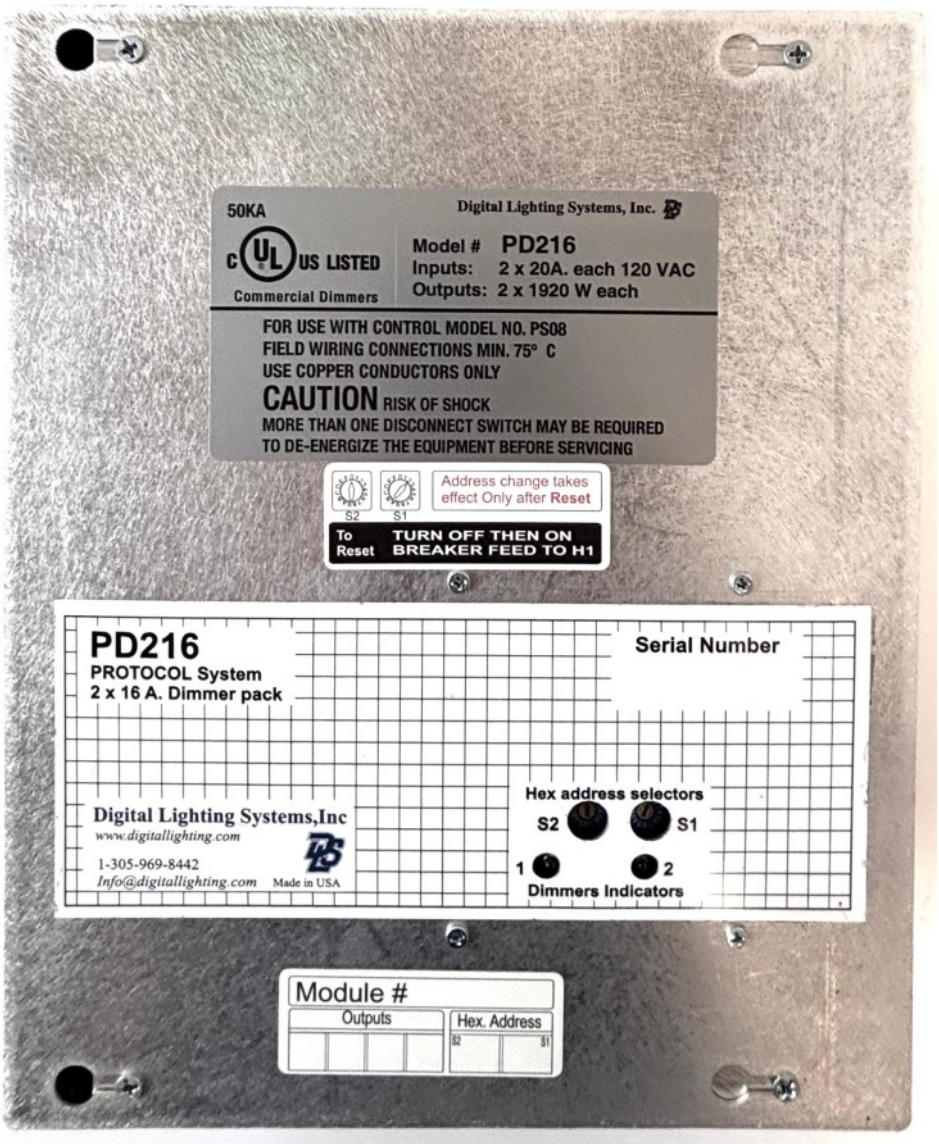
Digital Lighting Systems, Inc.

PROTOCOL
PD216

2 x 16 A. outputs
PD216-120 : 2 x 2000 Watts @ 120 VAC
PD216-277 : 2 x 4400 Watts @ 277 VAC



USER'S MANUAL

GENERAL DESCRIPTION

The PD216 is a 2-channel dimmer pack for the PROTOCOL lighting control system. The PD216 dimmer pack contains 2 solid-state dimmers. Power is fed to the PD216 from two 20 Amp. breakers on the same electrical phase. Each breaker feeds two dimmers and each dimmer is rated for a maximum output current of 16 amperes (1920 Watts at 120 VAC). The PD216 contains two printed circuit boards, the load driver module (LDM) and an INT04 control modules. The dimmers are triggered by the firing board (INT04).

THE INT04 - (See diagram on Page 2)

The INT04 is a microprocessor based control board with a nonvolatile memory chip, a communications chip, and a regulated DC power supply. The INT04 also contains, address selectors, LED output monitors and other support circuitry. The microprocessor is driven by powerful distributed intelligence software which handles all control and communications functions. The memory chip on the INT04 holds all of the PD216's pertinent information and settings which include low and high trim levels for each of the four outputs it controls.

The PD216 does not rely on any shared data source and functions independently of any other system component and without a central system controller. The PD216 communicates with Protocol system stations and controllers over a single twisted-pair of wires and can be connected anywhere on the system network bus. This adds convenience and versatility by allowing PD dimmers to be installed close to their loads and/or service panels.

THE LDM (LOAD DRIVER MODULE) - (See Diagram on Page 2)

The LDM is equivalent to four solid-state relays (SSR's) assembled on a single circuit board. The LDM is mounted at the bottom of the PD's enclosure which also serves as a heat sink. The relays are triggered by low-voltage signals generated by the INT04 module. These signals are optically-isolated by the LDM circuitry from all line voltage elements. A step-down 10 VAC- transformer on the LDM board supplies power to the INT04 module described above.

OTHER INFORMATION- (See diagram Page 4)

Several PD dimmer packs (PD804 / PD404 / PD104 / PD408 / PD216) may be daisy-chained together in any combination, up to a maximum of 63 individually addressed INT04s (each PD104, PD404, PD408, PD216 has one INT04, and each PD804 has two INT04s). PD dimmers are daisy-chained using the RJPD-6 cables (CAT5 network cables) supplied with the units. Each PD has a set of address selectors which must be set to a unique address. Please see Table 4 on Page 9 of this manual or the PROTOCOL SOFTWARE MANUAL for more information on addressing the PD dimmer pack.

DIMMING/SWITCHING - (See Page 8 for more information)

Through the PROTOCOL's "SOFTPRO" configuration software, each of the PD outputs may be independently configured not to dim. A PD dimmer may control any combination of dimmed and switched loads.

PD216 Load Driver Module Information

Figure 1 - PD216 LDM Detail

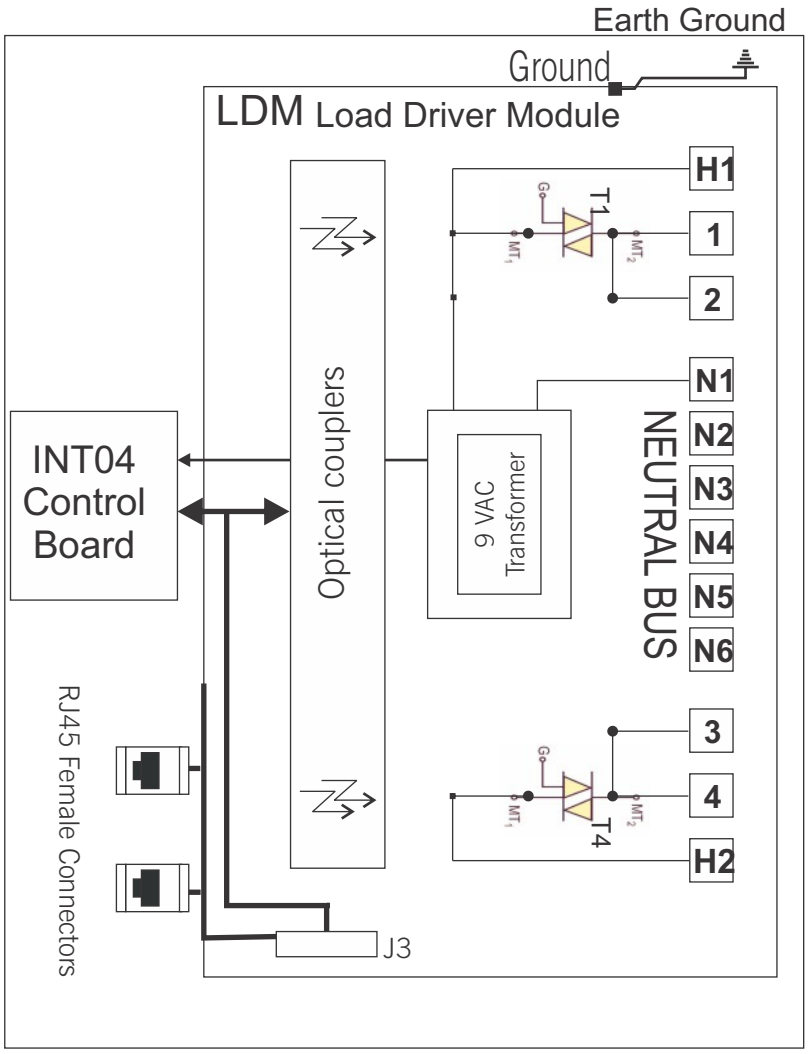


Table 1 - Terminals Definition

NAME	DESCRIPTION
1	Output Of Solid-State Relay #1
2	Output Of Solid-State Relay #1
3	Output Of Solid-State Relay #4
4	Output Of Solid-State Relay #4
H1	Hot Line Feed For Relays 1 & 2.
H2	Hot Line Feed For Relays 3 &

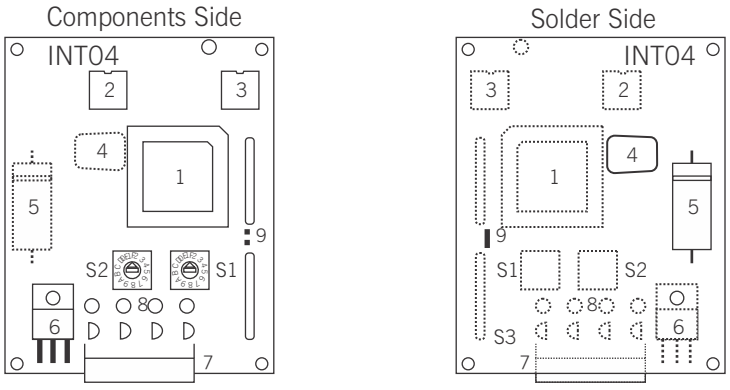
Table 2 - Absolute Maximum Electrical Ratings

Electrical Characteristic	Terminal	Maximum
Relay Load Current	1 & 4	16 Amps.
Input Current for 1 & 2	H1	20 Amps.
Input Current for 3 & 4	H2	20 Amps.
Input Voltage	H1-H2 1 Phase 120 VAC,	

PD216 - INT04 Detail

Table 3 - INT04 Circuit Legend

1	Microprocessor.
2	Nonvolatile Memory.
3	Communications Chip.
4	Quartz Crystal.
5	Power Supply Capacitor.
6	Voltage Regulator.
7	Signal & Power Connector.
8	Output LED Monitors.
9	Jumper for switches only



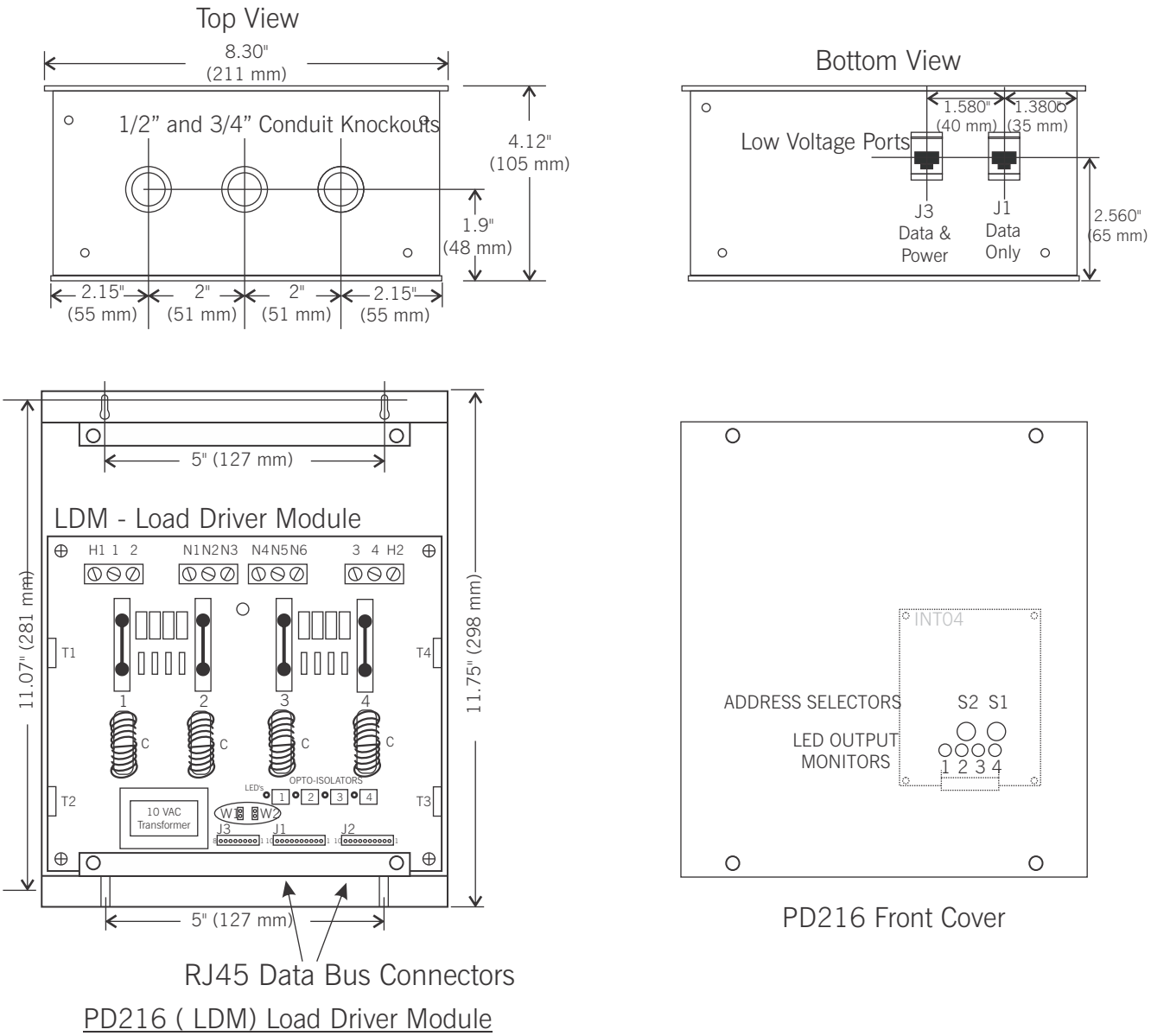
NOTE:
PD216 has one INT04 control board.

Figure 2 - PD216 / INT04 PROTOCOL Firing board Detail

Enclosure Installation

Surface mount the dimmer pack in a well ventilated area where the ambient temperature does not exceed 104° F for full load operation. Allow 2" of side clearance for proper air circulation and servicing. Installation clearance shall meet local and/or NEC code requirements. Enclosures may be attached to the wall or other mounting surface by holes in the heat sink flanges. Refer to the drawings below (FIGURE 3) for the correct dimensions. Conduit shall be pulled to the top of the dimmer packs.

NOTE

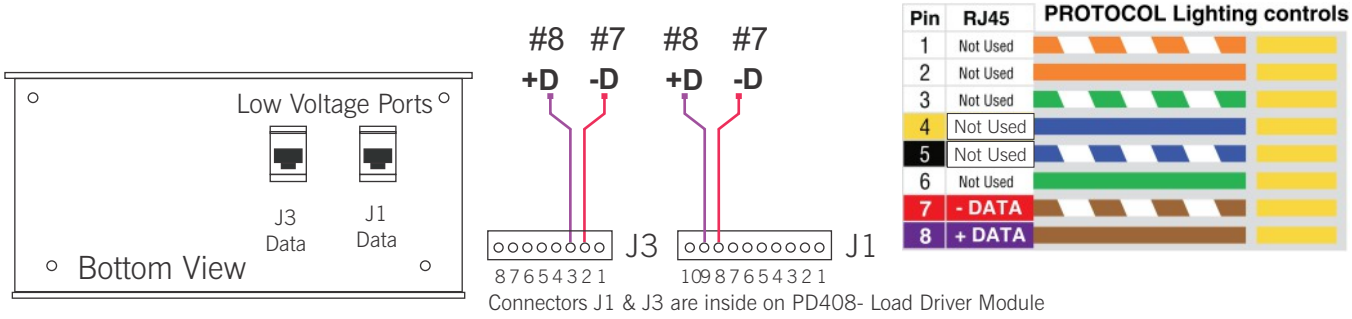


PD216 (LDM) Load Driver Module

Figure 3 - PD216 Dimensional Diagram

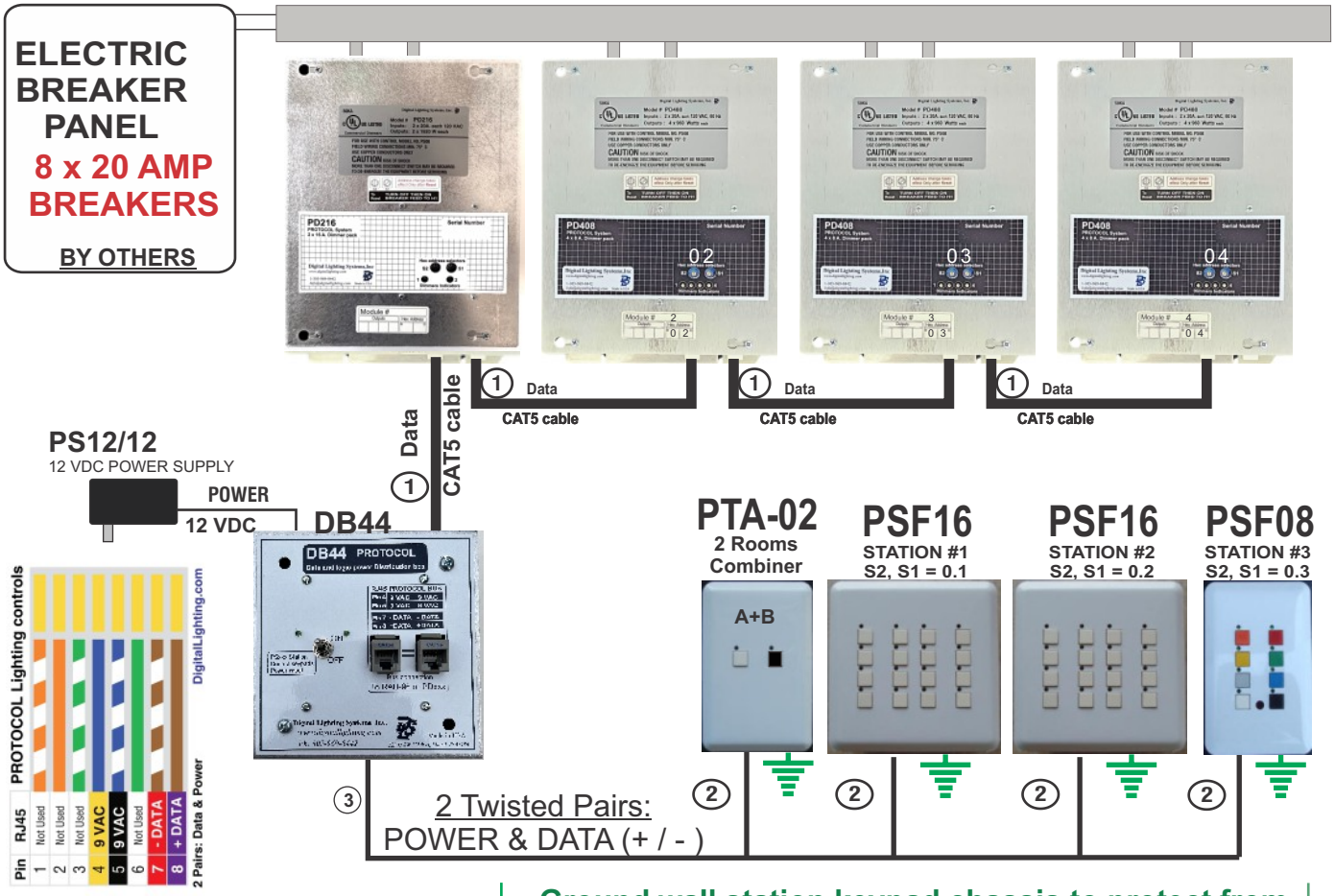
PD216 Low Voltage Wiring Methods

Figure 4 shows the **PD dimmer's** network ports with its pin assignments.



Connectors J1 & J3 are inside on PD408- Load Driver Module

Figure 5 - Typical PROTOCOL installation



Ground wall station keypad chassis to protect from

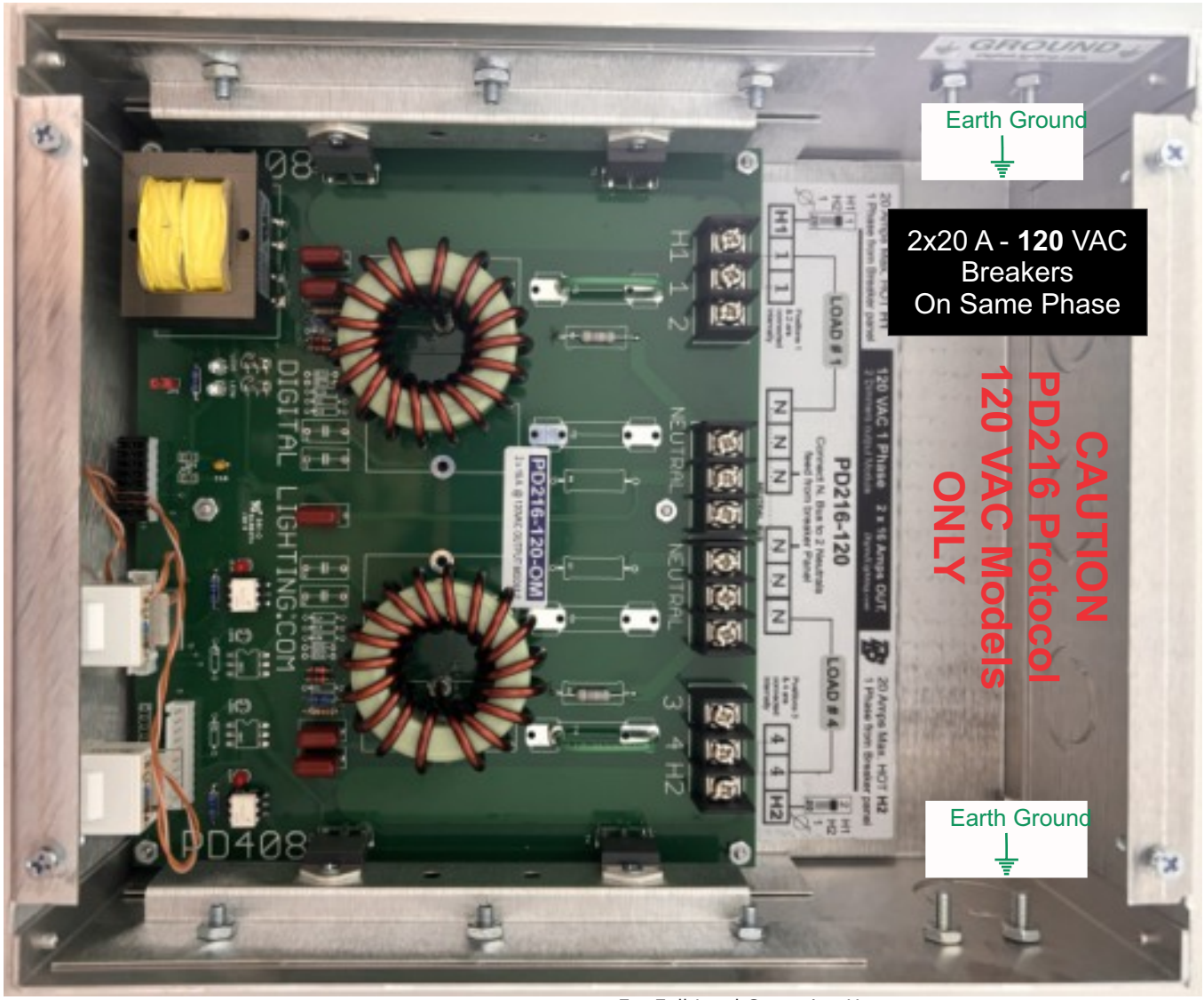
PSF wall keypad stations could be daisy chained or parallel wired.

PD216 General Wiring Instructions

Wiring Notes

- **DO NOT EXCEED** 2000 W (16 Amps.) per dimmer output @ 120VAC.
- All wiring between the control stations, dimmers, and other system controllers (network bus) is low voltage (NEMA Class 2) and may be run with two, twisted pair, shielded #18 AWG wire. Control network bus may be Carol Cable #C3362 unless otherwise required. Consult the PROTOCOL Hardware Installation Manual, Appendix E, for maximum wire length.
- **PD216** dimmer packs may be fed by one or two 20 A (maximum) branch circuits and may have up to two separately dimmed loads.
- Both breakers must be on the same power phase.
- **CAUTION: DO NOT** attempt to parallel outputs to increase capacity.
- Installations must conform to local and/or NEC code requirements.

Figure 7. PD216 Protocol **Typical 120 VAC Wiring.**



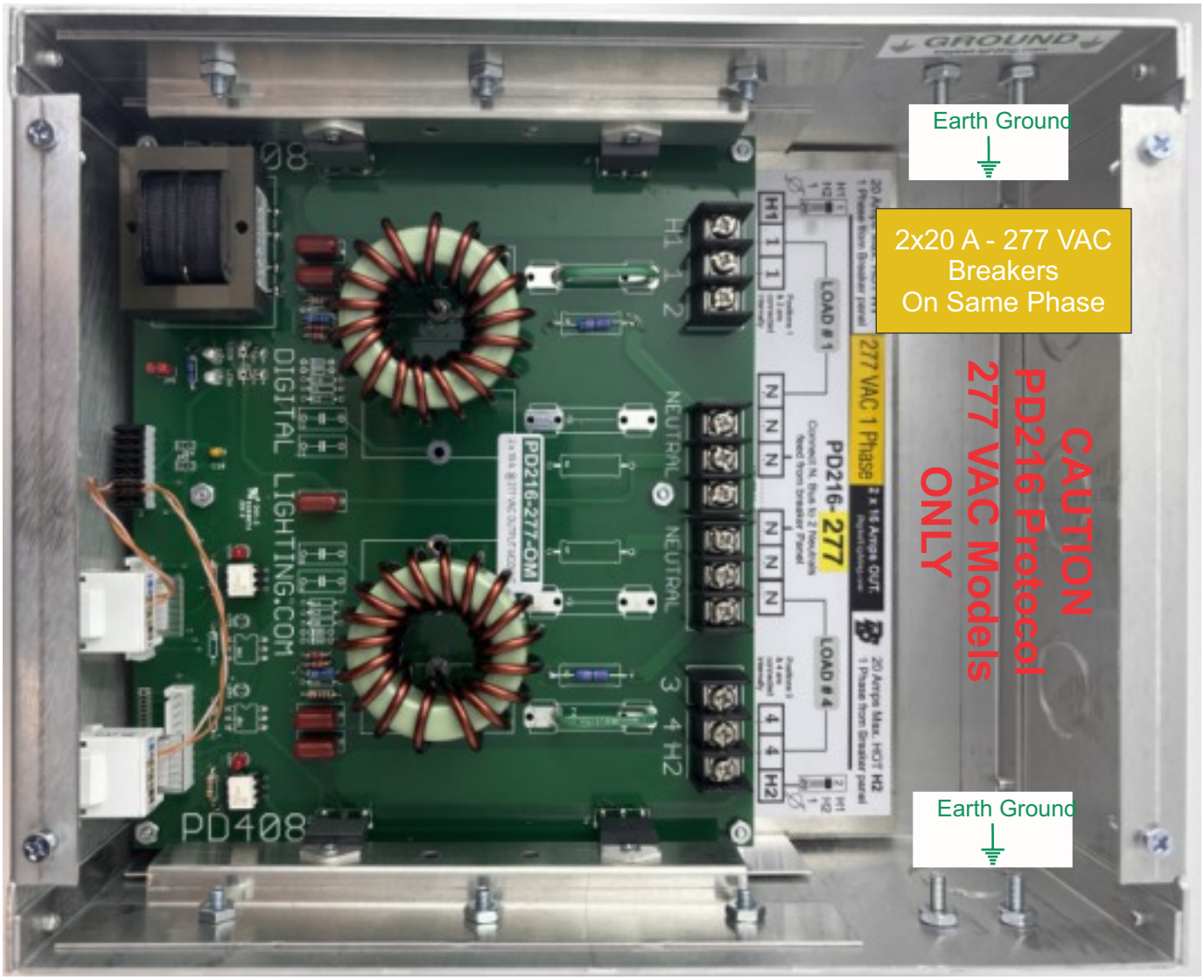
For Full Load Operation Use:
#12 AWG copper conductor wire for Line & Neutral Feeds.
#14 AWG copper conductors in/out to each load.
Max. Load: 16 Amperes (1920W at 120 VAC).

PD216 General Wiring Instructions

Wiring Notes

- DO NOT EXCEED 4400 W (16 Amps.) per dimmer output @ 277VAC.
- All wiring between the control stations, dimmers, and other system controllers (network bus) is low voltage (NEMA Class 2) and may be run with two, twisted pair, shielded #18 AWG wire. Control network bus may be Carol Cable #C3362 unless otherwise required. Consult the PROTOCOL Hardware Installation Manual, Appendix E, for maximum wire length.
- PD216 dimmer packs may be fed by one or two 20 A (maximum) branch circuits and may have up to two separately dimmed loads.
- Both breakers must be on the same power phase.
- CAUTION: DO NOT attempt to parallel outputs to increase capacity.
- Installations must conform to local and/or NEC code requirements.

Figure 7. PD216 Protocol **Typical 277 VAC Wiring.**



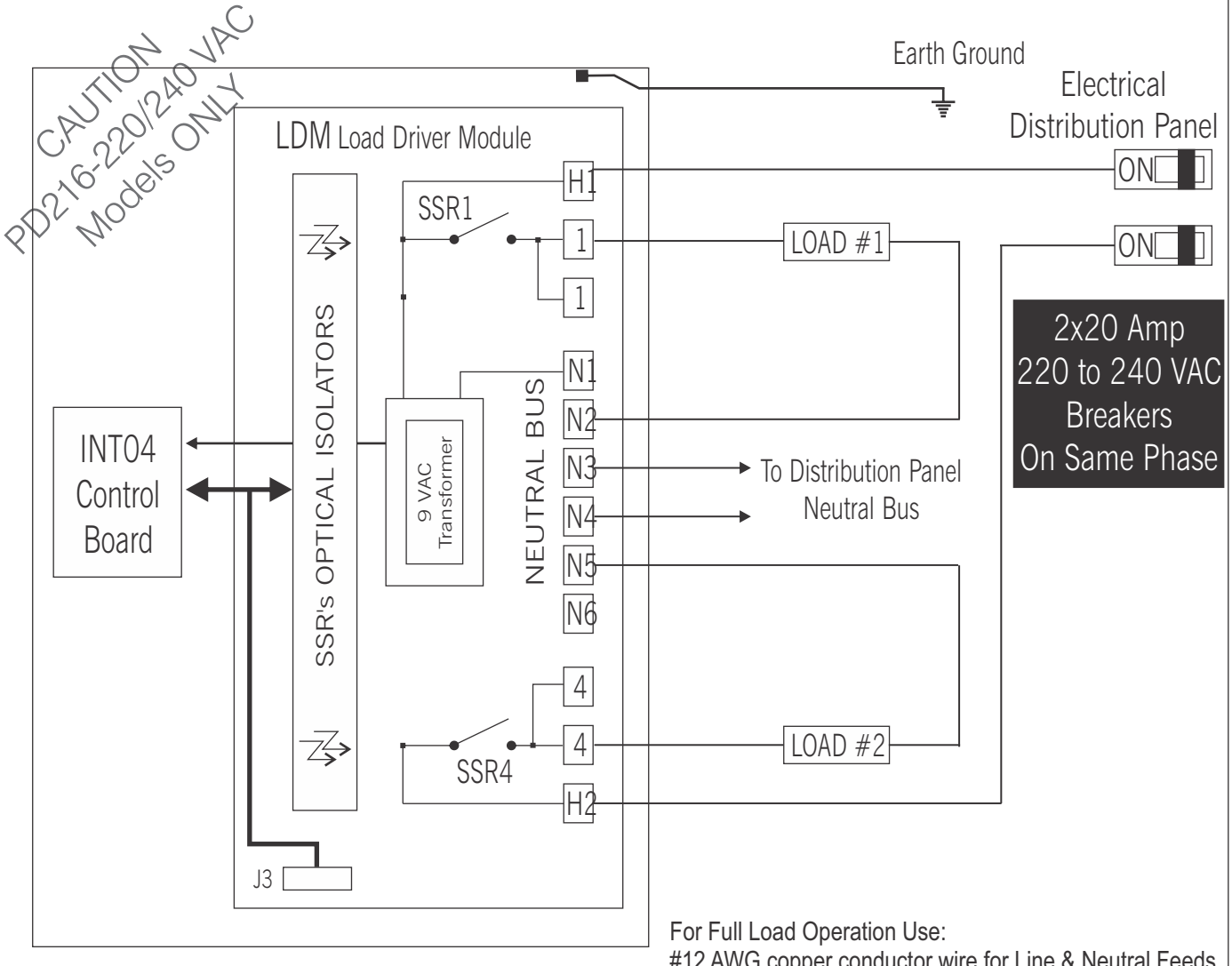
For Full Load Operation Use:
#12 AWG copper conductor wire for Line & Neutral Feeds.
#14 AWG copper conductors in/out to each load.
Max. Load: 16 Amperes (4432W at 277 VAC).

PD408-220 General Wiring Instructions

Wiring Notes

- **DO NOT EXCEED** 3840 W (16 Amps.) per dimmer output @ 240VAC.
- All wiring between the control stations, dimmers, and other system controllers (network bus) is low voltage (NEMA Class 2) and may be run with two, twisted pair, shielded #18 AWG wire. Control network bus may be Carol Cable #C3362 unless otherwise required. Consult the PROTOCOL Hardware Installation Manual, Appendix E, for maximum wire length.
- **PD216** dimmer packs may be fed by one or two 20 A (maximum) branch circuits and may have up to two separately dimmed loads.
- Both breakers must be on the same power phase.
- **CAUTION: DO NOT** attempt to parallel outputs to increase capacity.
- Installations must conform to local and/or NEC code requirements.

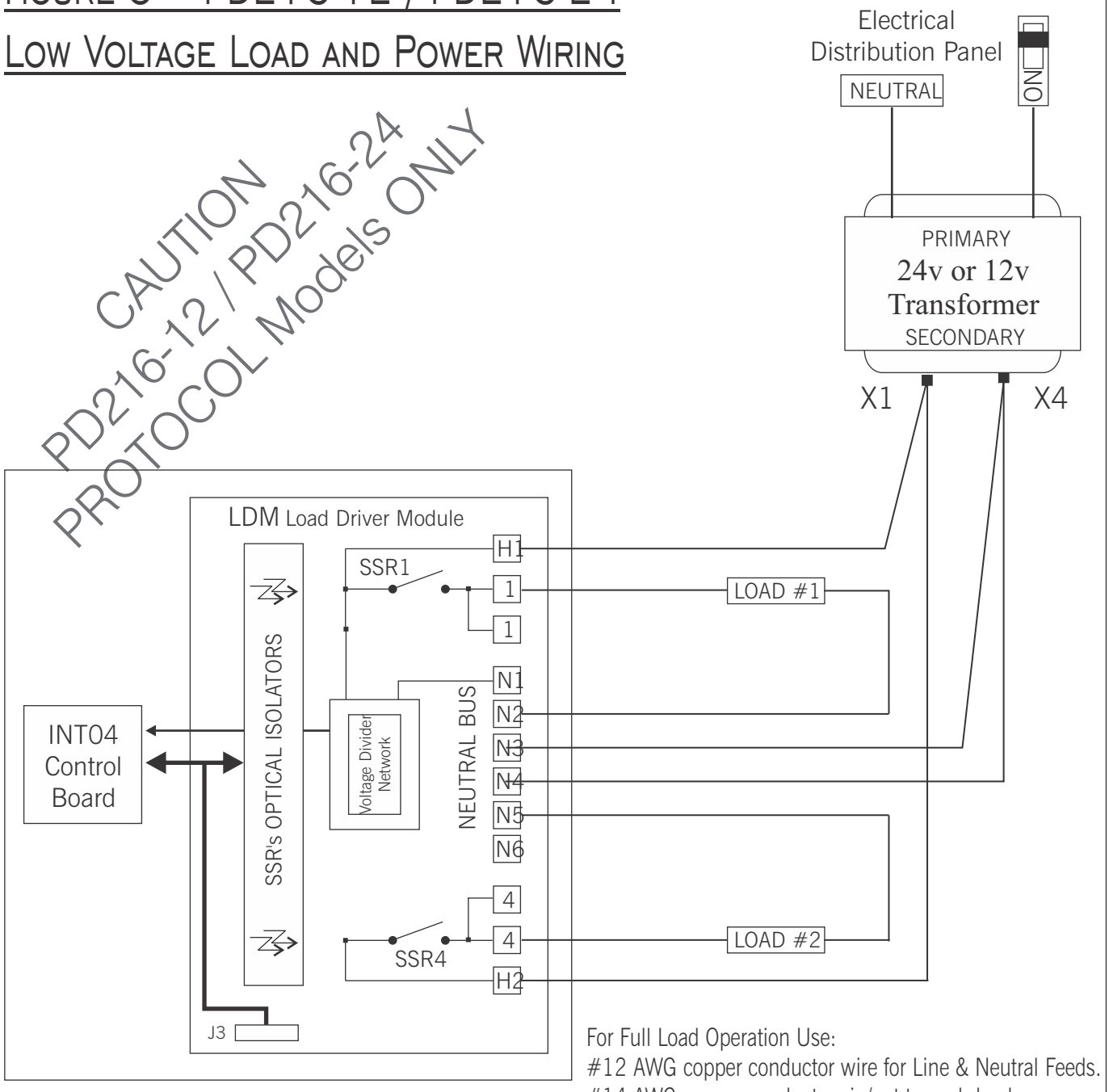
Figure 8 - PD216 Typical 220/240 VAC Wiring.



For Full Load Operation Use:
#12 AWG copper conductor wire for Line & Neutral Feeds.
#14 AWG copper conductors in/out to each load.
Max. Load: 16 Amperes (3840W at 240 VAC).

FIGURE 9 - PD216-12 / PD216-24

LOW VOLTAGE LOAD AND POWER WIRING



For Full Load Operation Use:
#12 AWG copper conductor wire for Line & Neutral Feeds.
#14 AWG copper conductors in/out to each load.
Max. Load per circuit : 16 Amperes (192W at 12 VAC).
Max. Load per circuit : 16 Amperes (384W at 24 VAC).

NOTES

1. With PD216-24 you may use a single 24 VAC-800 VA or better transformer or two separate 24 VAC-400 VA or better transformers.
2. With PD216-12 you may use a single 12 VAC-400 VA or better transformer or two separate 12 VAC-200 VA or better transformers.
3. Follow transformer's installation & wiring instructions from manufacturer.

PROTOCOL ADDRESS SETTING

Up to 63 uniquely addressed INT04 boards (two in each **PD804**, one in each **PD104, PD404, PD408**, **PD216**) may be installed in any one system. Each **INT04** must be set to a unique decimal address between 1 and 63. **INT04** #63 output 4 is not available for use. Total number of zones ((63 x 4) -1 = 251). Refer to ***TABLE 4*** On ***Page 9*** of this manual for proper setting of the address selectors S1 and S2 on the **PD** dimmer.

Example:

S2 & S1 should be set respectively to **1 & A** if the desired address is 26 (1 x 16 + A = 26, A =10). In this example, outputs 1 through 4 of **PD408** # 26 are referred to as 26.1, 26.2, 26.3 and 26.4 when configuring buttons on PROTOCOL stations, using the PROTOCOL "**SOFTPRO**" programming software. Address used must not be an address already used elsewhere in the system).

NOTE:

It is also possible to quadruple the maximum number of outputs on a system up to 1004 circuits. An **INT04** may have a decimal address of up to, and including, 252. Please contact factory for more details. For a complete Decimal to Hexadecimal conversion chart, please refer to ***Appendix A*** in the PROTOCOL ***Hardware*** and ***Software Manuals***.

NON-DIM OUTPUT SETTING

Whilst outputs may be programmed to dim or not dim through the "SOFTPRO" configuration software, in some circumstances it may be preferable for all outputs in the **PD** dimmer to be configured for non-dim (switch only) operation by a hardware lock. This prevents inadvertent dimming, or damage, of loads that cannot be dimmed, such as contactors, mechanical relays, motors, non-dim fluorescent, etc...

Since this procedure involves adding a jumper to the **INT04** board, it is preferable to have it performed by the factory, at time of order. However, any qualified electronic technician can perform the procedure in the field when necessary. ***Figure 10*** shows the location for installing the non-dim (ND) jumper.

Jumper to Ensure Non-Dim function of INT04 to be installed here.

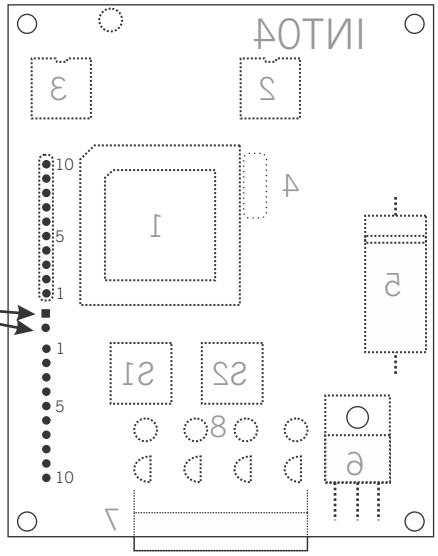


FIGURE 10 - PD DIMMER INT04 DETAIL

INT04 Solder (Back) Side

PD INSTALLATION CHECK LIST

BEFORE ENERGIZING The PD Dimmer, MAKE SURE:

- 0 Loads are tested before connecting to dimmers.
- 0 Breaker feed lines are on same electrical phase.
- 0 PD dimmer has been properly grounded.
- 0 All line voltage screw terminals are properly tightened to prevent hot spots.
- 0 ALL KNOCKOUT HOLES MUST BE COVERED WHEN UNIT IS INSTALLED

Table 4 - PD DIMMER Address Selection Information

00 INVALID ADDRESS
01 set S2,S1 to **0,1**
02 set S2,S1 to **0,2**
03 set S2,S1 to **0,3**
04 set S2,S1 to **0,4**
05 set S2,S1 to **0,5**
06 set S2,S1 to **0,6**
07 set S2,S1 to **0,7**
08 set S2,S1 to **0,8**
09 set S2,S1 to **0,9**
10 set S2,S1 to **0,A**
11 set S2,S1 to **0,B**
12 set S2,S1 to **0,C**
13 set S2,S1 to **0,D**
14 set S2,S1 to **0,E**
15 set S2,S1 to **0,F**
16 set S2,S1 to **1,0**
17 set S2,S1 to **1,1**
18 set S2,S1 to **1,2**
19 set S2,S1 to **1,3**
20 set S2,S1 to **1,4**
21 set S2,S1 to **1,5**
22 set S2,S1 to **1,6**
23 set S2,S1 to **1,7**
24 set S2,S1 to **1,8**
25 set S2,S1 to **1,9**
26 set S2,S1 to **1,A**
27 set S2,S1 to **1,B**
28 set S2,S1 to **1,C**
29 set S2,S1 to **1,D**
30 set S2,S1 to **1,E**
31 set S2,S1 to **1,F**
32 set S2,S1 to **2,0**
33 set S2,S1 to **2,1**
34 set S2,S1 to **2,2**
35 set S2,S1 to **2,3**
36 set S2,S1 to **2,4**
37 set S2,S1 to **2,5**
38 set S2,S1 to **2,6**
39 set S2,S1 to **2,7**
40 set S2,S1 to **2,8**
41 set S2,S1 to **2,9**
42 set S2,S1 to **2,A**
43 set S2,S1 to **2,B**
44 set S2,S1 to **2,C**
45 set S2,S1 to **2,D**
46 set S2 S1 to **2,E**
47 set S2,S1 to **2,F**
48 set S2,S1 to **3,0**
49 set S2,S1 to **3,1**
50 set S2,S1 to **3,2**
51 set S2,S1 to **3,3**
52 set S2,S1 to **3,4**
53 set S2,S1 to **3,5**
54 set S2,S1 to **3,6**
55 set S2,S1 to **3,7**
56 set S2,S1 to **3,8**
57 set S2,S1 to **3,9**
58 set S2,S1 to **3,A**
59 set S2,S1 to **3,B**
60 set S2,S1 to **3,C**
61 set S2,S1 to **3,D**
62 set S2,S1 to **3,E**
63 set S2,S1 to **3,F**

NOTES:
00 Decimal (S2,SI = 0,0) is not allowed on any device.
Max **PD408** Address: 63 Decimal (S2,S1 = 3,F)

LIMITED WARRANTY

Digital Lighting Systems, warrants to the purchaser that its products have been carefully manufactured and inspected and are warranted to be free from defects of workmanship and materials when used as intended. Any abuse or misuse contrary to normal operation shall void this warranty.

Digital Lighting Systems' obligation under this warranty shall be limited to the repairs of any factory defective units **within two years of date of invoice from Digital Lighting Systems** and Digital Lighting Systems shall not be liable for any other damages, whether direct or consequential. **The implied warranties of merchantability and fitness for a particular purpose are limited to the duration of the expressed warranty**. Some states do not allow the exclusion of the limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, you may also have other legal rights which vary from state to state.

Defective merchandise may be returned to **Digital Lighting Systems**, prepaid, after prior notification has been given and approval obtained for the return. To obtain prior approval for the return of the defective items, contact your local Digital Lighting Systems distributor, representative, or:

Digital Lighting Systems, Inc.
Attn: Customer Service Department
12302 SW 128 Ct. STE 105
Miami, FL 33186
(305) 969-8442

Upon request, replacement unit(s) will be shipped as soon as available. Unless immediate shipment of replacement merchandise is requested, **Digital Lighting Systems** will not ship replacement merchandise until defective merchandise is received, inspected, and determined to be defective.

No labor charges in connection with warranty problems will be reimbursed by Digital Lighting Systems without prior written approval from the factory.

Digital Lighting Systems distributors and representatives have no authority to change this warranty without written permission.

Digital Lighting Systems reserves the right to determine the best method of correcting warranty problems.

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Printed in U.S.A.
June 2025