
15	0E	67	42	119	76	171	AA	223	DE
16	0F	68	43	120	77	172	AB	224	DF
17	10	69	44	121	78	173	AC	225	E0
18	11	70	45	122	79	174	AD	226	E1
19	12	71	46	123	7A	175	AE	227	E2
20	13	72	47	124	7B	176	AF	228	E3
21	14	73	48	125	7C	177	B0	229	E4
22	15	74	49	126	7D	178	B1	230	E5
23	16	75	4A	127	7E	179	B2	231	E6
24	17	76	4B	128	7F	180	B3	232	E7
25	18	77	4C	129	80	181	B4	233	E8
26	19	78	4D	130	81	182	B5	234	E9
27	1A	79	4E	131	82	183	B6	235	EA
28	1B	80	4F	132	83	184	B7	236	EB
29	1C	81	50	133	84	185	B8	237	EC
30	1D	82	51	134	85	186	B9	238	ED
31	1E	83	52	135	86	187	BA	239	EE
32	1F	84	53	136	87	188	BB	240	EF
33	20	85	54	137	88	189	BC	241	F0
34	21	86	55	138	89	190	BD	242	F1
35	22	87	56	139	8A	191	BE	243	F2
36	23	88	57	140	8B	192	BF	244	F3
37	24	89	58	141	8C	193	C0	245	F4
38	25	90	59	142	8D	194	C1	246	F5
39	26	91	5A	143	8E	195	C2	247	F6
40	27	92	5B	144	8F	196	C3	248	F7
41	28	93	5C	145	90	197	C4	249	F8
42	29	94	5D	146	91	198	C5	250	F9
43	2A	95	5E	147	92	199	C6	251	FA
44	2B	96	5F	148	93	200	C7	252	FB
45	2C	97	60	149	94	201	C8	253	FC
46	2D	98	61	150	95	202	C9	254	FD
47	2E	99	62	151	96	203	CA	255	FE
48	2F	100	63	152	97	204	CB	256	FF
49	30	101	64	153	98	205	CC		
50	31	102	65	154	99	206	CD		
51	32	103	66	155	9A	207	CE		
52	33	104	67	156	9B	208	CF		

TROUBLE SHOOTING

If you experience problems with your S624, please consult the trouble shooting guide below. If this does not help, please call the factory for further assistance (7:30 - 5:00 weekdays, Eastern Time @ (215) 395-6934)

Symptom	Possible Cause
OT (Over temp) light is on	* Fan vents blocked causing over temperature condition * Ambient temperature over 40 deg. C or 104 deg. F
+15 VDC and L1 lights don't go on	* Control fuse blown * Input terminal block wired incorrectly * No power to unit
L2 or L3 lights don't go on	* Input power wired incorrectly * No power to unit
A certain channel stays on constantly	* Focus check button latched on
A single channel doesn't work	* Circuit breaker tripped * Lamp has burned out * Light plugged into wrong circuit * DMX address set incorrectly (with the DMX-512 option)
Channels 3 & 4 don't dim correctly	* Jumpers on control board set for wrong phase arrangement--check configuration section on page 7 * Jumpers on main terminal block set for wrong phase arrangement--check configuration section on page 4
Entire dimmer doesn't work	* DMX-512 address set for dimmers that the controller doesn't use * control fuse blown * Input power wires connected incorrectly

APPENDIX A: MODEL NUMBER DESIGNATION



APPENDIX B: SETTING THE HIGH AND LOW TRIMS

Under normal operation, the S624 shouldn't require trimming. However, if you adjusted the LOW trim for preheat or changed the high trims, you will need to recalibrate as follows:

Setup

1) If you have the DMX-512 option
   Connect a reliable DMX-512 source to the DMX in jack. (A console or DMX test box are acceptable)
   If you don't have the DMX-512 option
   Connect a reliable analog source to any of the analog input connectors. (A console or variable power supply are acceptable)

2) On the controller or test box, switch all the channels for the S264 to full.

Phase X

3) Set the your multimeter to read AC rms Voltage, with a range greater than 120 Volts. Connect the meter to the output of channel 1. You will also need to connect a load greater than 100 Watts to channel 1.

4) Turn the uppermost high trim fully clockwise. Make a mental note of the voltage displayed on the meter.

5) Watching the meter, slowly turn this pot counter-clockwise. Stop when the voltage starts to change. Backup slightly until the voltage returns to what it was in step 4)

Phase Y

If your S624 is configured for single phase power, skip to "Phase Z."

6) Connect the multimeter and a 100+ Watt load to channel 3.

7) Turn the second pot from the top fully clockwise. Make a mental note of the voltage displayed on the meter.

8) Watching the meter, slowly turn this pot counter-clockwise. Stop when the voltage starts to change. Backup slightly until the voltage returns to what it was in step 7)

Phase Z

9) Connect the multimeter and a 100+ Watt load to channel 5.

10) Turn the second pot from the bottom fully clockwise. Make a mental note of the voltage displayed on the meter.

11) Watching the meter, slowly turn this pot counter-clockwise. Stop when the

voltage starts to change. Backup slightly until the voltage returns to what it was in step 10)

Low trim

(Leave the multimeter and a 100+ Watt load connected to channel 5.)

12) On the controller or test box, set all channels to off (0%).

13) Turn the lowest pot fully counter-clockwise. The meter will read 0V. (Consider anything less than .1V as zero.)

14) Slowly turn the pot clockwise until the voltage rises above zero. Backup slightly until the voltage returns to zero. (If you want to set a preheat level then set the low trim to that voltage instead.)

APPENDIX C: CONTROL CONNECTOR PIN ASSIGNMENTS

AMP 8-pin CPC Connector

1 - signal common
2 - channel #1
3 - channel #2
4 - channel #3
5 - channel #4
6 - channel #5
7 - channel #6
8 - +15V DC

Cinch/Jones 10-pin

1 - channel #1
2 - channel #2
3 - channel #3
4 - channel #4
5 - channel #5
6 - channel #6
7 - +15V DC
8 - signal common
9 - no connection
10 - no connection

5-pin XLR (with the DMX-512 option)

1 - signal common (shield)
2 - Dimmer drive complement (data 1-)
3 - Dimmer drive true (data 1 +)
4 - no connection
5 - no connection

APPENDIX D: SPECIFICATIONS

PHYSICAL

Size:
5.125"H x 17.0"W x 12.25"D 3 spaces in a standard 19" rack (with optional rack ears)

Weight:
32 lbs.

Material:
16 gauge CR Steel, Textured black finish with white graphics

PERFORMANCE

Rise Time:
400us, measured from 10% to 90% at a 90 degree conduction angle

Efficiency:
97%

ELECTRICAL

Input Power:
Single Phase; 120/240 VAC 60 Amps
Three Phase; 120/208 VAC 40 Amps

Input Connectors Available:
Internal terminal block
75A, 5 pin, Union Connector G47M-RC
60A, 5 pin, Veam CIR030GRH-32A-5P-F80

Power Output:
6 x 2400W (Continuous Duty)

Control Input:
0-10Vdc (standard)
DMX-512 (optional)

Control Power Output:
15Vdc, 350mA

Circuit Protection:
Six 20A circuit breakers (10,000 AIC), Three 2A fuses (internal circuitry)