



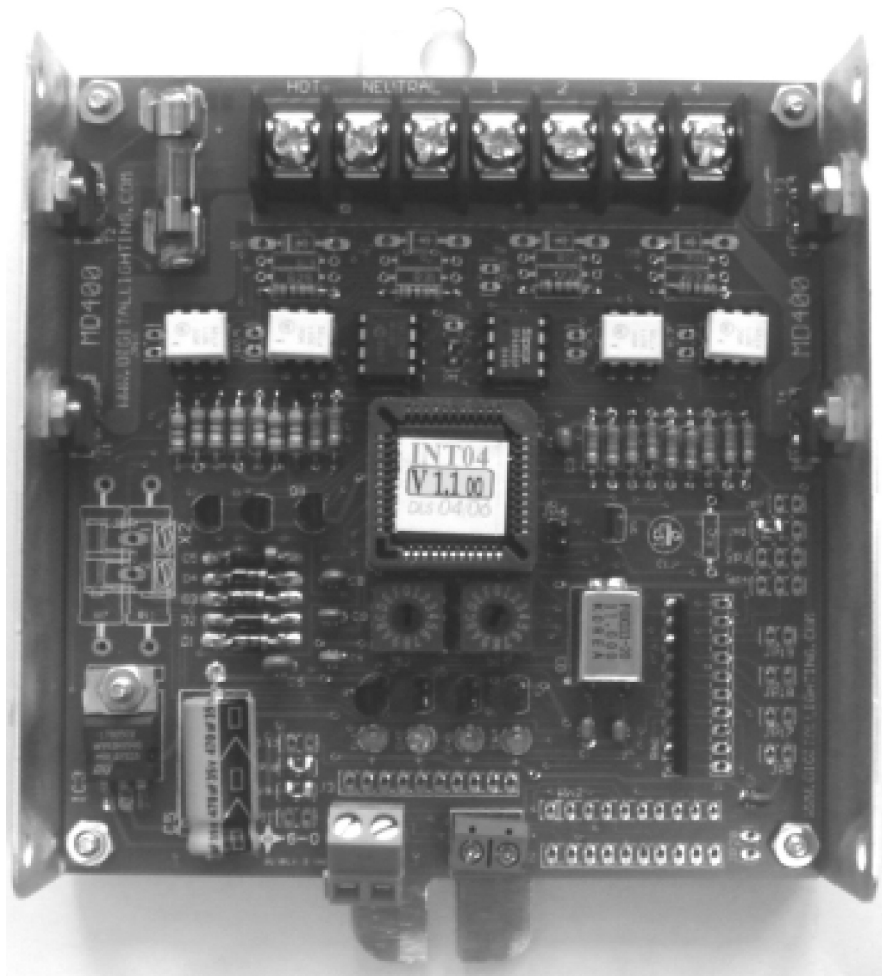
# Digital Lighting Systems, Inc.

## PROTOCOL

### MD402

**Four Dimmer or Switch Modules**

**4 x 2.5 A. outputs**



## USER'S MANUAL



## **GENERAL DESCRIPTION**

The **MD402** is a 4-channel **PROTOCOL** compatible dimmer pack. It is equivalent to four solid-state relays (SSR's) and a INT04 Logic assembled on a single circuit board. Power is fed to the **MD402** from One **10 Amp. Feed**. Each solid state relay is rated for a maximum output current of 2.5 amperes, **10 Amps total (up to 5 Amps each, 10 Amps total in VDC applications)**. The **MD402** has an open frame U shaped enclosure which also serves as a heat sink. The logic signals are optically-isolated from all line voltage elements. An external step-down 120 VAC to 8 - 12 VAC/ 300mA transformer is required to supply power to the Logic of the **MD402**. The **PROTOCOL DATA BUS** control cable is hardwired to the **MD402**. Several Dimmer packs may be daisy-chained together. Each **MD402** may be easily set to a unique address with 2 hexadecimal selectors. Each of the **MD402** outputs may be independently configured to dim or switch from the PSCXX wall stations.

**MD402** is available in several Voltages and the VDC versions provide full range dimming to **LEDs** and other VDC loads.

## **SWITCHING LOCK - (See Page 9 for more information)**

An **MD402** maybe locked by a hardware jumper into switching only. . Please see **Page9** for location of this jumper.

There are no RFI chokes installed inside the unit. In environments sensitive to RFI external chokes might be added by installer for noise filtering.



### MD402 Detail

Figure 1 - MD402 Detail

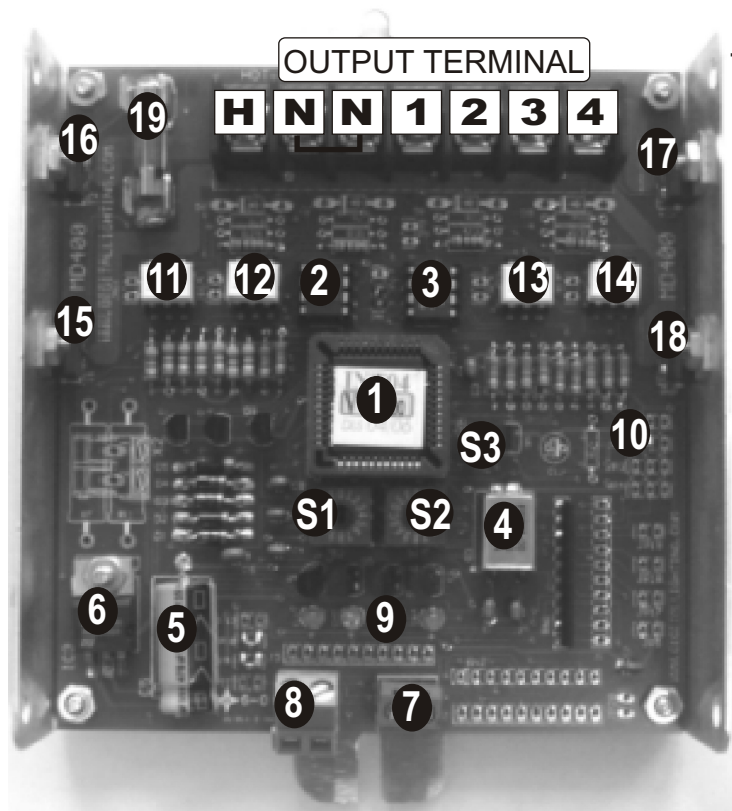


Table 1 - OUTPUT Terminals  
Definition

NAME	DESCRIPTION
1	Output Of Solid-State Relay #1
2	Output Of Solid-State Relay #2
3	Output Of Solid-State Relay #3
4	Output Of Solid-State Relay #4
H	Hot Line Feed For Relays 1 , 2 , 3 & 4.
N	Neutral Bus Connections.

Table 2 - Absolute Maximum  
Electrical Ratings

#### Electrical Characteristic Maximum

Output Load Current	1 to 4	2.5 Amps.
Input Current	H	10 Amps.
Input Voltage	H	120 VAC MD402-120
Input Voltage	H	220 VAC MD402-220
Input Voltage	H	24 VAC MD402-24
Input Voltage	H	12 VAC MD402-12
Input Voltage	H	24 VDC MD402-24DC
Input Voltage	H	12 VDC MD402-12DC

Table 3 -  
MD402 Circuit Legend

1	Microprocessor.
2	EEPROM Memory
3	Communications Chip.
4	Quartz Crystal.
5	Power Supply Capacitor.
6	Voltage Regulator.
7	DATA connector.
8	9 VAC connector (120,240V units)
9	Output LED Monitors.
10	Jumper for switches only
11,12,13,14	Optical Couplers # 1,2,3,4
15,16,17,18	Triacs or Mosfets # 1,2,3,4
19	Fuse 5mm 10 AMPS



### Mechanical Installation

The **MD402** modules are designed to be mounted in NEMA enclosures( by others).

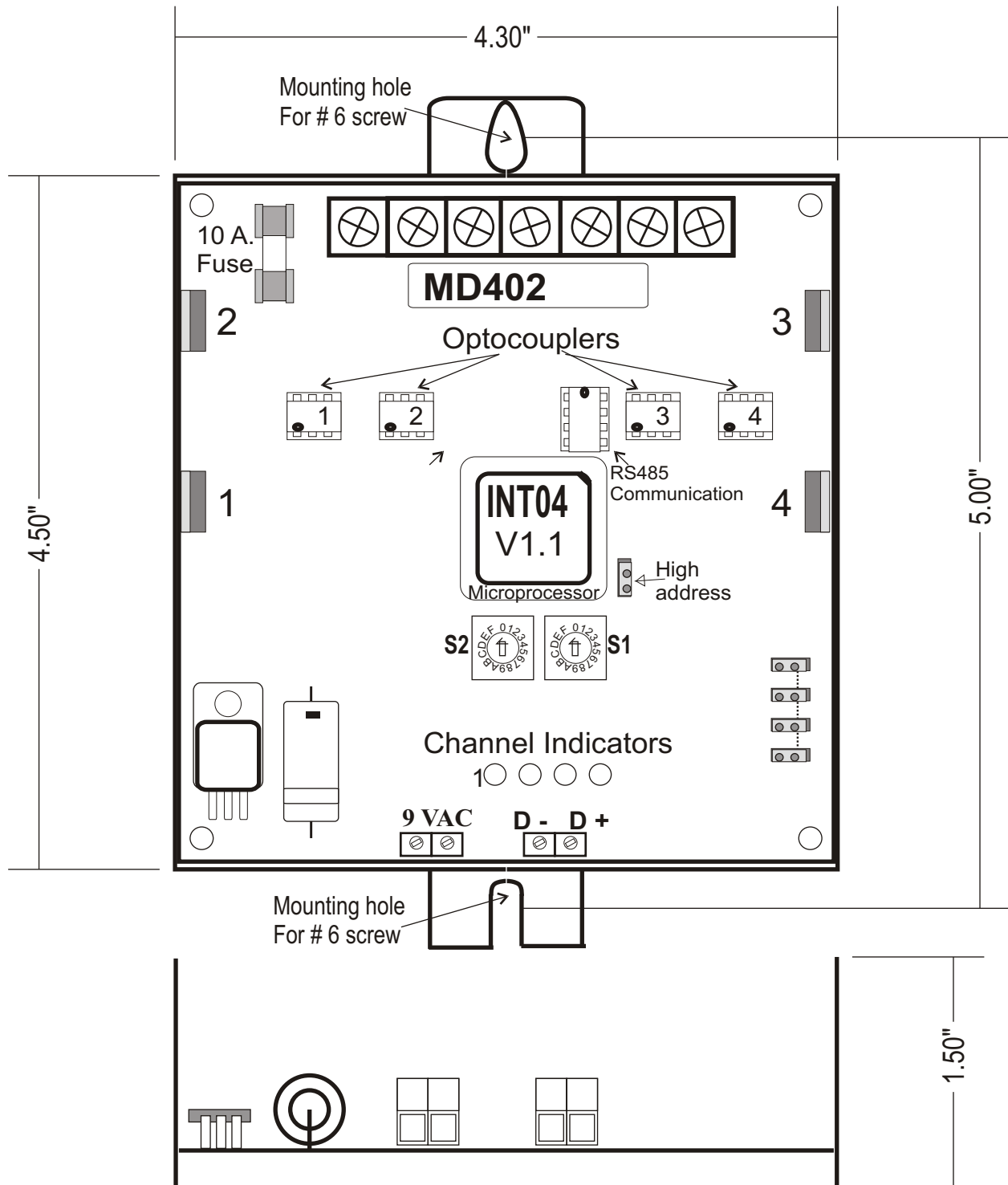


Figure 3 - Md402 Dimensional Diagram

### Md402 Control Logic Wiring Methods

Figure 4

MD Dimmer Network  
Ports Connections.

**MD402**  
Bottom view

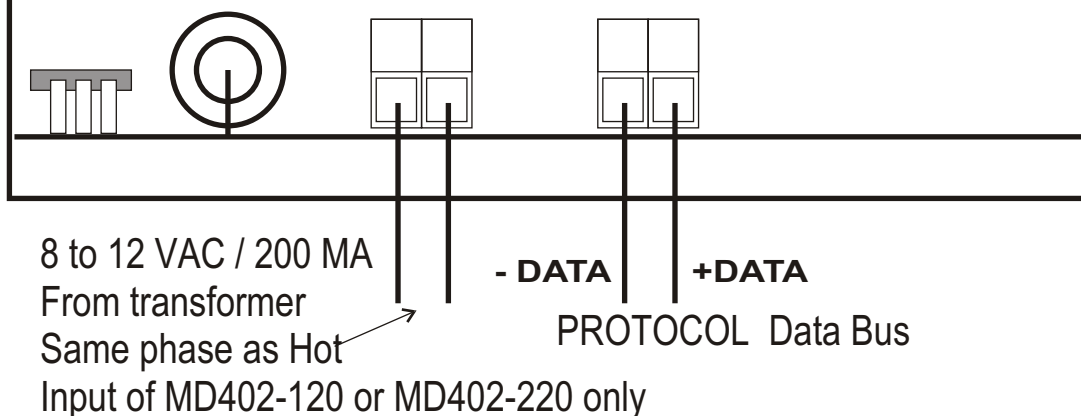
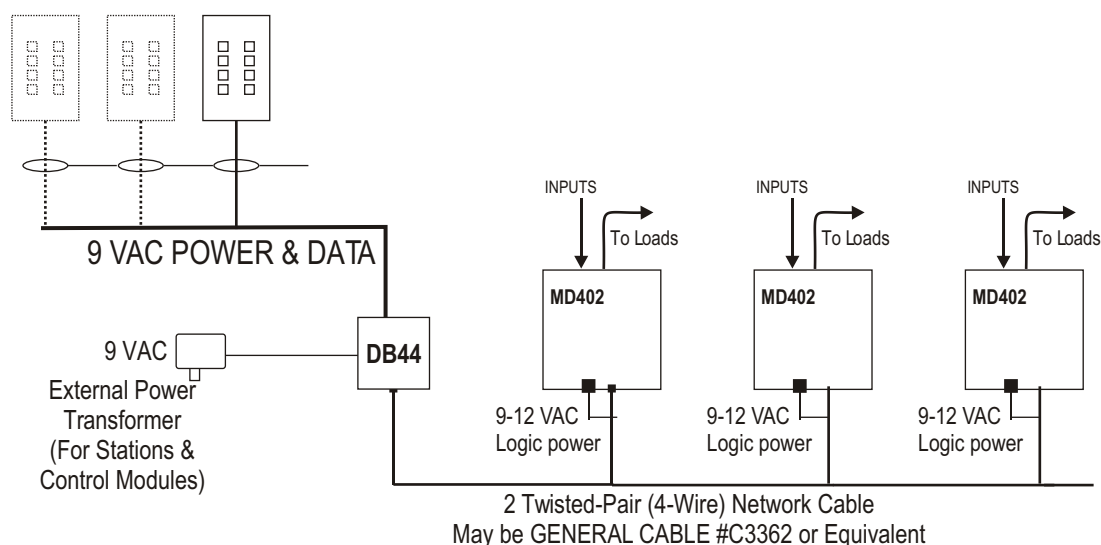


Figure 5 - Typical Installation



The same Low voltage AC transformer could be used for the  
all MD402-120 connected to the same phase

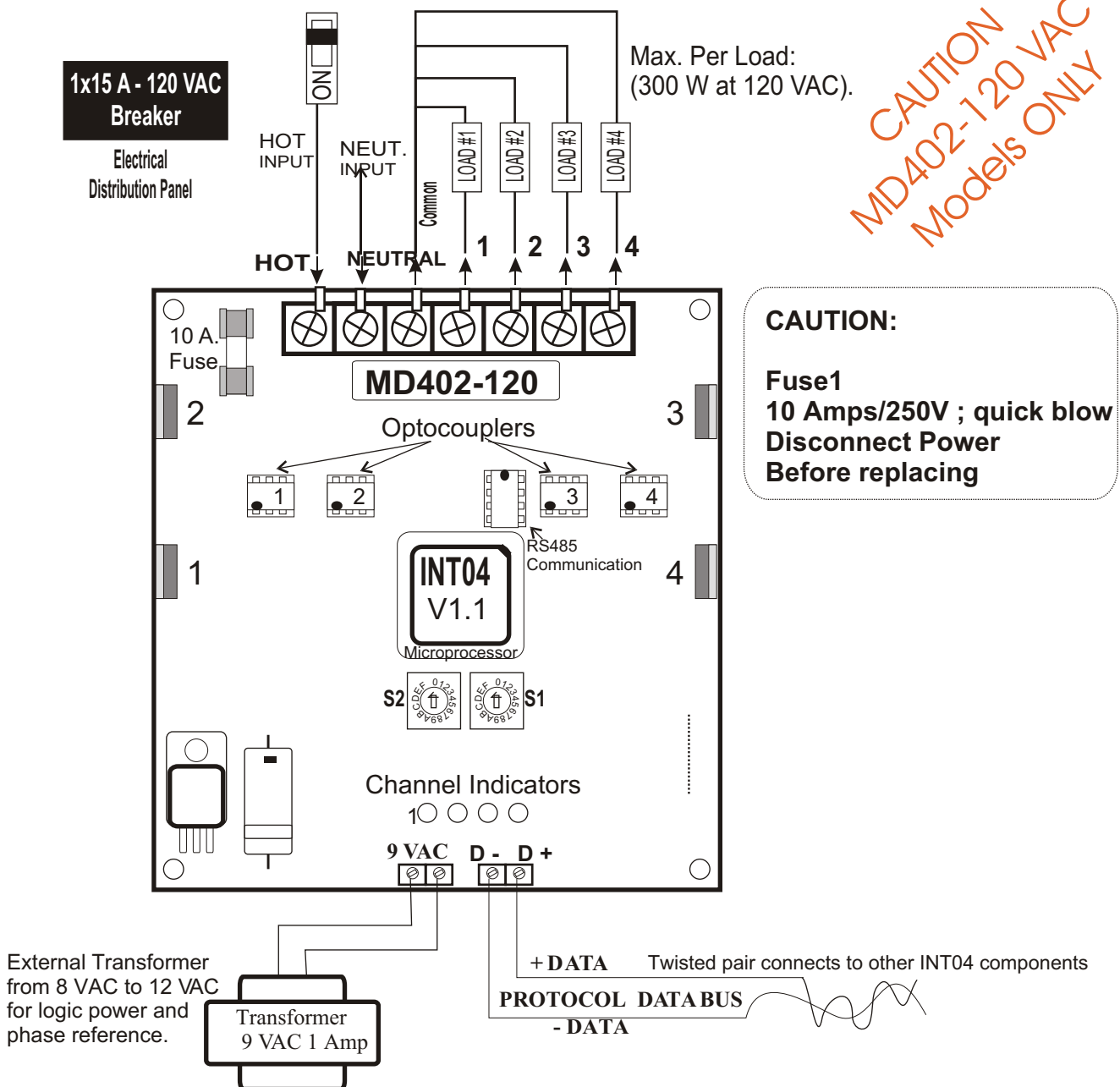


### MD402-120VAC General Wiring Instructions

#### Wiring Notes

- ❑ **DO NOT EXCEED** 300 W (2.5 Amps. ) per dimmer output @ 120VAC.
- ❑ All wiring between the controller and other dimmers (DATA bus) is low voltage (NEMA Class 2) and may be run with One, twisted pair, shielded #22 AWG wire.
- ❑ **MD402** dimmer Modules may be fed by one 15 A (maximum) branch circuits and may have up to four separately dimmed loads.
- ❑ **CAUTION: DO NOT** attempt to parallel outputs to increase capacity.
- ❑ **Installation must conform to local and/or NEC code requirements and must be performed by a qualified electrician.**
- ❑ All line voltage wires must have copper conductors of adequate Gauge with 90 °C wire insulation.
- ❑ **POWER EACH LOAD DIRECTLY BEFORE CONNECTING IT TO THE MD402 TO ENSURE PROPER WIRING.**

Figure 7 - MD402-120 Typical 120 VAC Wiring.



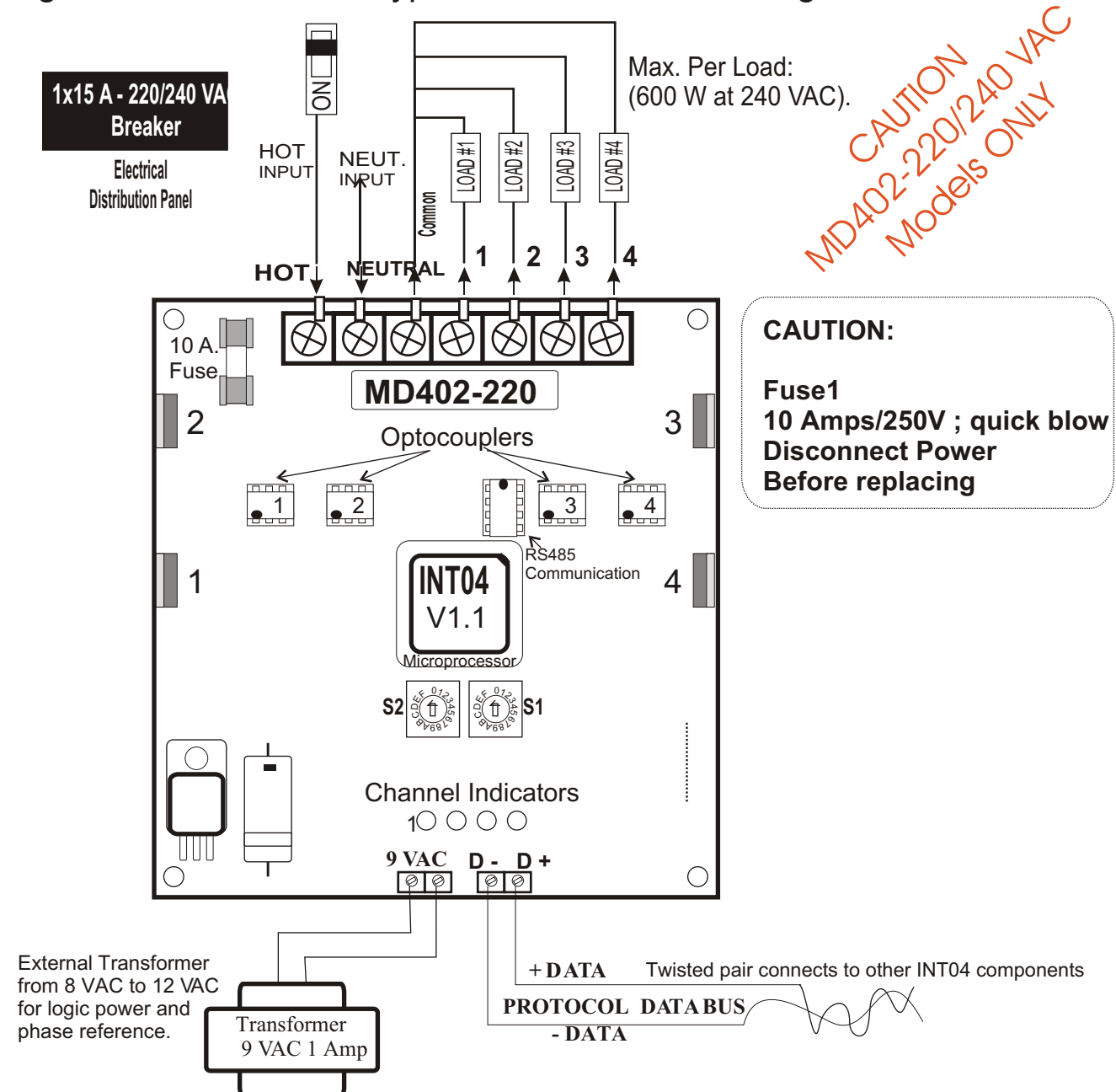


### MD402-220/240VAC General Wiring Instructions

#### Wiring Notes

- ❑ **DO NOT EXCEED** 600 W (2.5 Amps. ) per dimmer output @ 240VAC.
- ❑ All wiring between the controller and other dimmers (DATA bus) is low voltage (NEMA Class 2) and may be run with One, twisted pair, shielded #22 AWG wire.
- ❑ **MD402** dimmer Modules may be fed by one 15 A (maximum) branch circuits and may have up to four separately dimmed loads.
- ❑ **CAUTION: DO NOT** attempt to parallel outputs to increase capacity.
- ❑ **Installation must conform to local and/or NEC code requirements and must be performed by a qualified electrician.**
- ❑ All line voltage wires must have copper conductors of adequate Gauge with 90 °C wire insulation.
- ❑ **POWER EACH LOAD DIRECTLY BEFORE CONNECTING IT TO THE MD402 TO ENSURE PROPER WIRING.**

Figure 7 - MD402-240 Typical 220/240 VAC Wiring.



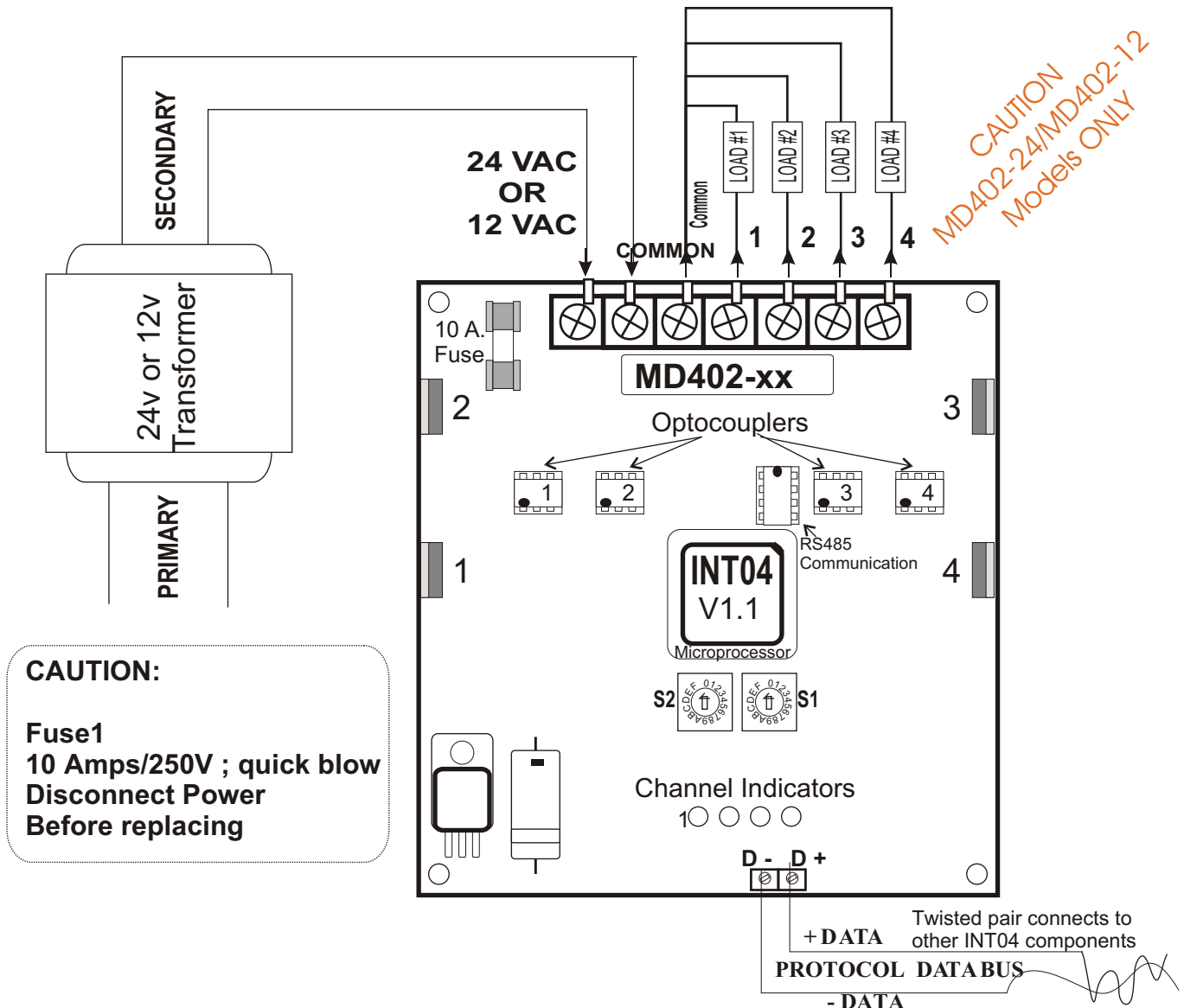




### Figure 9 - MD402-24VAC/ MD402-12VAC GENERAL WIRING INSTRUCTIONS:

#### Wiring Notes

- ❑ **DO NOT EXCEED** 60W @ 24 VAC or 30 W @ 12 VAC (2.5 Amps. ) per dimmer .
- ❑ All wiring between the controller and other dimmers (DATA bus) is low voltage (NEMA Class 2) and may be run with One, twisted pair, shielded #22 AWG wire.
- ❑ **MD402** dimmer Modules may be fed by one 15 A (maximum) branch circuits and may have up to four separately dimmed loads.
- ❑ **CAUTION: DO NOT** attempt to parallel outputs to increase capacity.
- ❑ **Installation must conform to local and/or NEC code requirements and must be performed by a qualified electrician.**
- ❑ All line voltage wires must have copper conductors of adequate Gauge with 90 °C wire insulation.
- ❑ **POWER EACH LOAD DIRECTLY BEFORE CONNECTING IT TO THE MD402 TO ENSURE PROPER WIRING.**



#### NOTES

- 1 With MD402-24 you may use a single 24 VAC-250 VA or better transformer.
- 2 With MD402-12 you may use a single 12 VAC-150 VA or better transformer.
- 3 Follow transformer's installation & wiring instructions from manufacturer.
- 4 Maximum Load Per Output: 30 Watts at 12 VAC OR Maximum Load Per Output: 60 watts at 24 VAC.

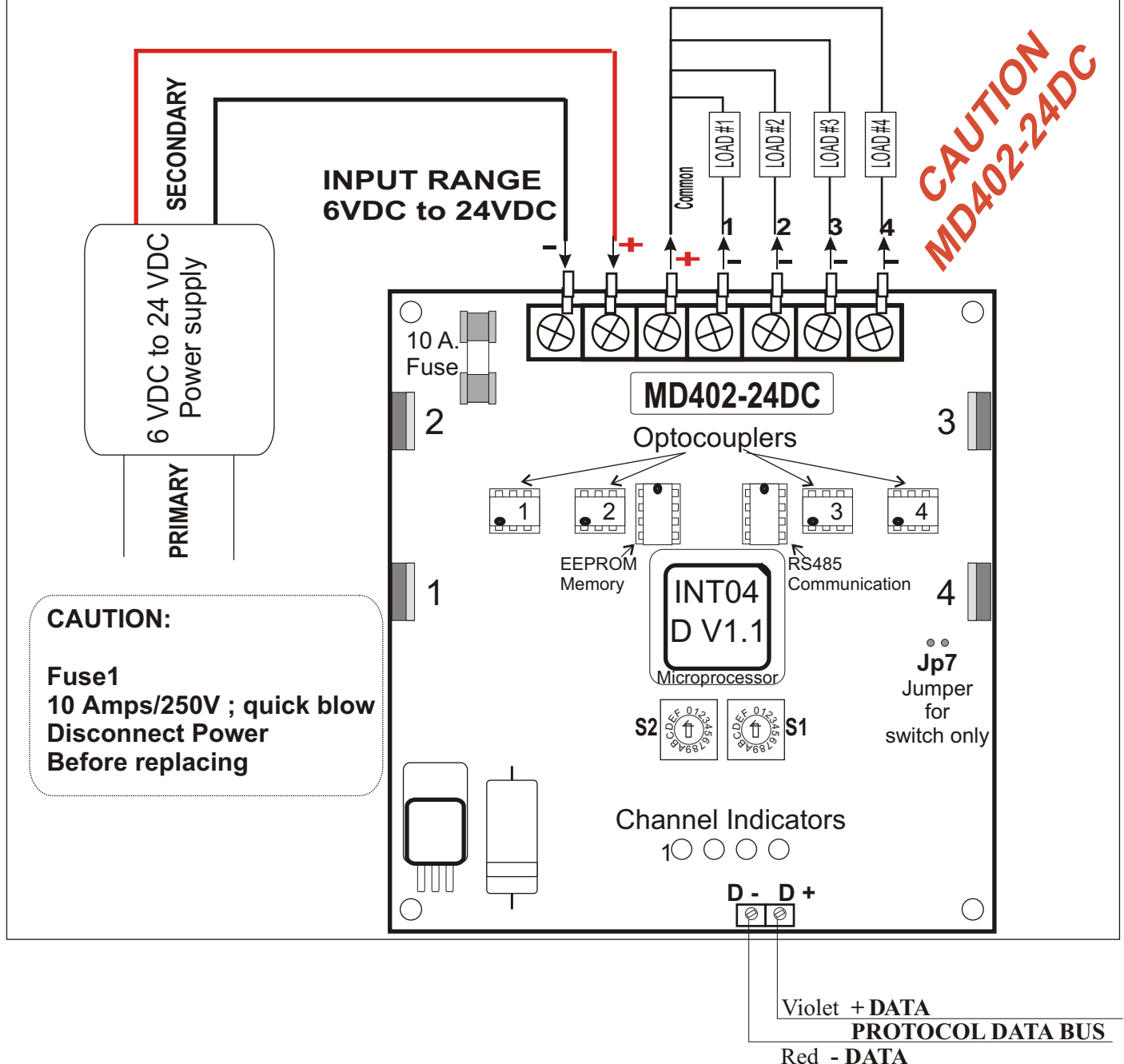




## Figure 9 - MD402-24VDC/MD402-12VDC GENERAL WIRING INSTRUCTIONS:

### Wiring Notes

- ❑ **DO NOT EXCEED** 120W @ 24 VDC or 60 W @ 12 VDC (5 Amps. ) per dimmer or **10 Amps total per 4 dimmers**
- ❑ All wiring between the controller and other dimmers (DATA bus) is low voltage (NEMA Class 2) and may be run with One, twisted pair, shielded #22 AWG wire.
- ❑ **MD402** dimmer Modules may be fed by one 10 A (maximum) branch circuits and may have up to four separately dimmed loads.
- ❑ **CAUTION: DO NOT** attempt to parallel outputs to increase capacity.
- ❑ **Installation must conform to local and/or NEC code requirements and must be performed by a qualified electrician.**
- ❑ All line voltage wires must have copper conductors of adequate Gauge with 90 °C wire insulation.
- ❑ **POWER EACH LOAD DIRECTLY BEFORE CONNECTING IT TO THE MD402 TO ENSURE PROPER WIRING.**



### Address Setting

Up to 63 **MD402** dimmer packs may be installed per system and their DATABUS input daisy-chained using standard twisted pair cables. Different addresses ranging from 1 to 63 may be selected for each dimmer. See table on page 10

### Non-Dim Output Setting

All of the MD402 outputs may be locked for non-dim (switch only) operation. This prevents inadvertent dimming, or damage, of loads that cannot be dimmed, such as contactors, mechanical relays, motors, non-dim fluorescent, etc...

Figure 8 shows the location for installing the non-dim (ND1) jumper.

### BEFORE ENERGIZING THE MD402 MAKE SURE:

- ☐ Loads are tested before connecting to dimmers.
- ☐ MD402 has been properly grounded.
- ☐ All line voltage screw terminals are properly tightened to prevent hot spots.
- ☐ Low voltage data lines connections are properly insulated.
- ☐ Low voltage data lines polarity is observed throughout the system.
- ☐ The MD402 is set to the right address.

### MD402 Installation Check List

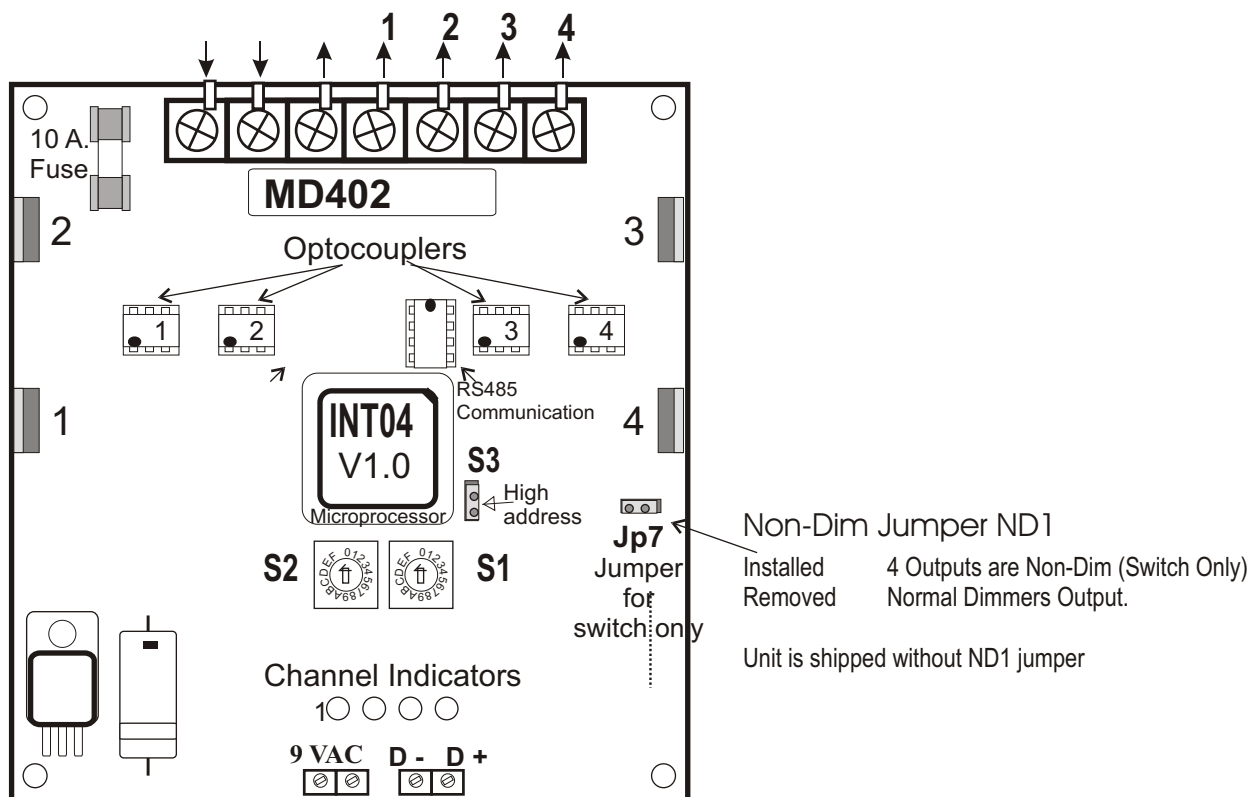


Figure 8 - MD402 Address & Mode Selection.



## MD402 Address Selection Information

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

### NOTES:

00 Decimal (S2,S1 = 0,0) is not allowed on any device.

Max Independent **PP405** Address: 63 Decimal (S2,S1 = 3,F)

Additional units could be slaved to existing addresses by adding 4 to the S2 address Example : S2,S1 = 55 will be slaved to 15



### 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 replacement or repair of any units as shall within two years of date of invoice from **Digital Lighting Systems**, prove defective; 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 128th court # 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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