LEVITON
NSI DIVISION
Building a Connected World

TOPAZ 24
DIMMER RACK

INSTALLATION & MAINTENANCE GUIDE
(Part # LIT-29132-1A)

Contractor: Please read these instructions before starting installation. After installation, please forward this guide to the user for operation and maintenance instruction.

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TOPAZ 24 RACK

INSTALLATION INSTRUCTIONS

The TOPAZ 24 dimmer racks are easy-to-install front-wired electrical distribution panels and are connected similarly to a circuit breaker panel. These instructions will tell you how to mount, wire, assemble, test and maintain TOPAZ 24 racks. The instructions in this manual are provided in the order of installation.

In the U.S.A., this equipment is intended to be installed in accordance with the National Electrical Code and local electrical regulations. In Canada, installation shall be in accordance with the Canadian Electrical Code.

Step 1 - Unpack rack(s)

In each rack box you will find one TOPAZ 24 rack, two keys, one set of circuit numbers, and one installation manual (this document). Dimmer and control modules are shipped separately. Leave control module and dimmer modules in their packing and store in clean, dry place until ready to perform Step 11. After unpacking, please inspect the rack for any possible shipping damage. Document any shipping damage and contact the freight company and Leviton.

Step 2 - Mount rack(s)

Racks must have 6" (152mm) minimum clearance above fan and 36" (914mm) minimum clearance in front for proper cooling and access. Racks should be located in a clean, dust free environment within proper operating temperature range. See Specifications - Table IV, pg 11.

One rack per location:
Note: If you have a multiple rack installation, skip ahead to the next section for instruction.

• Locate stud or a secure framing member in wall where rack is to be mounted.

• Using the dimensions shown in Figure 1 mark location of one row of 3 mounting holes on wall over stud.

• Fasten rack to wall with appropriate fasteners.
Note: Fully loaded rack weighs 66 pounds (29.9 Kg.) not including wire weight.

Two racks mounted together:

• Locate two studs or secure framing members on 16” (406mm) centers in wall where racks are to be mounted.

Note: If appropriately spaced studs or framing members cannot be located, racks may have to be mounted on Unistrut or equivalent supporting channels. Skip ahead to the next section for instructions.

• Using the dimensions shown in Figure 1 mark location of one row of 3 mounting holes on wall over each stud.

• Fasten racks to wall with appropriate fasteners.
Note: Two fully loaded bussed racks weigh 139 pounds (63 Kg.) not including wire weight.

Racks mounted to Unistrut supports:

Note: If more than two racks are mounted together, the mounting holes are no longer on 16” centers.

• Using the dimensions shown in Figure 1 mark the wall with the locations of two horizontal mounting channels.

• Fasten two mounting channels, Unistrut P3300T or equivalent (not supplied), to the wall at each vertical stud or framing member.

• Insert Unistrut nuts (not supplied) on 14” (356mm) centers in each channel for each rack section to be mounted.

• Mount the rack assembly to the mounting channels using bolts and lockwashers.

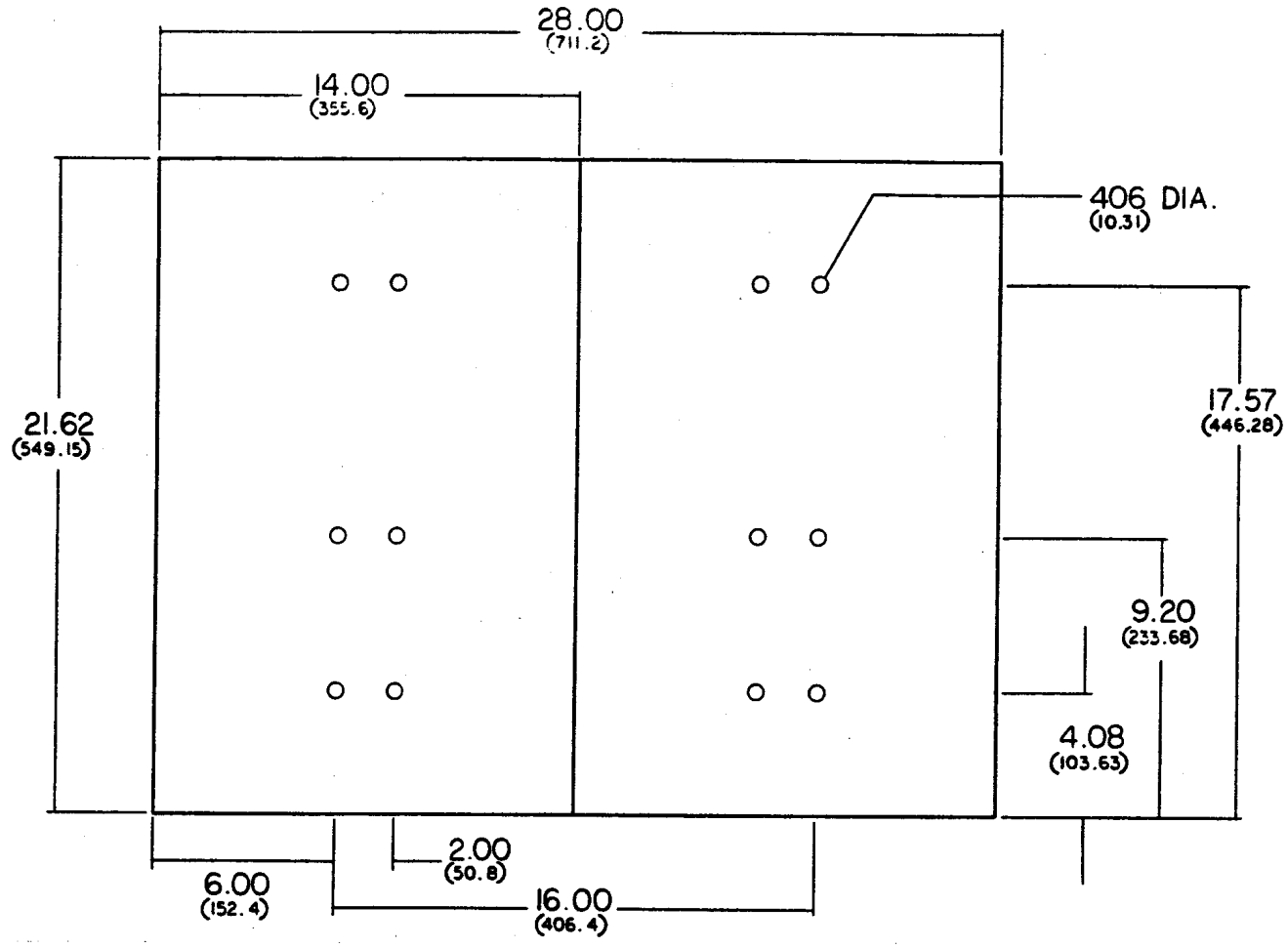

FIGURE 1 - MOUNTING DIMENSIONS

Step 3 - Terminate conduits

See Figure 2.

• Terminate the feeder conduit at the top or bottom conduit knockouts of the rack containing the feeder lugs. This is usually the left-most rack, or if provided, the auxiliary feeder rack. See Table IV, page 11 for knockout size and location. Dimmer racks can also be field punched for one 3" T.S. conduit in the top, and if provided, the auxiliary feeder rack will accept two 4" T.S. conduits in the blower opening cover plates.

• Terminate load conduits at top and/or bottom conduit knockouts of the rack which the loads will be connected. In most cases this means the first 24 loads should connect to the first rack, the next 24 loads should connect to the second rack and so on.

• Terminate the control conduits at the top, bottom or side conduit knockouts of the first rack. Bottom or side access is preferable.

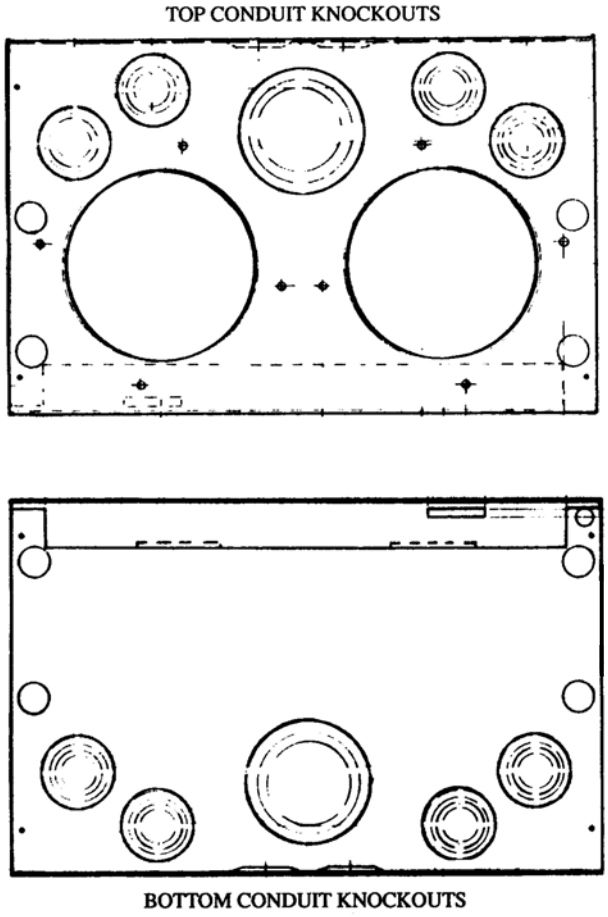

Figure 2 – Conduit Entry Area

Step 4 - Convert Bussing To Single-Phase

Racks are shipped ready to accept three-phase, 4 wire feeders. If feeder is single-phase, 3 wire, convert bussing as follows. Otherwise skip to the next Step (5).

Single Rack:

• Locate the required 1Ø Bus Adapter Kit, Model No. LEC 2012 (shipped separately).

• Remove the terminal lugs on the ØB bus and either the ØA or ØC bus. Refer to Figure 3. Keep the hardware, as it will be reused below.

• Install one end of the jumper bus bar from the kit to the feeder bus plate mounting hole on the ØB bus. Note that the bus is installed in front of the plate. Use the bolts kept from above noting that all bolted joints include a flat washer against all bus/lug surfaces, and a lock washer under the nut.

• Re-install one terminal along with the other end of the jumper bus bar to the feeder bus plate mounting hole on ØA or ØC bus using the long bolt supplied with the bus bar kit, and the balance of the hardware from above. Note that the lug is installed behind the plate, and that the joint includes a flat washer on top of the jumper bus as well as behind the lug. (If this kit is installed in more than one rack, connect to ØA in the first rack and ØC in the second rack to balance feeder).

Two racks bussed together:

• Proceed with the first (left-most) rack as above jumpering ØA to ØB and re-installing the lug on ØA.

• Install a second 10 Bus Adapter Kit in the second rack as above jumpering ØB to ØC for balance. In this rack no lugs are re-installed and the jumpering bus must be installed on the back of the feeder bus plate in order to clear the lateral neutral bus.

Note: Do not install lateral bus between the two ØB busses. Since one ØB bus is jumpered to ØA and one is jumpered to ØC, a short circuit will develop.

Step 5 - Pull power, load and control conductors to the racks

• Pull all conductors into the racks. Feeder and load conductors must be rated for 90˚C, and be copper. Control conductors must be rated for operation at 85˚C and are all Class 2. All control conductors must be routed so that they are not likely to come in contact with feeder or load conductors.

Step 6 - Connect power feeders

• Connect the feeders at the phase, neutral and ground lugs and tighten according to Table I.
See Figure 3 for lug locations. (If rack has been converted to single phase, only lugs A & C will be terminated.)

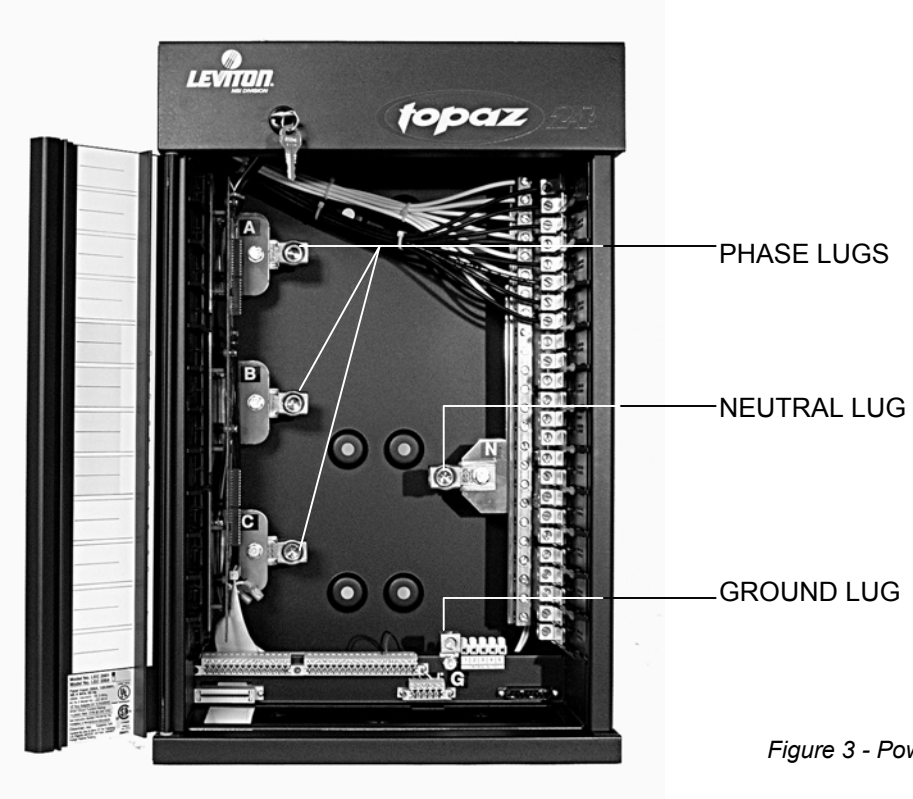

Figure 3 - Power Lug Locations

Table I - Line Terminal Torque Ratings

Line and Neutral Lugs (rated for copper wire only and for 9O˚C ampacity wire)	6 AWG - 250 kcmil (16 -127 mm2)	375 in. -lbs.
Ground Lug	14 AWG - 10 AWG (2 - 6 mm^2)	35 in.-lbs.
	8 AWG (10 mm^2)	40 in.-lbs.
	6 AWG - 4 AWG (16 - 20 mm^2)	45 in.-lbs.
	2 AWG - 1/0 AWG (35 - 50 mm^2)	50 in.-lbs.

Step 7 - Label Circuits

• A sheet of labels, P/N 29247, has been supplied to number the circuits in the circuit directory on the door of the rack. It is important to number these circuits as they also by association number the load terminals inside. Usually the left-most cabinet begins with circuits I thru 24, and on from left to right. If your racks have been factory assembled and custom numbered, skip to the next step (8).

Step 8 - Connect load conductors

Follow the instructions here for each dimmer type you are installing.

15/20 AMP INCANDESCENT & LOW-VOLTAGE LOADS:

• Referring to Figure 4, connect the load conductor for the first (upper) dimmer to the upper load terminal, and the second load conductor to the lower load terminal. Terminate their respective neutral conductors to the adjacent neutral terminals located directly behind the load lug. Tighten all lugs according to Table II.

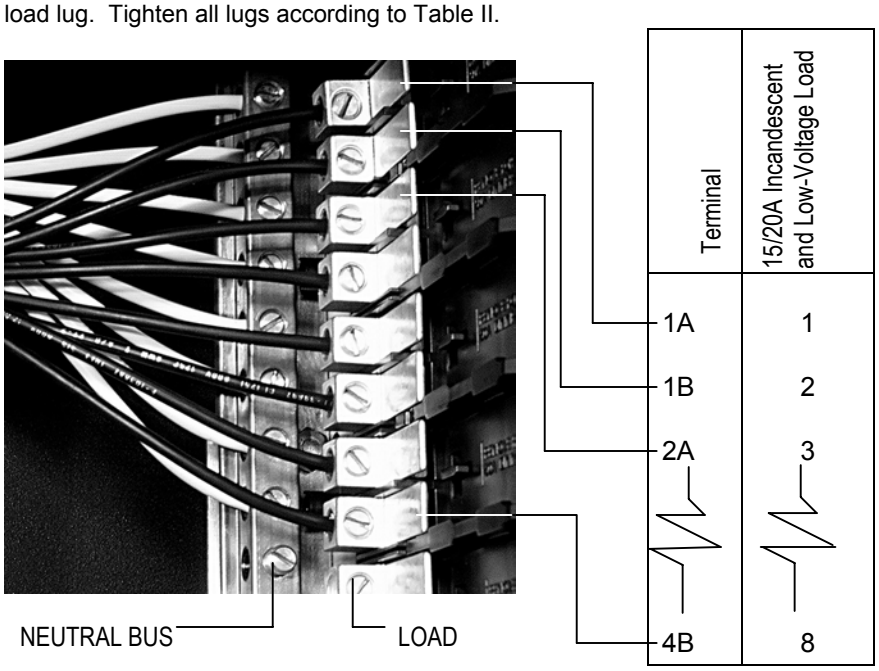

Figure 4 – Load Terminal Wiring

Table II – Load* Terminal *Torque Ratings

LOAD TERMINALS (rated for copper wire only, and for 9O˚C ampacity wire)	
14 AWG - 2 AWG (2 - 6 mm^2)	50 in.-lbs.

Note: If 15 Amp and 20 Amp 120V dimmers are intermixed on the premises, they must both be wired as 20 Amp branch circuits as the modules are not separately keyed.

LOW-VOLTAGE APPLICATION NOTES:

When using TOPAZ dimmer modules with transformer loads, the kW rating becomes the kVA rating. VA ratings are found by multiplying the input voltage (12OV) by the current flowing in the transformer primary (120V side) for all transformers connected to the dimmer module. When calculating VA load keep in mind that transformer losses add many VA to the published VA load rating of the transformer. When current cannot be measured, derate the kW rating of the dimmer module by 25% and add up the kW ratings of the lamps involved.

Caution:
Operation of a dimmed transformer loaded circuit with all lamps inoperative or removed may result in current flow or voltage in excess of normal levels. To avoid possible transformer overheating and possible premature transformer failure, Colortran strongly recommends the following:

a. Do not operate dimmed transformer loaded circuits without operative lamps in place; and
b. Replace burned out lamps as quickly as possible; and
c. Use transformers which incorporate thermal protection or fuse transformer primary windings to prevent transformer failure due to over-current.

For best results transformers employed in transformer loaded dimmed circuits should be high-quality units well varnished and with an extra margin of magnetic material.

Step 9 - Connect control conductors

Follow the instructions below for the type of control you are installing.
Note: All control terminals accept 24-14 AWG. (.02-2mm^2) wire and are all Class 2. All cable shielding and all drain wires (wires connected to cable shielding) must be insulated.

DMX512 or CMX:
A TOPAZ Remote or Universal Control Module is provided for each rack.

• Connect the control wires to the 5-position terminal strip in each rack as shown in Figure 5.

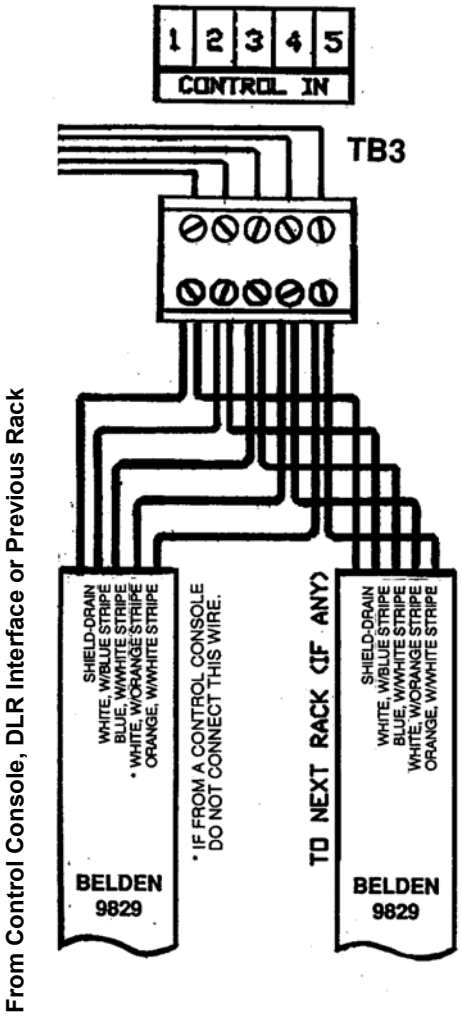

Figure 5

ANALOG 0-10V
For analog 0-10V applications, a Universal Control Module must be used.

• Locate the terminal block in the rack labeled “0-10VDC Dimmer Control Inputs” and connect the control wires to terminals 1-24. Make sure to connect at least one common per group of 12 inputs.

Step 10 - Seal unused openings

• Seal any unused mounting and conduit access holes in the rack. This is necessary to maintain proper ventilation while the rack is operating. If conduits are large and relatively empty, or if they connect to a gutter nearby, they must be sealed also.

Step 11 - Install control module(s)

• Unpack the control module(s).

• Set the 3 DIP switches labeled S1 on the printed circuit board (See Figure 6) as follows:

SW1 – down
SW2 – down
SW3 – down

• If the control module is a Remote type, verify that jumper JP5 is in the “REM” position.

• If the control module is a Universal type, verify that the AMX/DMX switch is in the DMX position and that the Status/Other switch is in the “Other" position. See Figure 7.

• Install the appropriate control module in the bottom slot of each pack by sliding it in until it is fully seated.

Control Module Type	Module No.	
	120V	240V(Foreign Electric Service Only)
TOPAZ 12 Remote	LEC2102	LEC2105
TOPAZ 12 Universal	600-902	600-904

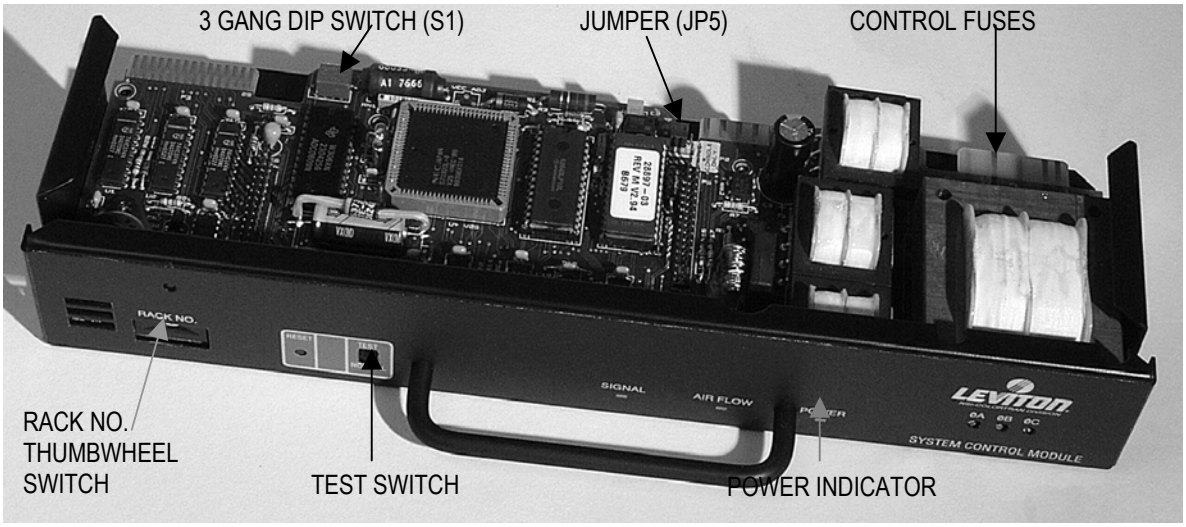

Figure 6 - Remote Control Module

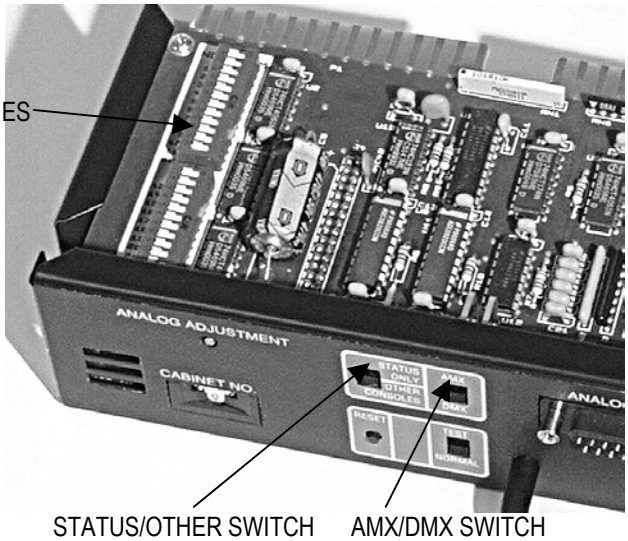

Figure 7 - Universal Control Module

Step 12 - Set thumbwheel switch(es)

• Set the thumbwheel switch(es) on all TOPAZ 24 control modules according to Table III on next page. See Figure 6 (Pack 1 is usually the left-most pack).

Table III - Thumbwheel Switch Settings

PACK NUMBER	THUMBWHEEL SWITCH NUMBER
1	0
2	1
3	2
4	3
5	4
6	5
7	6
8	7
9	8
10	9
11	10
12	11
13	12
14	13
15	14
16	15

Step 13 - Set Non-Dim switches

Note: if control module is not a Topaz Universal type, skip to the next step (Step 14).

• Switch Non-Dim switches to select which dimmers are to operate in the Non-Dim mode. The Non-Dim mode switches are located on the left-hand side of the top printed-circuit board on the Universal Control Module. See Figure 7, page 7. In the off (left) position, the channel will function as a dimmer. In the on (right) position, the dimmer will function as a non-dim (fully off or fully on).

CAUTION: Do not operate these switches while the pack is energized.

Step 14 - Apply power and check

• Apply power to the rack. Power indicator LED should be lit on each control module. If the LED is not lit or is flashing, at least one control fuse is blown or one power leg has no voltage present. See Figure 6.

CAUTION: High Voltage - all measurements with a meter and other operations within the rack must be with the rack de-energized or by a qualified electrical installer exercising extreme care.

Check the control fuses on the rear of the control module.

Check the feeder wiring with a meter, correct the problem and restore power to the rack.

Model No.	Max Load	Voltage	Circuit Breaker
166-361	1.8kW	120	15A
166-362	2.4kW	120	20A
166-364	2.5kW	220/240*	15A

*(foreign electrical services only)

Step 15 - Install dimmers

• Unpack all dimmers.

• Slide a dimmer module into each slot in the rack, beginning with the bottom dimmer slots first and building upward. Push the dimmers in until they are seated firmly.

Step 16 - Install filler modules

• If there are less than 12 dimmer modules for a rack, unpack and install filler modules (Part Number 166-360) in slots where there are no dimmers. This must be done to insure proper cooling while the rack is in operation.

Filler modules look the same as dimmers but do not have circuit breakers and are installed the same way.
NOTE: Rack should not be operated without **all** spaces filled. This insures proper cooling.

Step 17 - Test loads

• Switch all dimmer circuit breakers OFF first (switched to the right).

• Switch the test switch on each control module to the TEST position. See Figure 6. This will turn on the fan.

• Switch on the circuit breaker of each dimmer, one at a time, by moving the breaker handle to the left. Verify that the load is on and the dimmer is operating.

• When testing is completed, switch the test switch on each control module to the NORMAL position. This will turn off the fan and all dimmers.

• Verify that all circuit breakers are in the ON position (switched to the left).

Step 18 - Close door

• If desired, label circuits for easy identification later.

• Close the front access door. This will aid proper cooling of the rack and restrict access to the dimmer circuit breakers. See Figure 8.

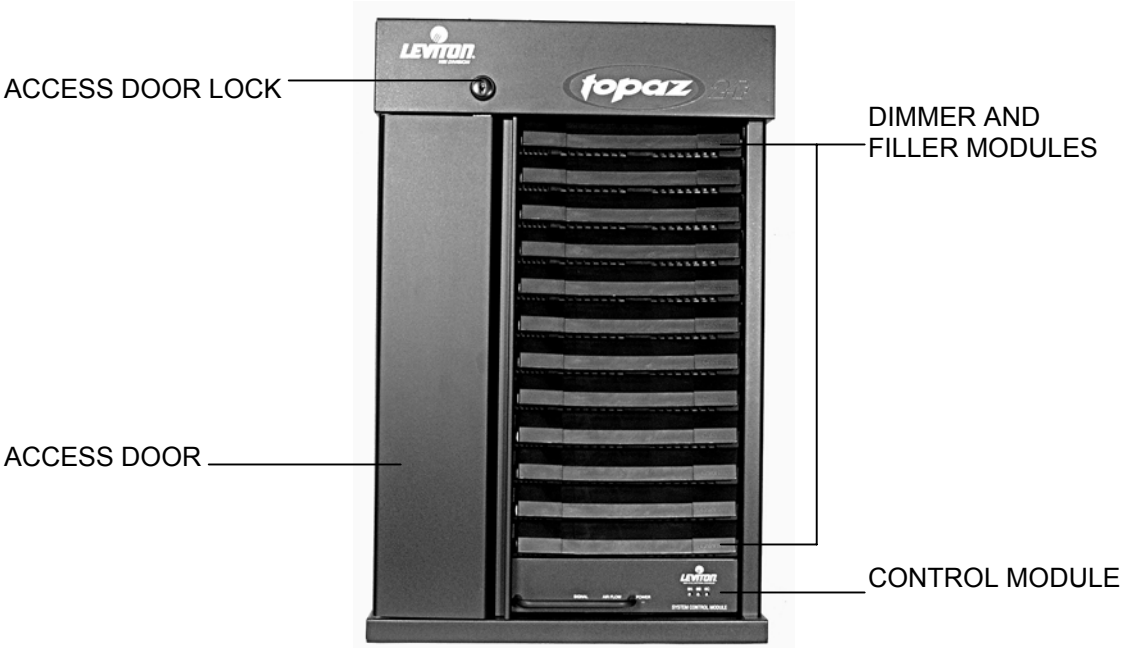

Figure 8 - Assembled Rack

MAINTENANCE

Caution: Do not perform maintenance with the rack energized.

Every six months (or more often, if the environment is particularly dusty) clean any accumulation of dust from the fan grills, dimmer module air intake openings, control module front and any other place dust may have accumulated. This may be done with compressed air or a vacuum. Also check all electrical terminations for tightness, bus to bus, bus to lug, and lug or terminal to wire. Refer to Tables I & II for torque ratings on wire termination.

Table IV - Specifications (per single rack section)

Rack Capacity:	24 Circuits, 20 Amp max. per circuit.
Dimensions:	21-5/8" H x 14" W x 9' D (546mm H x 356mm W x 229mm D)
Weight:	Empty - 30 lbs. (1 3.6 Kg.) Full - 66 lbs. (29.9 Kg.)
Conduit Knockouts Top and Bottom Load/Line: Sides Control Signal: Bussing:	4 concentric ½", ¾", I", 1 1¼" T.S. 1 concentric 1½", 2", 2½" T.S. 1 concentric ½", ¾" T.S. 5 rectangular 2¼" x 2¾"
Maximum Fan Noise Rating:	33dba, 20 Amp max. per circuit.
Ambient Operating Temperature:	O˚C (32˚F) to 40˚C (104˚F)
Maximum Operating Humidity:	90% without condensation.
Maximum Feeder Size:	200 Amp.
Nominal Input: 120 V Circuits: 240 Circuits: (FOREIGN ELECTRICAL SERVICE ONLY)	120/208V, 3Ø, 4W, 60 Hz, or (with LEC 2012 Kit Installed) 120/240V, 1Ø, 3W, 60 Hz. 240/415V, 3Ø, 4W, 50/6OHz, or (with LEC 2012 Kit Installed) 240/480V, 1Ø, 3W, 50/6OHz
Phase-to-Neutral Operating Voltage:	120V± I 0% or 220/240V ± 1 0%
Operating Frequency:	60 ± .5Hz or 50 ± .5Hzl
Rack Enclosure:	NEMA Type 1 for indoor use only (utilizer dans un endroit a l'abri)

For further information on the operation of the TOPAZ 24 Rack refer to the user guides and operations manuals of the control console or architectural control stations that will be used in conjunction with this product. For additional assistance, please contact the NSI Technical Support Line, Monday through Friday, 8:00 am to 5:00 pm PST. 1-800-864-2502

LEVITON-NSI DIVISION TWO-YEAR LIMITED WARRANTY

Leviton-NSI warrants new Leviton-NSI electronic control and dimmer products to be free from defective materials and workmanship for a period of two years from the date of purchase to the original owner when purchased from an authorized Leviton-NSI dealer.

Fixtures, lamps and gel material are not covered under this warranty.

The purchaser is encouraged to complete and mail to Leviton-NSI the product registration card enclosed with each product. Leviton-NSI products that have been subjected to accident, alteration, abuse or defacing of the serial number are not covered by this warranty. The normal wear and tear of items such as knobs, jacks and switches are not covered under this warranty.

If your Leviton-NSI product requires service during the warranty period, Leviton-NSI will repair, at its option, defective materials provided you have identified yourself as the original owner of the product to Leviton-NSI or any authorized Leviton-NSI dealer. Transportation charges to and from an authorized dealer or the Leviton-NSI factory for repair shall be the responsibility of the owner. All products returned to Leviton-NSI must have a factory return authorization number issued prior to shipping.

Leviton-NSI is not liable for any incidental or consequential damages resulting from defect or failure other than repairs of the Leviton-NSI product subject to the terms of this warranty. This warranty gives you specific legal rights, and you may have other rights which vary from state to state. This warranty is expressly in lieu of all other agreements and warranties expressed or implied except as may be otherwise required by law.

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