

OWNER'S MANUAL



MD460DMX-24

MD412DMX-48

MD412DMX512

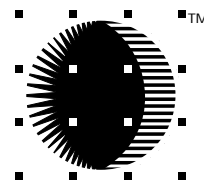
MD412DMX512KO

MD812DMX512

MD812DMX512KO

MD824DMX512

MD824DMX512KO



ETA SYSTEMS

A Creative Light & Sound Company

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Thank you for purchasing an ETA SYSTEMS MD PROFESSIONAL SERIES DIMMER unit. Years of experience, innovative engineering design, and care in manufacturing have resulted in this lighting control system. We are proud that you chose to be among the many professionals utilizing ETA's superior quality products. With proper operation and care, you and your audiences will enjoy many years of professional lighting presentations.

CAUTION: TO INSURE FULL, SAFE USE OF YOUR MD SERIES DIMMER PACK, PLEASE READ AND FOLLOW THE INSTRUCTIONS IN THIS OWNER'S MANUAL CAREFULLY. ETA HAS DESIGNED A SAFE, DURABLE, AND HIGH POWERED ELECTRICAL CONTROL SYSTEM. AS SUCH, THIS CAN BE POTENTIALLY DANGEROUS. ONLY QUALIFIED TECHNICAL PERSONNEL SHOULD INSTALL, USE, AND MAINTAIN THIS TYPE CONTROL SYSTEM. BUYERS AND USERS HAVE THE RESPONSIBILITY TO BE AWARE OF AND TAKE PROPER SAFETY PRECAUTIONS.

Every effort has been made to provide complete, accurate information for the safe, effective, use and application of ETA lighting products. The end user assumes responsibility for any injury, unit malfunction, or damage to other ancillary system equipment in the system resulting from negligence, misapplication, or exceeding the unit power ratings.

Questions and concerns regarding proper use, electrical hook-ups, power capacity, or system applications require qualified technical assistance. Feel free to contact ETA Customer Service or your ETA Dealer for information and technical assistance.

For warranty convenience and ready reference, please take a minute and record the following information:

Purchased From: _____

Date: _____

Unit Model No. _____

Serial No. _____

NOTE: READ AND BECOME FAMILIAR WITH THE ENTIRE CONTENTS OF THIS OWNER'S MANUAL PRIOR TO USE OF THE PRODUCT.

WARNING: IMPROPER USE AND APPLICATION OF HIGH VOLTAGE CONTROL AND POWER DISTRIBUTION UNITS COULD RESULT IN EQUIPMENT DAMAGE, SERIOUS INJURY, OR DEATH.

IMPORTANT SAFEGUARDS:

When using electrical control equipment, basic safety precautions should be observed. This includes but is not limited to the following:

1. Read all instructions before using this product.
2. To prevent electrical shock, do not use this product near or in water or in conditions of extreme humidity.
3. Close supervision and monitoring is advised when the device is used by or near other individuals, especially young children.
4. Unplug or disconnect the device from the electrical power outlet when the device is not in use, or before maintenance and cleaning.
5. Do not operate this device with a damaged cord or plug, or if the device malfunctions, is dropped, or any damage is suspected.
6. Use of attachments or other items not sold or specified by ETA is not recommended and may void all implied and written warranties.

ordinary use or modification to the product shall be at the user's risk.

8. Do not leave the device(s) totally unattended while it is operating.
9. Provide a sufficient clearance around the unit of at least three to four inches when operating, for proper functioning and cooling.

For fan-cooled installations, periodically clean unit and filters.

10. This device utilizes grounded AC power plugs/cables which must be connected to an electrically grounded power source or receptacle.
11. If it is necessary to use an extended power cable, use only a 3-wire extension cord or cable that has the required voltage and current rating, and if terminated, a three blade grounding plug, and a 3-slot receptacle that will accept the plug on the unit. Repair or replace damaged cords & connectors.
12. Do not route power or interconnecting cables where they may be damaged due to abnormal conditions which could result in unit failure.

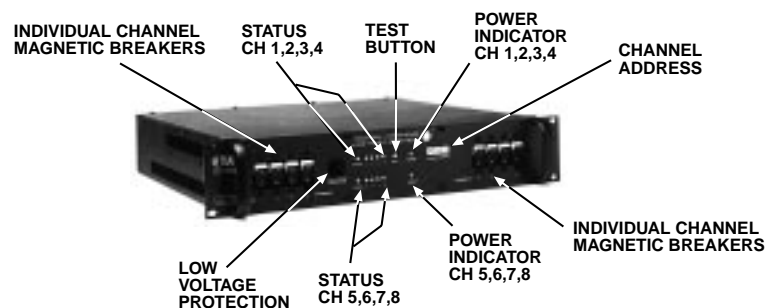
SAVE THESE INSTRUCTIONS

ELECTRICAL RATINGS

<u>Model No.</u>	<u>Input Power Requirements Max.</u>	<u>Output Capacity</u>
MD412DMX512	(2) 120VAC 60Hz 20A Each	4X 1200W = 4800W
MD424DMX512	(2) 220VAC 60Hz 40A Each	8X 1200W = 9600W
MD824DMX512	(2) 220VAC 60Hz 80A Each	8X 2400W = 19200W

As seen in the above chart, Models MD812 DMX512, MD824 DMX512, and MD412 DMX512 are provided with a terminal block for hard-wire connections for 220 VAC single phase or any two (2) phases of three phase power source.

GENERAL INFORMATION



ANSI/UL-508 Standard, certified by ETL Laboratories (pending)

The "MD" Professional Series Digital solid-state dimmers feature ETA® Systems exclusive "two dimmers in one." Designed into every four and eight channel unit are two Protocol Control Systems; both digital DMX512 and Multiplex. The analog signal (0 to 10V DC) is optional. Cable connections are standard 5-pin DMX or 3-pin Microphone type. Optional analog series require ETA's 4-channel analog cables and an easy field conversion with a 6-pin DIN connector kit. Connecting the required cable automatically establishes the required protocol when the micro-processor senses the input signal.

These dimmers are standard rack mount units and available in a 4 or 8 channel configuration. All units feature terminal block for hard wire power hook-up to a single phase or two legs of a three-phase source. Output power connector options include dual Edison receptacles or standard terminal blocks. All channels are always individually circuit-breaker protected.

Additional features include magnetic circuit-breaker protection, SCR power control, and utilization of toroidal audio noise filters. The dimmers are engineered in the US and made to the high standards established by ETA® Systems. Dimmers are backed by a one (1) year limited warranty for failure due to workmanship and materials. Due to manufacturer's limitations, SCRs are warranted for only 60 days.

Special Features:

- Multiple protocol: DMX512 and Ultrplex (multiplex), optional 0-10 V DC Analog requires a field modification kit.
- Microprocessor-monitored system features 4 or 8 channel models with either 1.2KW or 2.4KW power capacity.
- Multi-phase power hook-up options; single phase or any two legs of a three phase power source.
- Simplified channel assignment utilizes front-panel decimal switches.
- Low voltage protection provided by a front-panel (resettable) circuit breaker.
- Convenient front panel channel test circuitry.
- Availability of ten (10) built-in chase sequences and speeds.
- Individual channel field conversion to relay functions.
- Provides dual Edison power output receptacles or chassis knock-outs for access to internal terminal block connectors.
- Individual channel protection provided by magnetic circuit breakers.
- Designed for cooler and safer operation.

GENERAL UNIT DESCRIPTION:

The ETA MD Series Dimmer pack is a switchable multiple outlet "extension cord." The unit takes its power from either a 120 VAC or 220 VAC power source (usually a wall outlet, power distribution box, or the house lighting panel). The dimmer circuitry divides the incoming power into four or eight control channels which in turn feed the unit's electrical output receptacles, and ultimately, the lighting.

It should be noted that the Dimmer Pack cannot independently power stage lighting by itself. An external ETA or equivalent lighting controller must be connected to provide the required control signal to the Dimmer Pack, to turn the lighting on and off, and to control dimming levels for each channel. In this respect, the Dimmer Pack acts as a slave unit which provides a controlled linear voltage output resulting in smooth, gradual dimming without pulsing or erratic jumps in light output level.

The stage lamp fixtures are connected to individual Dimmer Packs which are fed a turn-on signal from a lighting controller unit. The actual number and type of controllers and dimmers required is dependent on house power availability and stage lighting wattage requirements.

CAUTION: Do not operate a Dimmer Pack beyond its maximum voltage and wattage rating or irreparable damage will result.

The Dimmer Pack's maximum power output capability is determined by the total capacity of the input power source. It is also influenced by the loading effects from other electrical equipment connected

to the same power source. The Dimmer Pack wattage rating indicates the power handling capability of the unit, it does not mean the Dimmer can generate more power than that available from the power source to the dimmer.

QUICK REFERENCE DIMMER PACK CONNECTION PROCEDURES:

1. Power Requirements:

UNIT	INPUT POWER CONNECTION & PHASING
MD412DMX512	117VAC Two line cord inputs; single or multi-phase
MD812DMX512	220VAC Single Phase or 2 legs of 208/220VAC 3 Phase
MD812DMX512	220VAC Single Phase or 2 legs of 208/220VAC 3 Phase

2. Grounding. House service and light cords, etc., must be grounded (see DIMMER PACK OPERATION section on grounding).

3. Cord Inspection. Each time the unit is used, visually check for damaged cord covering and frayed or bare wires. Replace/repair any damaged cords or plugs. Repairing must be done only by qualified electrical technicians.

4. Check and make sure stage light power cords are adequate for the stage light voltage and wattage rating.

5. Check and make sure the AC power input cord is the proper size. (See instructions for Input Power Connection for your specific ETA MD Series Dimmer Pack Model in this manual.)

6. Check the stage lights & cords. Test & verify each by plugging the individual stage light(s) into a hot 120 VAC wall outlet BEFORE connecting to your ETA MD Series Dimmer Pack.

7. Check for and replace defective lamps *before* connecting lighting to dimmer packs.

8. Check and verify the total wattage of the lamp fixtures to be plugged into each dimmer pack channel. The total calculated wattage must not exceed the maximum specified power rating of each channel.

9. Check and verify the total wattage of all lights to be connected to any particular Dimmer Pack. This total calculated wattage must not exceed the maximum specified power rating of the particular Dimmer.

WARNING: WHENEVER A DIMMER PACK IS PLUGGED INTO AN AC POWER SOURCE, THE DIMMER OUTPUT PLUGS ARE ELECTRICALLY "HOT", EVEN IF THE ASSOCIATED CONTROLLER POWER IS TURNED OFF.

DIMMER PACK OPERATION

1. Check and verify the dimmer is properly wired to the specified power source and the load to be connected does not exceed the total power capacity.

2. Your lighting system MUST be properly grounded. As with all electrical equipment, proper grounding is a must to protect the user and the audiences from potential electrical shock hazards and the possible consequences. As a side note, professional stage lighting does not "hum" or "sing" when properly grounded. If lamps or Dimmer Packs "hum," this is a result of defective grounding - not the dimmer system. Check and verify total lighting and power system grounding. Proper grounding also eliminates or drastically minimizes interference from other electrical noise generating sources.

3. Safe, quiet, and reliable operation of any lighting system is dependant upon the power system neutrals and grounds NOT being mechanically or electrically connected anywhere in the lighting system — except at the primary power source entrance to the house lighting panel. Again, for safe, noise-free lighting, power source neutrals and grounds must be electrically isolated from each other, with the exception of the mains power service to the facility or at the primary power feed to the house lighting panel.

4. Ground Continuity Check. Before connecting any controlled lighting system to a house lighting panel or any other power source, it is advisable to check and verify that system power grounds are not connected to their respective power neutrals. To do this, make sure the main power is turned off, and if possible locked out. You will need an ohmmeter with the range selector set on the highest resistance range. Connect the ohmmeter leads between the system neutral and ground connections. The resulting resistance should measure open circuit or infinity. If the resulting resistance reading is 60 Meg-Ohms or less on the highest meter resistance range, this is an indication there is a ground-neutral tie-point fault somewhere in the lighting system. This condition must be corrected for safety, reliability, and proper lighting system operation.

CAUTION: INEXPERIENCED INDIVIDUALS SHOULD NOT ATTEMPT TO PERFORM THE GROUND CONTINUITY CHECK AS SERIOUS INJURY OR SYSTEM DAMAGE COULD RESULT. CONTACT A QUALIFIED ELECTRICIAN OR TECHNICIAN AS REQUIRED.

5. Power cord/connector inspection. It is always a good idea to visually inspect lighting system interconnect and power cables for any damage to minimize intermittent, open circuits, and conditions that could result in system failure or an electrical shock hazard. A single strand of frayed wire could short and damage your Dimmer Pack or create a condition which could cause an electrical shock. Power connectors and plugs should be checked for wire strands or leads pulled out of their pins, loose retaining hardware, and proper strain reliefs. Replace or repair faulty cords.

6. It is also recommended that stage lamp fixtures be checked and verified BEFORE connecting them to a Dimmer Pack, particularly if they are to be installed in an inaccessible location. This is easily done by temporarily connecting the light directly to a known live power source. Repair fixtures and replace defective lamps as necessary BEFORE connecting to a Dimmer Pack.

7. Do not overload the power capacity of the dimmer, and most importantly, the individual power output channels. Continually overloading the power capacity may lead to premature failure of the dimmer or other lighting system components, and will void the warranty.

8. For safety and long life, it is wise to use electrical interconnect cabling and connectors which meet or exceed prevailing industry standards for the electrical loading used. (See figure #1).

9. RELAY FUNCTION. When the relay function is activated for a channel and the input is below approximately 20 % of full scale, that channel will stay in an OFF mode. When a signal is applied that exceeds 20% of the full scale value, the channel will be turned full ON, similar to a relay action. When an input signal level falls below approximately 15% of the full scale, the channel will turn OFF.

There are two DMX512 Control PC Boards mounted inside each MD824DMX512 and MD812DMX512 digital dimmer unit. The upper PC board controls channels 1 thru 4 and the lower PC board controls channels 5 thru 8. Only one PC board on MD412DMX512 controls channels 1 thru 4.

One 8-position dip switch is present on each control board. Upper PC Board switch positions 1 thru 4 control channels 1 through 4, and 1 through 4 lower PC Board switch positions control channels 5 through 8, and the relay functions. NOTE: Switches 5 through 8 on both control PC boards are pre-set at the factory and should not require re-adjustment and left alone.

To activate the relay function for each channel, slide the corresponding switch out towards the PC board edge. Switch 1 controls channel 1, switch 2 controls channel 2, etc.

DMX-512 ADDRESS SETTING

The three front panel decimal rotary switches provide a convenient, simple method to access all 512 channel address locations. This feature allows several dimmer packs to be used with one controller.

To select and set a DMX channel address, use a small screwdriver or a small tipped tool. If you want the dimmer channel to be set at the first available address, carefully set the switches, from left to right, at 0, 0, 1. When this is done, channels 1 thru 8 will be located at DMX channel addresses 1 thru 8.

If two MD824DMX512s are being used together to allow a 16 channel capacity, set the second unit's switches to 0, 0, 9. This will place the first channel of the second dimmer unit on channel 9.

It is possible to overlay channels of one dimmer over channels of a second dimmer. For example, if you wanted to overlay channels 5 thru 8 of dimmer A and channels 1 thru 4 of dimmer B, you would simply set the address of dimmer B to 0, 0, 5. This will automatically place the first channel of dimmer B to channel address 5, the second channel of dimmer B on channel address 6. etc.,

The three front panel decimal rotary switches also provide access to the built-in chase and speed controls. To access the chase mode, set the first switch to 9. To increase or decrease the chase speed, adjust the second switch from 0 to 9 for the desired chase speed. To change the chase sequences, the third switch can be set to one of ten chase sequences.

TEST SWITCH. A convenient front-panel push-button test switch is provided to check the DMX 512 dimmer operation or for initial dimmer set-up without requiring a lighting controller. Beginning with channel 1, each time the test switch is depressed, the channel selected will be turned ON or OFF. Each channel can be set in this manner, up to and including channel 8. When channel 8 is in the ON mode, depressing the test switch will command all channels to be turned ON. Depressing the test switch one more time will turn all the channels OFF.

MD SERIES DIMMER PACKS - GENERAL OPERATION

The MD412DMX512, MD812DMX512, and MD824DMX512 are designed for installation into a standard 19" equipment rack to allow centralized power control and a professional appearance.

NOTE: When installing power equipment into a rack cabinet, it is advisable to use a vented cabinet with cooling fans to insure proper cooling and to prevent "hot spots" which could result in premature equipment failure.

MD412DMX512 & MD812DMX512 / UKO FEATURES

- Uses (2) molded U-grounded 120VAC plug input power cords
- Provides Max 4800W @ 40 Amps (1200W @ 10 Amps X 4 channels)
- U-grounded output receptacles standard. An optional knock-out rear panel is available as a special order.
- Each channel has a front panel LED signal status indicator.
- Front panel decimal Address selector switch.
- Uses 2 - 5 pin DMX connectors.
- Uses two 6-pin DIN panel connector for connection to analog signal input. Upper connector for CH 1 to 4, Lower connector for CH 5 to 8.
- Uses 2 3-pin XLR connectors on rear panel for ultraplex input & output connections. Can use standard microphone cable configurations.

MD812DMX512 / UKO & MD824DMX512 / UKO FEATURES

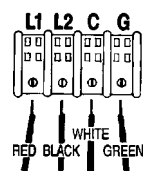
- Requires 4-wire power cable, see Figure #2 for wiring
- This MD812 provides Max. 9600W @ 2 X 40 Amps (1200W X 8 channels)
- This MD824 provides Max. 19200W @ 2 X 80 Amps (2400W X 8 Channels)
- U-grounded Edison output receptacles standard. An optional knock-out rear panel is available as a special order.
- Each channel has a front panel LED signal status indicator.
- Front panel decimal Address selector switch

Uses 2-5 pin DMX connectors.

Uses two 6-pin DIN panel connectors for connection to analog signal input. Upper connector for CH 1 to 4, Lower connector for CH 5 to 8.

Uses 2 3-pin XLR connectors on rear panel for ultraplex input & output connections. Can use standard microphone cable configurations.

RACK Mount DIMMER PACK HOOK UP:



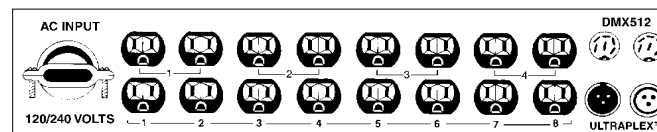
This unit will operate on any two legs of 220 VAC single or three phase power.

Terminal block inside dimmer pack. Power input wiring must be #2 gauge. Power requirements for ETA® MD824DMX-512 dimmer at full load - 160 amps total or 80 amps per hot leg.

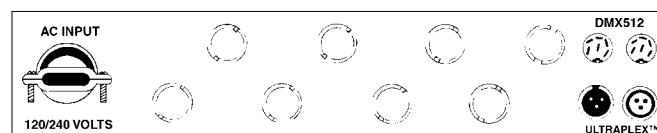
DANGER! LIFE THREATENING AND POTENTIALLY LETHAL SHOCK HAZARD. WIRING, HOOK-UP, AND TROUBLE-SHOOTING OF DIMMERS AND OTHER COMPONENTS IN THE LIGHTING SYSTEM MUST BE PERFORMED ONLY BY QUALIFIED TECHNICAL PERSONNEL. FAILURE TO OBSERVE AND FOLLOW ESTABLISHED SAFETY PRACTICES COULD RESULT IN DEATH, SERIOUS INJURY, EQUIPMENT FAILURE OR IRREPARABLE DAMAGE.

The 220VAC dimmer units can be operated from any two phases of a single phase source or any two legs of a 3-phase 220VAC power source, providing the required amperage capacity is available. Input voltage and current capacity must be checked and verified prior to electrical hook-up and use of the dimmer.

OPTIONAL POWER OUTPUT BACK PANELS FOR MD SERIES RACK-MOUNT DIMMER PACKS



MD412DMX / MD812DMX / MD824DMX



MD412DMXUKO / MD812DMXUKO / MD824DMXUKO

CARE AND MAINTENANCE

1. Refer to the Important Safeguards in the front of this manual.
2. For rack mounted Dimmer Packs, it is recommended that some type of shock mounting be considered, particularly for remote and mobile equipment installations.
3. Follow recommended interconnect procedures, especially grounding and safety checks, and cable and equipment inspections each time the lighting system is changed around or taken apart. Don't assume there are no damage or problems. Even if the lighting system worked well in the last show, inspect lighting system components, fixtures, cables, and connectors before or during the system interconnect.

4. ETA MD Series Dimmer Packs are designed to be very durable. If there is a malfunction and repair is required, the unit should be returned to ETA for repair, regardless of warranty status.

SERVICE – ETA maintains a trained service staff and has the equipment necessary to troubleshoot and repair these units in a safe manner. Repairs to any ETA product not performed by ETA or an authorized dealer or service facility will void all warranties and relieve ETA of any liabilities.

EQUIPMENT RETURNS

ETA Customer Service must be contacted, a Return Authorization approved and a RA# issued before equipment or parts can be returned for any reason. This is required for tracking and billing purposes. Unauthorized returns will not be accepted.

When returning equipment to ETA, it must be properly packaged in the original or suitable carton, and insured for its full value in case of loss, handling, or shipping damage. ETA shall not be responsible for any equipment loss or shipping damage during incoming or return shipment.

Include the following information with all returns:

- * Customer name, address, and daytime phone number.
- * Name or description and serial number (if applicable) of the equipment.
- * A purchase receipt, invoice, or other proof of date of purchase (required for all in-warranty returns/repairs).
- * A brief description of the problem or failure, or what you believe is the problem with the unit.

POWER CONVERSION FORMULAS

Working with power control equipment requires a basic knowledge of the power source capacity in voltage and current, and the available power in wattage required by the devices (load) for proper operation. Circuit loading in excess of power line capacity can result in control equipment damage and power source failures, including potentials for fire and shock hazards to user personnel.

Following are simple formulas to aid users in calculating power and current. Source voltage is usually known. Two factors must be known (or estimated) in order to work the formulas.

To calculate power in Watts, current and voltage must be known. The formula is:

$$\text{Power (Watts)} = \text{Current (Amps)} \times \text{Voltage (Volts)}$$

For example, if the Current given is 10 Amps, and the line voltage is 120 Volts, transposing the numbers in the formula, we have:

$$\text{Power} = 10 \text{ Amps} \times 120 \text{ Volts} = 1200 \text{ Watts}$$

To calculate amperage in Amps, power in Watts and voltage in Volts must be known. The formula is:

$$\text{Amperage (Amps)} = \text{Power (Watts)} \text{ divided by the Voltage (Volts).}$$

For example, if the Power rating for a spotlight is 2000 Watts, and the line voltage is 120 Volts, transposing the numbers in the formula, we have:

$$\text{Amperage} = \frac{2000 \text{ Watts}}{120 \text{ Volts}} = 16.67 \text{ Amps}$$

With a safety factor, the spot should be connected to a 20 Amp source.

Utilizing the above formulas will enable a user to determine power line capacity requirements against the number and total wattage of the lights to be used. This information can also help in determining the type and current carrying capacity of interconnect light cabling.

The amount of power a line cable can safely carry is determined by the diameter (gauge) of the wire conductor. Refer to the National Electrical Code for cable size requirements. Figure #1 is a quick reference to indicate how many Amps are needed to power a typical system. Total the number of light fixture wattages to determine the actual number of lights that can be safely used with a given power source. Remember to add a safety factor for "head room."

CAUTION: Even though lighting systems may be randomly turned on and off, continually operating lighting systems at or in excess of the power line loading capacity may result in total system failure at crucial times.

Wire Gauge Size	Max. power capacity @ 120VAC Line Input	
	Power/Watts	Current/Amps
18	1200	10
16	1800	15
14	2400	20
12	3600	30
10	4200	35
8	4800	40
6	6600	55
4	8400	70
2	11,400	95

Figure #1 - Wire Capacity Selection Guide

Note: Wire size capacity selection for 220VAC and other voltage sources can be found in the National Electrical Code handbook or by consulting your local electrical contractor.

ETA Dimmer Pack Series

These models are designed for satellite or remote operation and to be suspended on a lighting truss or tripod stand located near the stage lights.

Please Note: The MD46024DMX512 and MD41248DMX512 share the same features as rack-mounted DMX412, 812 and 824 dimmers outlined in this owner's manual. Those operational features include normal operation, DMX512 address settings, activating the relay function or the convenient test switch.

Models MD46024DMX512 and MD41248DMX512 are designed for 120 volt AC input. The -24 is supplied with one power cord and protected with an individual 5 amp breaker per channel and a total 20 amp unit breaker. The maximum load is 600 watts per channel, 2400 watts per unit. The -48 is supplied with 2 power cords and protected with an individual 10 amp breaker per channel and 20 amp unit breakers per 20 amp circuit. The maximum load is 1200 watts per channel, 4800 watts per unit.

Each channel has two U-grounded receptacles on either model that allow for 1 or 2 stage light cords per channel.

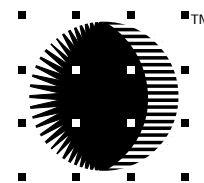
DMX-512 ADDRESS SETTING - 4 channel models

The three front panel decimal rotary switches provide a convenient, simple method to access all 512 channel address locations. This feature allows several dimmer packs to be used with one controller.

To select and set a DMX channel address, use a small screwdriver or a small tipped tool. If you want the dimmer channel to be set at the first available address, carefully set the switches, from left to right, at 0, 0, 1. When this is done, channels 1 thru 4 will be located at DMX channel addresses 1 thru 4.

If two are being used together to allow an 8 channel capacity, set the second unit's switches to 0, 0, 5. This will place the first channel of the second dimmer unit on channel 5.

The three front panel decimal rotary switches also provide access to the built-in chase and speed controls. To access the chase mode, set the first switch to 9. To increase or decrease the chase speed, adjust the second switch from 0 to 9 for the desired chase speed. To change the chase sequences, the third switch can be set to one of ten chase sequences.



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