LiteTouch
Brilliant Solutions in Lighting Automation

Lighting Control Systems

Installation and Troubleshooting Manual

Version 2.6

LiteTouch
Brilliant Solutions in Lighting Automation

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LiteTouch® Installation and Troubleshooting Manual

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Manual updated May 18, 2006

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Overview 1

A LiteTouch® lighting control system is complex. To install it properly requires that you, the installer, have a good understanding of LiteTouch systems, that you use the right components, and that you plan carefully each step of the installation to avoid problems later. Please take the time to read this manual and refer to it when you have a question.

Installation Checklist

When installing a LiteTouch lighting control system, you should generally take the following steps:

❒ Gather information from schedules, drawings, and bills of material. See Chapter 2, “Gather Information” on page 5.

❒ Verify the system’s low voltage power requirements. For various reasons, power requirements are often underestimated. See “Determine Power Requirements” on page 8.

❒ Install enclosures and keypad backboxes. It is most convenient to install them before wiring, but they may be installed after wiring. See “Install Enclosures and Backboxes” on page 14.

❒ Install the load homeruns (line voltage) and keypad homeruns (low voltage). See Chapter 3, “Install Boxes and Wiring” on page 11.

❒ Install the power supply modules in enclosures. See “Install Power Supply Modules” on page 23.

❒ Install the control modules, as follows.

- Connect load homeruns to modules.

- Wire low voltage power leads from power supply modules to any low voltage relay, electronic ballast dimmer, and DC motor control modules.

See “Install Control Modules” on page 26.

❒ Install the keypads. See “Install Keypads” on page 30.

❒ Install the CCU. See “Install the CCU” on page 56.

❒ Wire the keypad homeruns, DC power, and data homeruns to the CCU, as follows:

- Connect data cables (supplied) to modules and the transorb board. See “Connect Modules with Data Cables” on page 61.
- On large installations or with multiple enclosure locations, you may need to string enclosures together to reduce the number of data homeruns. See “String Enclosures Together” on page 62.
- Wire the data homeruns. See “Connect Data Homeruns” on page 64.
- Connect the data homeruns to the CCU module ports. See “Connect Data Homeruns” on page 64.
- Wire keypad homeruns to the CCU keypad ports. See “Connect Keypad Homeruns” on page 65.
- Wire power supply leads to the CCU ports. See “Connect Keypad Homeruns” on page 65.
- Run an AC power line to the CCU (5000LC only). See “Run AC Power Line to the CCU (5000LC only)” on page 66.

❒ Update the schedules. Any time you make a change to the design, note it on the schedules or by other means. This information needs to be included in the program and must also be known for effective troubleshooting. See “Note Changes on Schedules” on page 10.

❒ Refer to Chapter 5, “Start and Test System” on page 69 for information on powering up and testing the system.

❒ Refer to Chapter 6, “Troubleshooting” on page 103 for information on troubleshooting the system after it is installed.

❒ Refer to “Transient Voltage Surge Suppression” on page 20 for information on protecting the LiteTouch system from voltage surges.

Installation Guidelines

WARNING

A LiteTouch system should never be used to control equipment that could pose a danger or safety risk to humans, pets, or wildlife (e.g., gas valves, pool covers, garbage disposals, etc.). LiteTouch assumes no responsibility or liability if a LiteTouch system is used or installed improperly or against LiteTouch's instructions.

You should follow these guidelines when installing a LiteTouch system:

- Start with a detailed plan. Take into account the homeowner's desires. Work out any known problems before you begin installation.
- If any changes are made to the LiteTouch system during installation, document them so the changes can be added to the control program. Also, anyone troubleshooting the system after it is installed will need to know about any changes you made to the design.
- If possible, place control modules in multiple locations to reduce the distance of homeruns. Having multiple enclosure locations in large applications can save miles of wiring.
- Control modules and power supply modules may create noise that could cause interference with some devices. For this reason, enclosures should be located as far away from such devices as possible.
- Each load must have its own neutral.
- Keypad wire is low voltage and should NOT be pulled in parallel with line voltage wire. Low voltage and line voltage runs must always be spaced at least six inches apart.
- Label each load homerun with the load number it serves. The number appears on the Enclosure Schedule and should also be on the drawings. You need this information when you connect the lines to the modules.
- Do not use shielded wire for keypads.
- Do not create a closed loop when wiring keypad homeruns.

NOTES

Gather Information 2

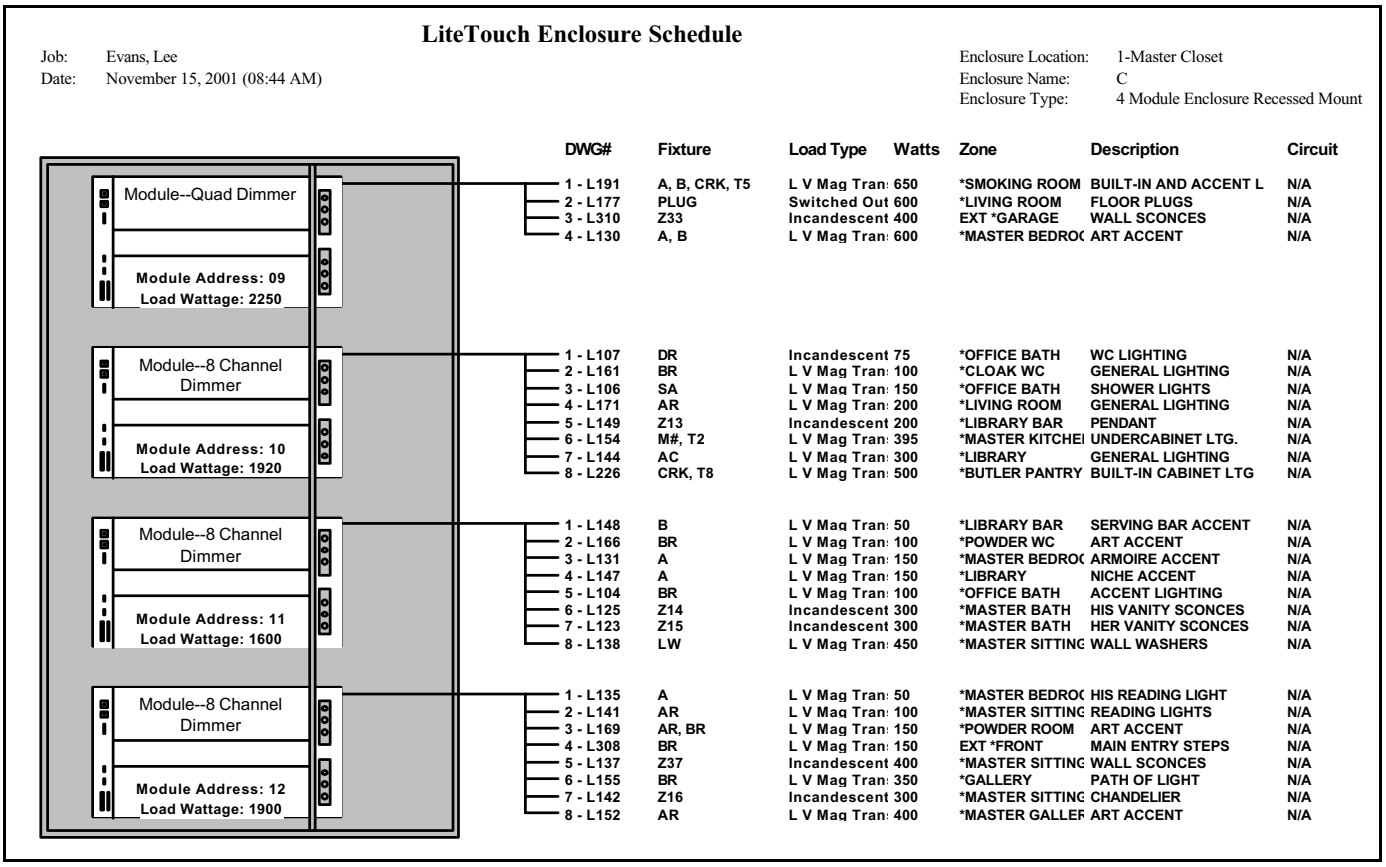
The following information is required from the designer of the LiteTouch system:

- Electrical/lighting plans with module, keypad, and CCU locations.
- LiteTouch Enclosure Schedule with enclosure/module detail.
- LiteTouch Keypad Design Schedule with keypad detail.
- LiteTouch Load/Lighting Schedule, which is a descriptive list of loads controlled by the LiteTouch system.

The LiteTouch Enclosure Schedule, Keypad Design Schedule, and Load/Lighting Schedule are normally produced using LiteTouch's LiteWare® software. The following pages contain examples of LiteTouch schedules produced with LiteWare 3.6 for a 5000LC CCU system.

Enclosure Schedule

The second page of an Enclosure Schedule is shown below.



LiteTouch Enclosure Schedule

Job: Evans, Lee
Date: November 15, 2001 (08:44 AM)

Enclosure Location: 1-Master Closet
Enclosure Name: C
Enclosure Type: 4 Module Enclosure Recessed Mount

DWG#	Fixture	Load Type	Watts	Zone	Description	Circuit
1 - L191	A, B, CRK, T5	L V Mag Tran	650	*SMOKING ROOM	BUILT-IN AND ACCENT L	N/A
2 - L177	PLUG	Switched Out	600	*LIVING ROOM	FLOOR PLUGS	N/A
3 - L310	Z33	Incandescent	400	EXT *GARAGE	WALL SCONCES	N/A
4 - L130	A, B	L V Mag Tran	600	*MASTER BEDROO	ART ACCENT	N/A
1 - L107	DR	Incandescent	75	*OFFICE BATH	WC LIGHTING	N/A
2 - L161	BR	L V Mag Tran	100	*CLOAK WC	GENERAL LIGHTING	N/A
3 - L106	SA	L V Mag Tran	150	*OFFICE BATH	SHOWER LIGHTS	N/A
4 - L171	AR	L V Mag Tran	200	*LIVING ROOM	GENERAL LIGHTING	N/A
5 - L149	Z13	Incandescent	200	*LIBRARY BAR	PENDANT	N/A
6 - L154	M#, T2	L V Mag Tran	395	*MASTER KITCHEI	UNDERCABINET LTG.	N/A
7 - L144	AC	L V Mag Tran	300	*LIBRARY	GENERAL LIGHTING	N/A
8 - L226	CRK, T8	L V Mag Tran	500	*BUTLER PANTRY	BUILT-IN CABINET LTG	N/A
1 - L148	B	L V Mag Tran	50	*LIBRARY BAR	SERVING BAR ACCENT	N/A
2 - L166	BR	L V Mag Tran	100	*POWDER WC	ART ACCENT	N/A
3 - L131	A	L V Mag Tran	150	*MASTER BEDROO	ARMOIRE ACCENT	N/A
4 - L147	A	L V Mag Tran	150	*LIBRARY	NICHE ACCENT	N/A
5 - L104	BR	L V Mag Tran	100	*OFFICE BATH	ACCENT LIGHTING	N/A
6 - L125	Z14	Incandescent	300	*MASTER BATH	HIS VANITY SCONCES	N/A
7 - L123	Z15	Incandescent	300	*MASTER BATH	HER VANITY SCONCES	N/A
8 - L138	LW	L V Mag Tran	450	*MASTER SITTING	WALL WASHERS	N/A
1 - L135	A	L V Mag Tran	50	*MASTER BEDROO	HIS READING LIGHT	N/A
2 - L141	AR	L V Mag Tran	100	*MASTER SITTING	READING LIGHTS	N/A
3 - L169	AR, BR	L V Mag Tran	150	*POWDER ROOM	ART ACCENT	N/A
4 - L308	BR	L V Mag Tran	150	EXT *FRONT	MAIN ENTRY STEPS	N/A
5 - L137	Z37	Incandescent	400	*MASTER SITTING	WALL SCONCES	N/A
6 - L155	BR	L V Mag Tran	350	*GALLERY	PATH OF LIGHT	N/A
7 - L142	Z16	Incandescent	300	*MASTER SITTING	CHANDELIER	N/A
8 - L152	AR	L V Mag Tran	400	*MASTER GALLEF	ART ACCENT	N/A

DWG # The number assigned to each load and its associated module.

Fixture The name or code assigned to the fixture type used with the load.

Load Type The type of fixture, a rating that correlates to a specific module type. Load types need to be matched with correct module types.

Watts The total watts used by the load or fixture.

Zone The location of the load in the home (same as “Area” on the load list).

Description A description of the load/fixture.

Circuit If a circuit is specified for the load, it is listed in this column.

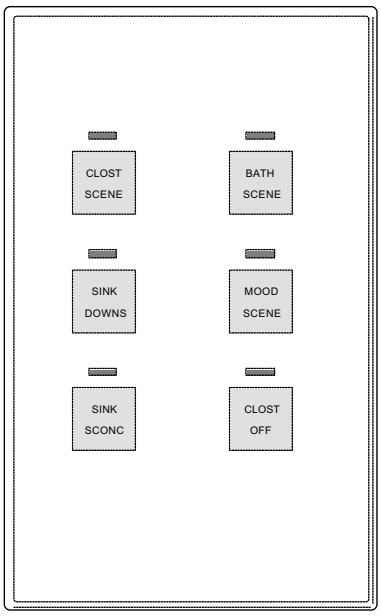
Keypad Design Schedule

The first page of a Keypad Design Schedule is shown below. Additional pages list information for each switch. As many as three pages may be required to describe a single keypad.

LiteTouch Station Design Schedule

Job: Evans, Lee
Date: November 15, 2001 (08:46 AM)
Comment:

Station Location: Master Closet at His Si
Drawing Number: S08



Pos #	Button Color	LED Color	Text Color	Engraving Text
1	Ivory	Green	Black	CLOST SCENE
3	Ivory	Green	Black	BATH SCENE
4	Ivory	Green	Black	SINK DOWNS
6	Ivory	Green	Black	MOOD SCENE
7	Ivory	Green	Black	SINK SCONC
9	Ivory	Green	Black	CLOST OFF

Drawing #	Location	Series	Style	Colors	Gang	Address
S08	Master Closet at His Si	S	Sculpted	FACEPLATE: Ivory		08

First Page

The first page graphically depicts the keypad.

The table at the bottom references the drawing number and shows the location in the home where the keypad should be installed. The “address” that the keypad must use is shown in the last column.

The table on the right shows the color/style/engraving detail for the keypad.

Additional Pages

The additional pages of the Keypad Design Schedule show detail for each switch assignment. This detail is provided mostly for troubleshooting and reference.

Load/Lighting Schedule

The first portion of a Load/Lighting Schedule is shown below. The load list provides more information about the loads than does the Enclosure Schedule. Refer to this list when additional information is required.

LiteTouch Load/Lighting Schedule

Job: Jane Doe Residence Enclosure Location: *All*

Date: November 21, 2001

Drawing Number	Output Position	(Address)	Area	Description	Fixture or Load	Load Type	Watts	Qty.	Total Watts	Module Function
Load103	Enclosure3.0.0	(09-0)	Masterbed	Downlights	FX1	L V Mag Trans	50	5	250	Switching
Load104	Enclosure3.1.0	(04-0)	Masterbed	Cove	FX2	Incandescent	60	2	120	Dimming
Load101	Enclosure3.1.1	(04-1)	Hall	Downlights	FX2	Incandescent	60	4	240	Dimming
Load105	Enclosure3.1.2	(04-2)	Masterbed	Ceiling Fan	FX10	Neon	40	2	80	Dimming
Load106	Enclosure3.1.3	(04-3)	Masterbed	Reading Downlights	FX5	Incandescent	20	4	80	Dimming
Load107	Enclosure3.0.1	(09-1)	Landscape	Ocean Floods	FX7	FL Elec Dimming	80	4	320	Switching
Load108	Enclosure2.1.0	(01-0)	Lanai	Exterior	FX7	FL Elec Dimming	80	6	480	Switching
Load116	Enclosure3.1.4	(04-4)	Hall	Downlights	FX8	Incandescent	100	5	500	Dimming
Load117	Enclosure3.0.2	(09-2)	Study	Lamp	FX1	L V Mag Trans	50	3	150	Switching
Load118	Enclosure3.1.5	(04-5)	Study	Downlights	FX2	Incandescent	60	4	240	Dimming
Load119	Enclosure3.1.6	(04-6)	Study	Downlights	FX2	Incandescent	60	6	360	Dimming
Load120	Enclosure3.1.7	(04-7)	Study	Desk	FX5	Incandescent	20	5	100	Dimming
Load102	Enclosure2.3.0	(05-0)	Wardrobe	Downlights	FX9	L V Mag Trans	50	4	200	Dimming
Load109	Enclosure3.0.3	(09-3)	MasterBath	Exhaust Fan	FX3	Fans	150	2	300	Switching
Load110	Enclosure2.3.1	(05-1)	MasterBath	Shower	FX8	Incandescent	100	2	200	Dimming
Load111	Enclosure2.3.2	(05-2)	MasterBath	Tub	FX5	Incandescent	20	1	20	Dimming
Load112	Enclosure2.3.3	(05-3)	MasterBath	Downlights	FX5	Incandescent	20	10	200	Dimming
Load113	Enclosure3.0.4	(09-4)	MasterBath	Vanity	FX7	FL Elec Dimming	80	2	160	Switching
Load114	Enclosure3.0.5	(09-5)	MasterBath	Toilet fan	FX3	Fans	150	1	150	Switching
Load115	Enclosure2.3.4	(05-4)	MasterBath	Downlight	FX5	Incandescent	20	6	120	Dimming
Load121	Enclosure3.0.6	(09-6)	Landscape	Exterior		Mercury Vapor	200	1	200	Switching
Load122	Enclosure3.2.0	(00-0)	Garage	Alarm system	FX12	L V Mag Trans	50	3	150	LV Switching (24V AC/DC)
Load123	Enclosure3.2.1	(00-1)	Garage	Sensors	FX13	(Sp)Elec Trans	20	1	20	LV Switching (24V AC/DC)

Determine Power Requirements

A LiteTouch lighting control system is subject to changes and additions during the design process. Sometimes these changes do not get included in the final Enclosure Schedule, and the number and placement of power supplies is not sufficient.

For this reason, you should calculate the power requirements based on the job's total keypads/LEDs to determine the actual power needs prior to installation.

Enclosure Schedule Limitations

Due to some limitations in LiteWare, the Enclosure Schedule may not always show the correct locations for all power supplies. The Enclosure Schedule shows only enclosures, modules, and power supplies—it cannot show the length or location of keypad homeruns. When a keypad homerun requires an additional power supply because of its length, the Enclosure Schedule may not indicate it. If the LiteWare Enclosure Schedule shows an additional power supply in an enclosure by itself, it is identifying the need for the power supply but not its location.

Calculate Low Voltage Power Usage

The following table shows which LiteTouch components draw low voltage power from LiteTouch power supplies:

Low Voltage LiteTouch Device	Power Requirement
Keypads	
Each keypad	10 mA
Each button LED on each keypad	10 mA
Master control keypad	300 mA
Other Devices	
Low voltage relay	330 mA
DC motor control	250 mA

A single power supply supplies 2 amps (2000 mA) of power. A dual power supply consists of two single power supplies.

For example, a nine-button keypad draws about 100 mA; 20 nine-button keypads draw about 2000 mA, the capacity of a LiteTouch power supply.

In addition, some modules draw power from the LiteTouch power supply. (Most modules get their power from the AC circuit.) These modules are also listed in the table.

The following table can be used to calculate your power needs.

Power Requirements Calculation Form			
Device Drawing Power	**Total Quantity**	**Unit Power Usage**	**Total Usage**
Total keypads		x 10mA	
Total LEDs (or buttons) on all keypads		x 10mA	
Master control keypads		x 300mA	
Low voltage relay		x 330mA	
DC motor control		x 250mA	
Other			
Add “Total Usage” column to get the total power requirement			

Refer to “Keypad Wiring” on page 12 for additional information on keypad wiring, including limitations.

Note Changes on Schedules

If you make any changes to the LiteTouch design (e.g., add a power supply, keypad, etc.), note the changes on the appropriate schedule.

Inform the LiteTouch system designer of any changes that could affect the system program (e.g., added keypad, added loads, etc.).

In addition, leave a copy of all changes at the job site when the job is completed, as this information is required when troubleshooting problems with the system.

Install Boxes and Wiring 3

The LiteTouch control system uses standard line voltage for load homeruns and low voltage for keypad homeruns. This chapter provides information and guidelines for installing line voltage and low voltage wiring, enclosures, and keypad backboxes.

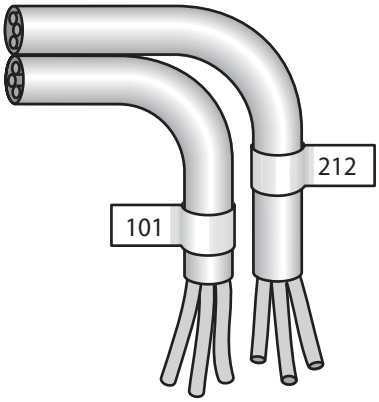
NOTE ☞ It is recommended, though not required, that you install enclosures and keypad backboxes before pulling wire so you can better estimate wire length. For information on installing enclosures and backboxes, see "Install Enclosures and Backboxes" on page 14.

Line Voltage Wiring Guidelines

A load homerun connects the loads to be controlled with their associated modules, which are mounted in enclosures. Always use 12-gauge wire for line voltage load homeruns.

All modules that control line voltage loads require one line voltage run from a breaker. Each module should receive power from a separate breaker. Always use 12-gauge wire for line voltage runs between breakers and modules.

Label each load homerun Label each load homerun at the enclosure with the proper load number from the Enclosure Schedule, "DWG #" column (see example below). Time spent labeling loads will save considerable time later when you need to identify each line to connect it to the modules.



Separate neutral runs Provide each load with its own neutral run. Do not share neutral runs.

Keep line voltage and low voltage wiring separate Keep line voltage wiring separate from low voltage wiring, and maintain a minimum distance of six inches between them.

Low Voltage Wiring Guidelines

Use low voltage wiring for the following:

- Keypad homeruns
- Communications and low voltage power wiring between the enclosures and the CCU

Keypad Wiring

LiteTouch number 08-2103-01wire is recommended for keypad homeruns. It contains four 16-gauge wires, unshielded.

LiteTouch wire is superior quality and the proper gauge to reduce the potential for communication problems. Only LiteTouch low voltage cable supplies the correct color coding for wires.

Never use shielded wire for keypad homeruns.

The cable color used for keypad homeruns is orange.

The table below shows the LiteTouch wire colors:

LiteTouch Wire Colors
Red
Black
Blue
White (spare)

Closed loops

Never enclose a loop (connect both the beginning and end of a run to the CCU).

If you need to group several keypads at the end of a line, use heavier gauge wire to avoid voltage drops.

Keypad Homerun Limitations

Following are the requirements for keypad homerun wiring due to distance and keypad limitations.

Distance

Keep keypad homeruns as short as possible. As a rule, a keypad homerun should not exceed 1000 feet. Distance causes a gradual voltage drop, and at distances over a 1000 feet, the voltage drop may cause communication problems. If you need a keypad homerun longer than 1000 feet, you can add an additional power supply (housed in an enclosure) at the end of the run to maintain the voltage level.

Maximum number of keypads

The maximum number of keypads on a homerun depends on the number of keypads, number of buttons per keypad, and the overall length of the homerun. As a rule, you should limit a single homerun to about 20 keypads, but this is only a guideline. Refer to "Calculate Low Voltage Power Usage" on page 9 for information on calculating your homerun power requirements. If you exceed the power output for the homerun, the voltage may drop during times of peak usage causing data errors. Refer to the section below, "Add Extra Power Supplies" for information on increasing power to the homerun.

Using several keypad homeruns is preferable (and less likely to cause problems) to fewer runs containing a maximum number of keypads. Several keypad homeruns can be tied together at the CCU.

Enclosure/CCU distance

Enclosure(s) that contain power supplies for the keypad homeruns must be within 50 feet of the CCU. Use two-conductor, 16-gauge wire to run power from the power supply modules to the CCU.

Other enclosures have no specific distance requirements. Maximum distance is 4000 feet.

Add Extra Power Supplies

One CCU port can support up to two power supplies (the limit determined by the CCU backplane). If additional power is required for a run longer than 1000 feet, a power supply can be added directly to the keypad homerun using one of the following two methods:

- Add a power supply at the end of the keypad homerun, housed in a two-module enclosure.
- Add a power supply to the enclosure nearest the CCU, and wire the power supply directly to the keypad homerun, bypassing the CCU port.

Install Enclosures and Backboxes

Enclosures and keypad backboxes can be installed before or after wiring. Use enclosures to house modules, and use standard electrical boxes (backboxes) to house keypads.

Enclosures

An *enclosure* houses control modules and power supplies. An enclosure is available in two sizes, four-module and two-module. Each of these is available in surface mount (mounted on wall surface) and recessed mount (recessed into wall).

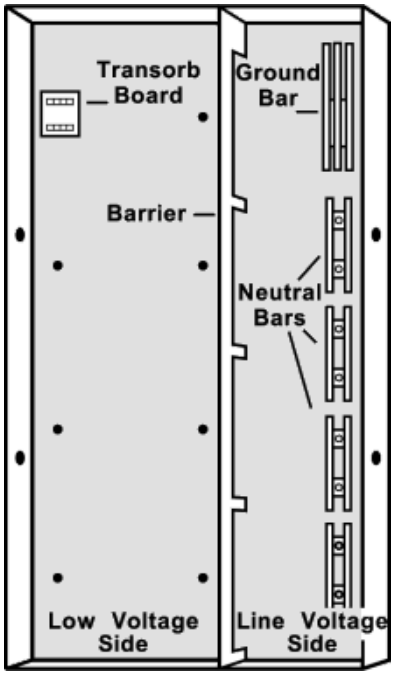
NOTE ☞ Additional transorb boards for each module can be added to the enclosure to provide increased protection for the equipment. Also, an enclosure voltage separator can be added so that different voltage modules can be installed in the same enclosure.

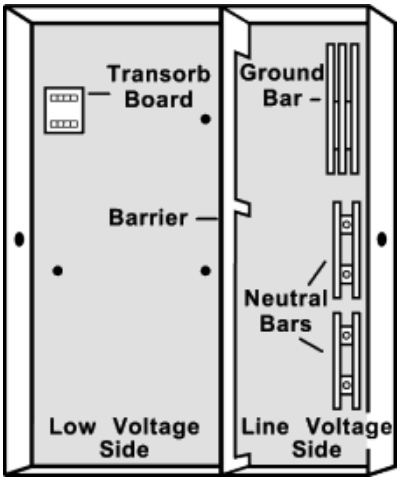
CAUTION

In accordance with CSA requirements, the interior space isolates line and low-voltage sections, and this isolation must be maintained. Place LiteTouch enclosures in an environment in which ambient temperatures are between 35° and 95° Fahrenheit. Modules may create some noise and should not be located where this may be objectionable.

Enclosure dimensions are as follows:

Four-Module Enclosure	
Box dimensions:	37" H x 20" W x 4" D
Surface mount lid:	36.8" H x 19.8" W
Recess mount lid:	38.5" H x 20.6" W
Two-Module Enclosure	
Box dimensions:	20" H x 20" W x 4" D
Surface mount lid:	20" H x 20" W
Recess mount lid:	22" H x 22" W
Knockouts	
Line voltage side:	$18\frac{7}{8}$" in top, $18\frac{7}{8}$" in bottom
Low voltage side:	$6\frac{7}{8}$" in top, $6\frac{7}{8}$" in bottom



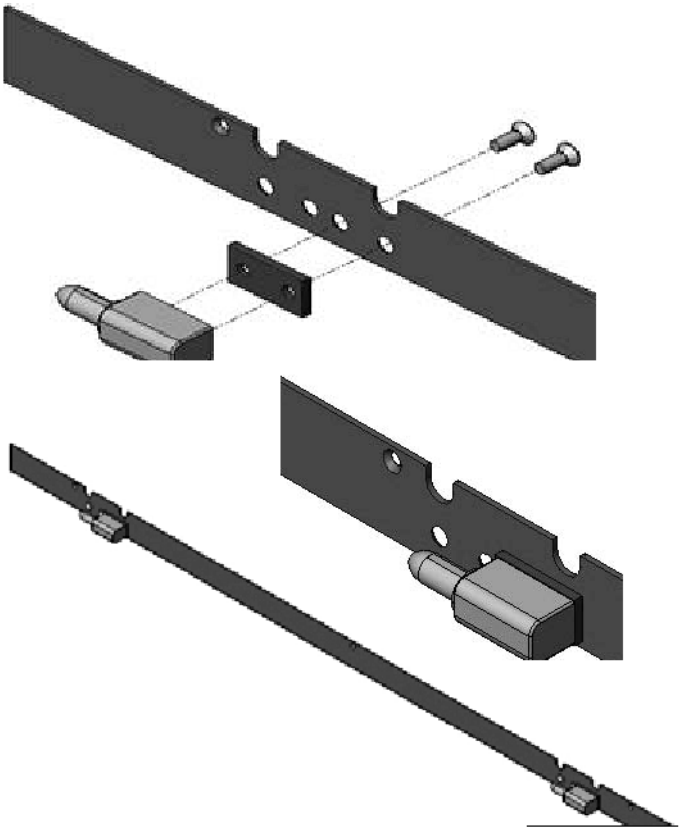


You can install enclosures two or more units high or in any configuration that fits the space in which they are installed.

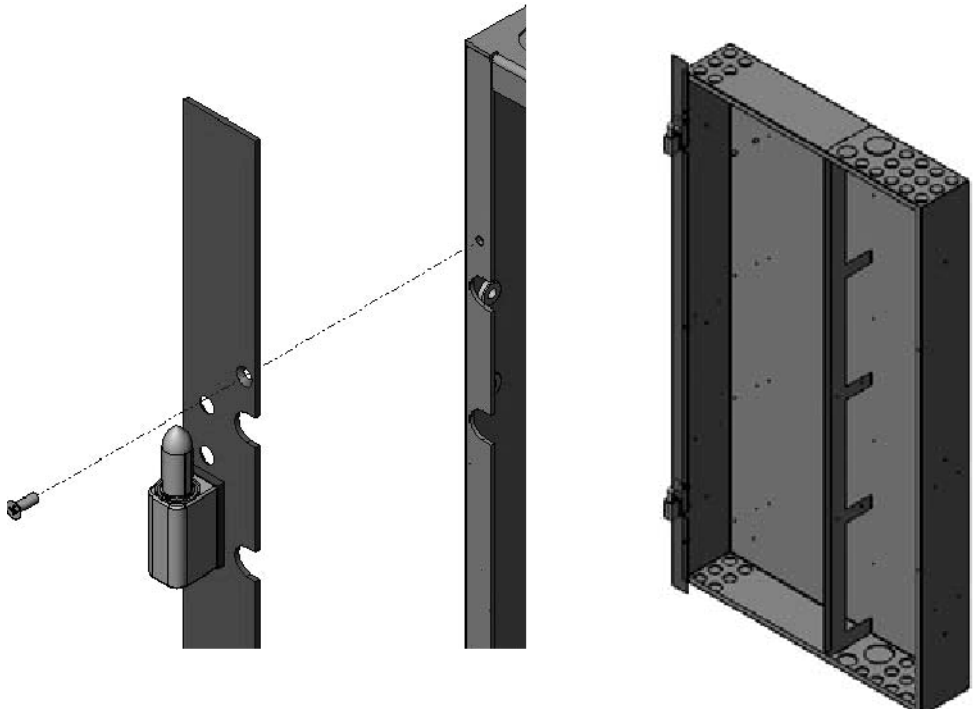
Install Recessed Mount Enclosure

To install the mounting kit for a recessed mount enclosure, take the following steps:

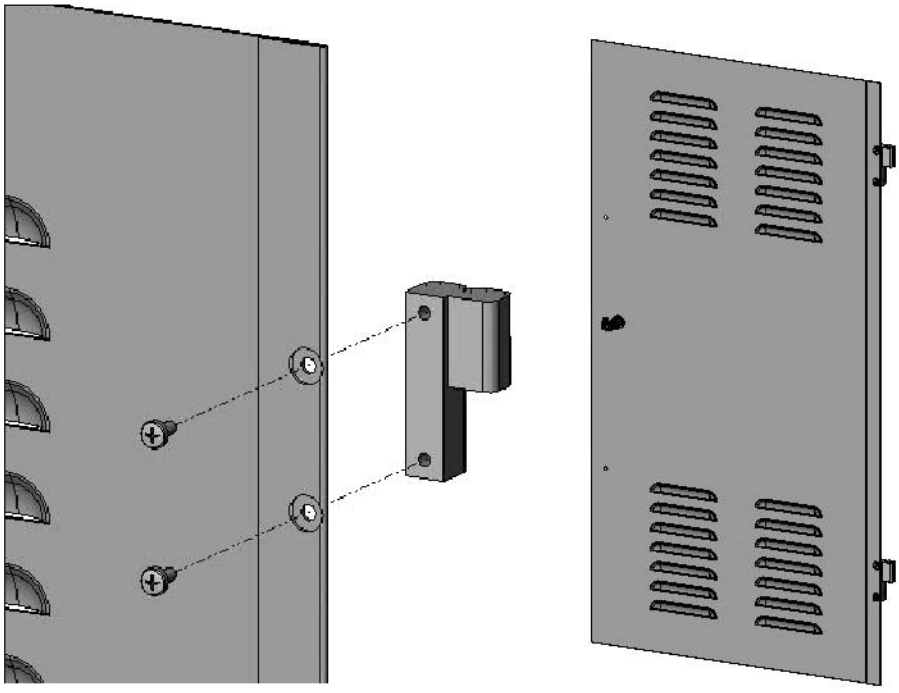
1. Attach the two hinges to the enclosure trim. Align the spacer (2580-072) with the lower two holes on each end of the trim (2580-070) and place the male section of each hinge (2580-122) against the spacer, as shown below. Use two 10-32 x $^1/_2$ flat-head screws (5150-960) to attach each spacer and hinge to the trim.



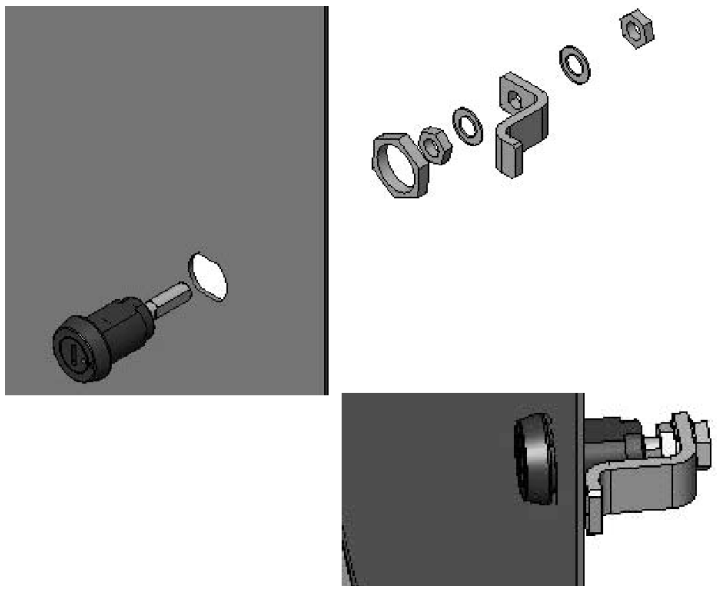
2. Attach the assembled trim piece to the enclosure in three places using 6-32 x $^{3}/_{8}$ flat-head screws (5150-619), as shown below.



3. Attach the female side of the two hinges (2580-122) to the enclosure lid using 10-32 x $^{3}/_{8}$ pan-head screws, as shown below.



4. Place the latch (2580-120) through the cutout on the door, and attach it with the nuts and washers, as shown below. The small dimple on the latch should be facing the outside.

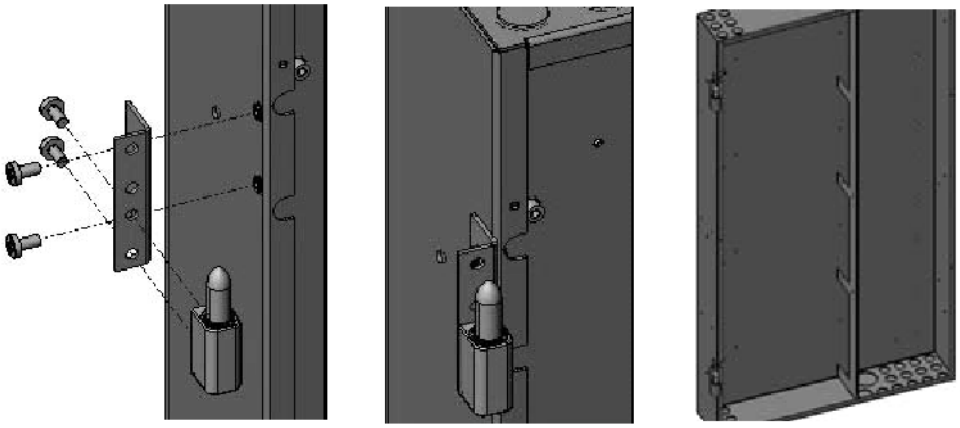


5. Use two black 6-32 x 3/8 (5150-600) screws in the two holes above and below the latch to secure the lid closed.

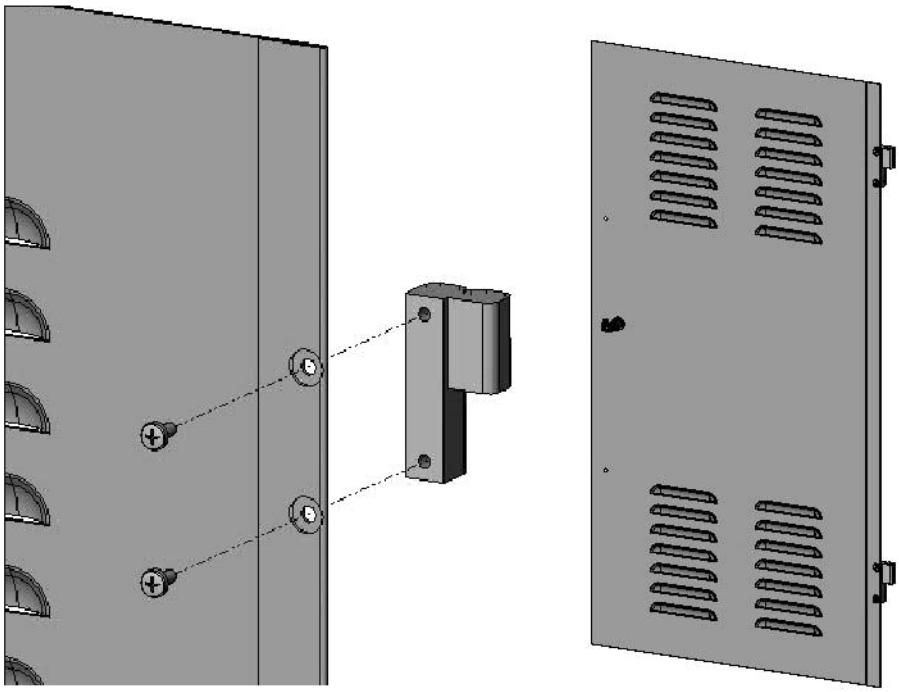
Install Surface Mount Enclosure

To install the mounting kit for a surface mount enclosure, take the following steps:

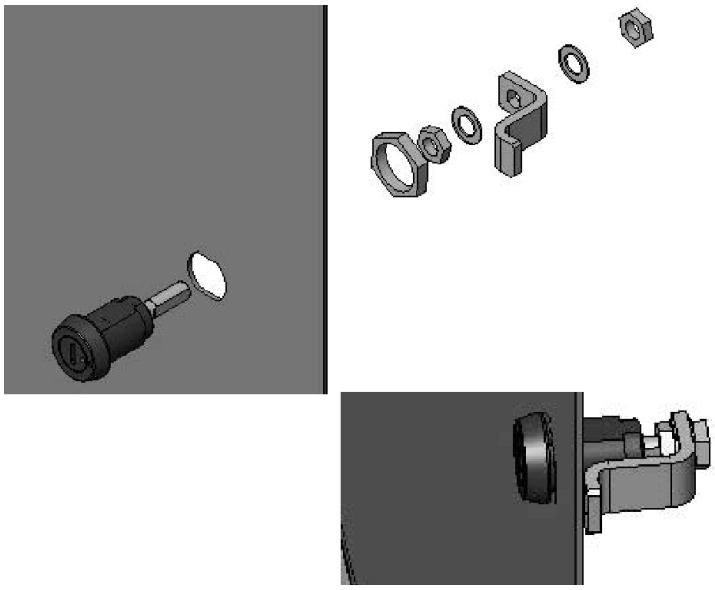
1. Attach the two hinges to the hinge bracket. Align the male section of each hinge (2580-122) with the lower two holes on each end of the hinge bracket (2580-064), as shown below. Use two 10-32 x $^{3}/_{8}$ pan-head screws (5150-984) to attach each hinge to the bracket.



2. Attach the hinge bracket with the hinges to the enclosure using 10-32 x $^3/_8$ (5150-934) pan-head screws.Attach the female side of the two hinges (2580-122) to the enclosure lid using 10-32 x $^3/_8$ pan-head screws, as shown below.



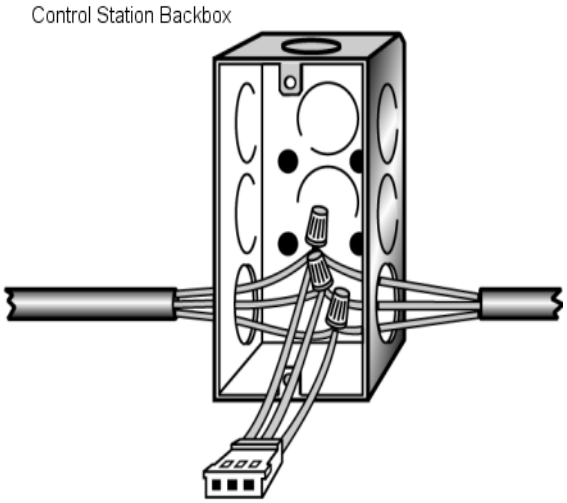
3. Place the latch (2580-120) through the cutout on the door, and attach it with the nuts and washers, as shown below. The small dimple on the latch should be facing the outside.



4. Use two black 6-32 x 3/8 (5150-600) screws in the two holes above and below the latch to secure the lid closed.

Keypad Boxes

Keypad backboxes should have a minimum inside dimension of 3" high x 1⅞" wide x 1½" deep. Use a square-cornered backbox to best accommodate these dimensions. Do not use plaster rings with rounded corners—keypads, especially multiple-gang keypads, will not fit. Single-gang, metal cut-in boxes, plaster, or tile rings are not acceptable.



Transient Voltage Surge Suppression

Transient voltage surges and spikes can cause serious damage to unprotected electronic devices, including a LiteTouch control system. Damage from transients can range from a slow degradation of components to complete destruction. Transients can come from outside the home (lightning, grid switching, downed lines, etc.) or inside the home (refrigerators, dryers, HVAC, etc.).

To minimize transients, LiteTouch recommends that you install a Transient Voltage Surge Suppressor (TVSS) at the main service entrance and at each sub-panel.

TVSSs are parallel devices that shunt any transients to ground. In order to do its job properly, a TVSS must be mounted within 18" of the electrical panel. The closer it is mounted, the better the protection it provides. Since

TVSSs are parallel devices and no power passes through them, the panel amperage is not an issue.

LiteTouch recommends and sells the EFI Omni-Phase protection system. The Omni-Phase is compact, relatively inexpensive, and provides excellent protection. The OSE model is used on the service entrance because it is a flat blocker (no sine wave tracking) rated at 75,000 peak amps. The OSW model, rated at 50,000 peak amps, is used on sub-panels because it has sine wave tracking.

If increased capacity and redundant protection is desired, LiteTouch recommends the MXP model, rated at 90,000 peak amps with sine wave tracking, for the service entrance. This is used with the MBP model, rated at 50,000 peak amps with sine wave tracking, for sub-panels.

Refer to the documentation that comes with the units for specifications and installation instructions. For further information, contact LiteTouch technical support.

NOTES

Install LiteTouch Components 4

This section provides instructions for installing the following LiteTouch components:

- Power supply modules
- Control modules
- Keypads
- CCU

Install Power Supply Modules

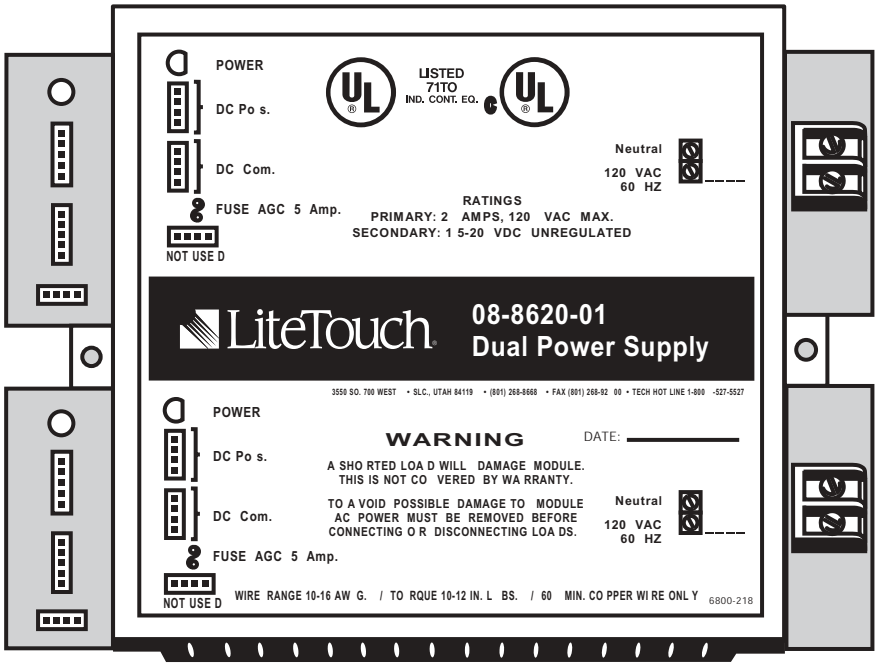
All LiteTouch systems require at least one power supply module. Power supply modules provide DC power for the following:

- Keypads
- Some control modules, including low voltage relay, electronic ballast dimmer, and DC motor control modules
- Standard and Compact CCUs (the 5000LC has its own power supply)

Power supplies are available in two models:

- Single power supply module: 08-8610-01
- Dual power supply module: 08-8620-01

Each power supply module supplies two amps of low voltage power (2000 mA). A dual power supply module (shown below) consists of two single power supplies, providing a total low voltage output of four amps (4000 mA).



NOTE ☞ Power supply modules that power the keypad homeruns must be within 50 feet of the CCU. The wiring between the power supplies and the CCU must be two-conductor and16-gauge. Refer to "Install Enclosures and Backboxes" on page 14 for more information.

Power Supply Requirements

Power supply modules are required to power the following:

- Keypad homeruns
- Low voltage relay, electronic ballast dimmer, and DC motor control modules

Keypad Homeruns

All keypad homeruns are connected to ports on the CCU. Route adequate power to each port to supply the attached keypad homeruns. Information on wiring the power to the CCU ports is covered in the section "Connect Keypad Homeruns" on page 65.

Two Power Supply Limit per CCU Port

You can wire up to two power supply modules (or one dual power supply module) to a CCU port. This is because the backplane board on the CCU

can only handle four amps (2 amps per power supply). However, an additional power supply can be wired directly to a keypad run. For more information, see "Add Extra Power Supplies for Keypad Homeruns" on page 26.

Low Voltage Modules

A power supply is required to power low voltage relay, electronic ballast dimmer, and DC motor control modules. The power supply in the enclosure containing one of these modules must have the capacity to handle the module. Refer to "Calculate Low Voltage Power Usage" on page 9 for specific requirements for each of these modules.

Other modules draw their power from a line power breaker source.

Low voltage wiring cannot be completed until the control modules are installed. Refer to "Wire Power for Low Voltage Modules" on page 30 for specific information on wiring low voltage modules.

Install a Power Supply

Take note of whether you are installing single or dual power supplies. A single power supply module supplies two amps (2000 mA) of power; a dual power supply, a total of four amps (4000 mA) of power.

Each power supply requires a maximum 2 amps of input power from the circuit breaker panel. Do not place more than 8 power supplies on one circuit.

Do the following to install a power supply:

1. Mount the power supply module in the appropriate enclosure following the guidelines in the previous section.

2. To attach a power supply module to an enclousure, align the holes on the module tabs with the mounting holes on the back of the enclosure.

3. Insert the metal screws (provided) and tighten them.

4. Connect line voltage wires to the NEUTRAL and 120 VAC connectors.

5. Connect 16-gauge, two-conductor wire for the output ports, positive to DC POS and common to DC COM. Refer to the drawing on page 24.

6. Connect the other end of the wires to the CCU port or module to be powered. Refer to the drawing on page 60.

Add Extra Power Supplies for Keypad Homeruns

One CCU port can support up to two power supplies (the limit determined by the CCU backplane). If additional power is required, a power supply can be added directly to the keypad homerun using one of the following two methods:

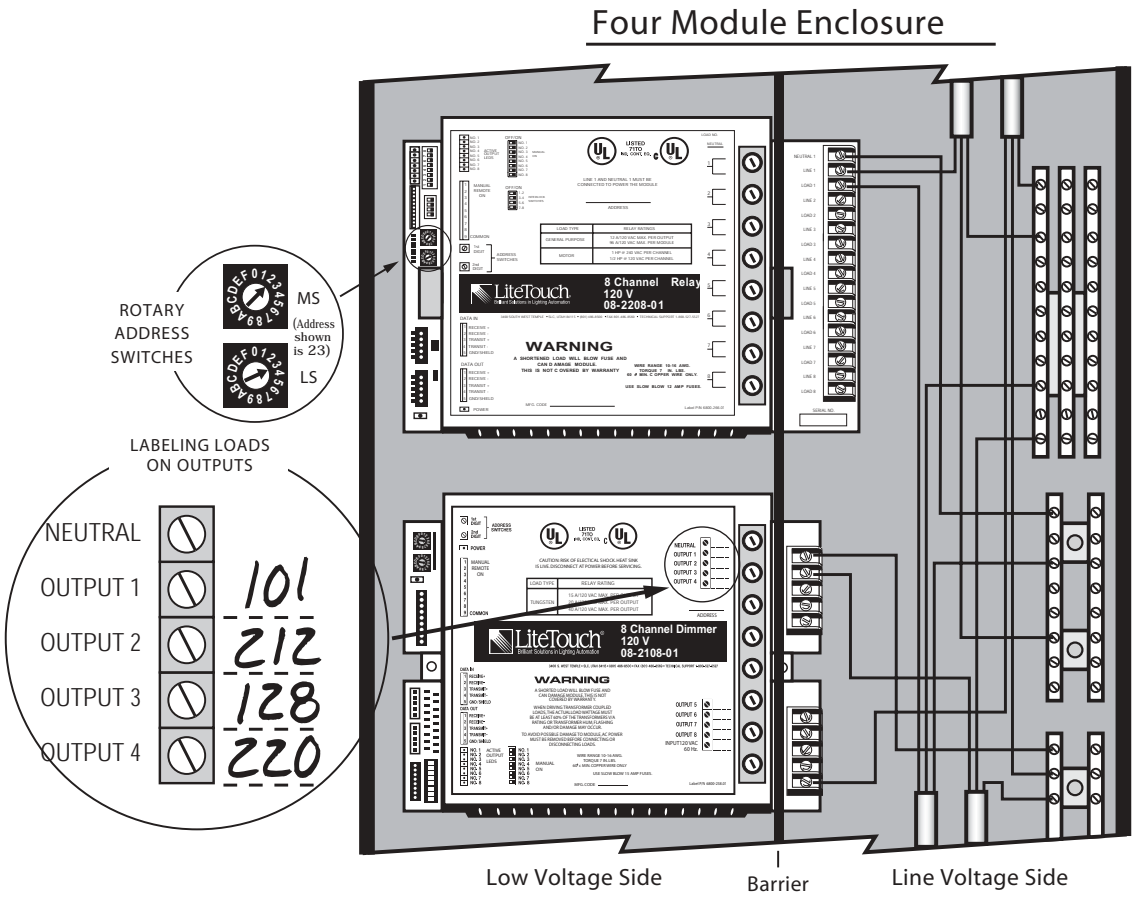
- Add a power supply at the end of the keypad homerun, housed in a two-module enclosure.
- Add a power supply to the enclosure nearest the CCU, and wire the power supply directly to the keypad homerun, bypassing the CCU port.

Install Control Modules

Do the following to install a control module. Install modules in their proper location in each enclosure as specified on the enclosure schedule.

1. To attach a module to an enclousure, align the holes on the module tabs with the mounting holes on the back of the enclosure.
2. Insert the metal screws (provided) and tighten them.
3. Set the correct module address on each module (per the Enclosure Schedule). Modules used with a Standard or Compact CCU are limited to numeric address only. Modules used with the 5000LC can use alphanumeric addresses.

   Set the address using two alphanumeric rotary address switches located on the left-hand side of each module (shown below). MS indicates “Most Significant Digit,” LS indicates “Least Significant Digit.”



4. Write down the numbers of the loads (shown on the Enclosure Schedule in the "DWG #" column) to be attached to each module. The illustration above shows the labeling strip. Load numbers should also be labeled on the load homeruns.

It is easiest if you install all modules before beginning the wiring, explained in the next section.

Wire Line Voltage

Note the following cautions and warnings before wiring the load homeruns and the line voltage breaker lines to the modules:

CAUTION

There is a barrier in each enclosure that isolates line voltage from low voltage. DO NOT cross over or through this barrier with any wires. Keep low voltage wires on the low-voltage side and line voltage wires on the line-voltage side. All low and line voltage lines must maintain a minimum distance of six inches.
Before connecting load homeruns to modules, verify that there are no shorts in the load runs.
When using low voltage transformer loads, make sure the lamps are installed before connecting them to the outputs of the dimmer modules. The unloaded transformers can induce a voltage back to the dimmer and damage the module components as well as the transformer.
Do not place more than one module on a breaker.
All neutral feeds associated with a module must be connected to that module's neutral bar, including the neutral from the breaker.

WARNING

Turn off power to modules before connecting load homeruns or installing/servicing fixtures. When powered on, dimmer modules have "triac leakage voltage," which allows some power into any connected load homeruns until the fixtures are installed.

Do the following to connect load homeruns to modules.

1. Identify the load homeruns and the line voltage breaker line to be attached to each module.

2. All modules that control line voltage loads require one line voltage run from a breaker, and each module should receive power from a separate breaker. Run the line voltage runs for the modules into each enclosure.

   Refer to Appendix B, "Drawings" on page 163 for detailed drawings showing the wiring routing and various module connections.

3. Route the load homeruns into the enclosure. Each load homerun and breaker line must have its own neutral feed.

4. For each breaker run, connect the wires as follows:

   - Connect the **positive** feed to the module at the location specified on the module. If not specified, the breaker VAC connects to input "1" on the relay module. 120 input is specified on all other modules.

- Connect the **neutral** feed to the neutral bar for that module. Each module has its own neutral bar. Match each neutral line to the corresponding neutral bar. If neutral lines are mismatched, some modules will not function correctly (e.g., dimmer modules).

- Connect the **ground** feed to the common ground bar.

5. For each load homerun, connect the wires as follows:

   - Connect the **positive** feed to the module at the location specified on the Enclosure Schedule.

   - Connect the **neutral** feed to the neutral bar for that module.

   - Connect the **ground** feed to the common ground bar.

6. For each module that uses line voltage, run a neutral line from each module's neutral bar to the module's NEUTRAL 1 port.

7. When all load homeruns and line voltage breaker runs are completed, tie the lines together into bundles.

Quad or Dual Dimmer Module

The quad dimmer module requires two breaker lines, one for each control section. Both breaker lines must be in the same phase. This is only an issue if the home has three-phase power.

Both breaker lines power the controlled loads, but only the breaker line that connects to the top section supplies power to the module itself. The bottom unit derives its reference for dimming from the top half, therefore the bottom and top sections of a quad or dual module must be in phase or dimming will not function properly (lights tend to jump when dimming).

NOTE ☞ Quad or dual modules use separate neutral bars for each section, one for each side. Be sure to keep separate the neutrals for each half.

8-Channel Relay Module

The 8-channel relay module (power switches fluorescent, low voltage incandescent, outlets, motors, and other undimmed loads) is designed to receive line power from LINE 1 and NEUTRAL 1 on the terminal block, therefore, OUTPUT 1 is reserved for a load requiring line voltage. All other outputs may be low or line voltage. Refer to Appendix B, "Drawings" on page 163 for additional detail.

Wire Power for Low Voltage Modules

Most modules receive power from line voltage. However, the following modules must receive low voltage power from a power supply module:

- Low voltage relay (draws 330 mA)
- Electronic ballast dimmer (draws 350 mA)
- DC motor control module (draws 250 mA)

The power supply must be installed in the enclosure in which the low voltage module(s) is located.

Use two 16-gauge wires for power supply connections between the power supply and the low voltage module. The low voltage relay, electronic ballast dimmer, and DC motor control modules all have power connectors.

If the power supply and modules are in different enclosures, route the wires from one enclosure to another and take the length of the run into consideration when determining the wire gauge (50-foot run maximum).

Refer to Appendix B, “Drawings” on page 163 for additional detail.

Manually Control Loads

Until the LiteTouch control system is fully operational, you can use the control modules to control loads. Once you have the modules installed, you can turn loads on and off using the DIP switches on each module. The DIP switches are located on the low voltage side of each module.

Install Keypads

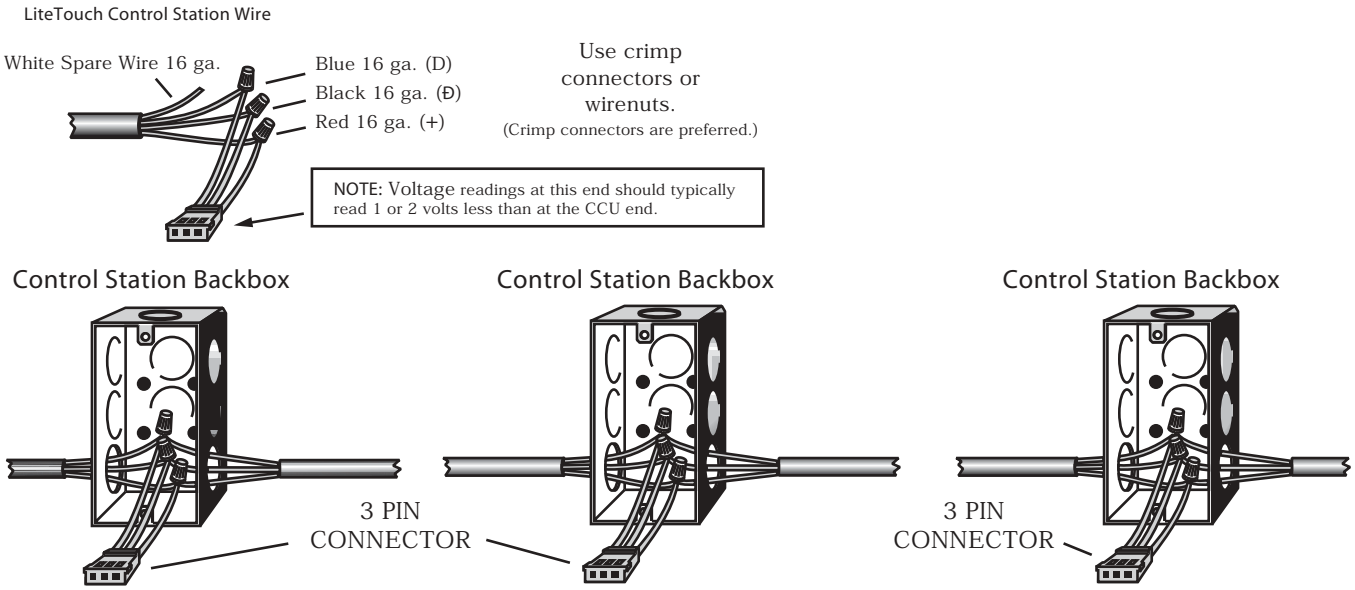
Do the following to install keypads in the backboxes.

CAUTION

A keypad is a sensitive piece of electronic equipment with a micro-processor chip. Keep it in its protective bag until **ALL** construction work is complete.The bag protects the keypad from construction dirt, sheetrock dust, paint, and other debris. When construction work is complete, remove the protective bag, mark the keypad address on the backplate label, vacuum out the backbox, and re-install the keypad.

1. At each keypad backbox, splice the keypad pigtail (shipped with each keypad) to the keypad homerun. Always use the pigtail that comes with the keypad, as some newer or older models use different pigtails and they cannot be mixed.

   Use crimp connectors or wirenuts for the connections. The following picture identifies the colors for each wire. In a LiteTouch cable, the white wire is reserved as a spare.

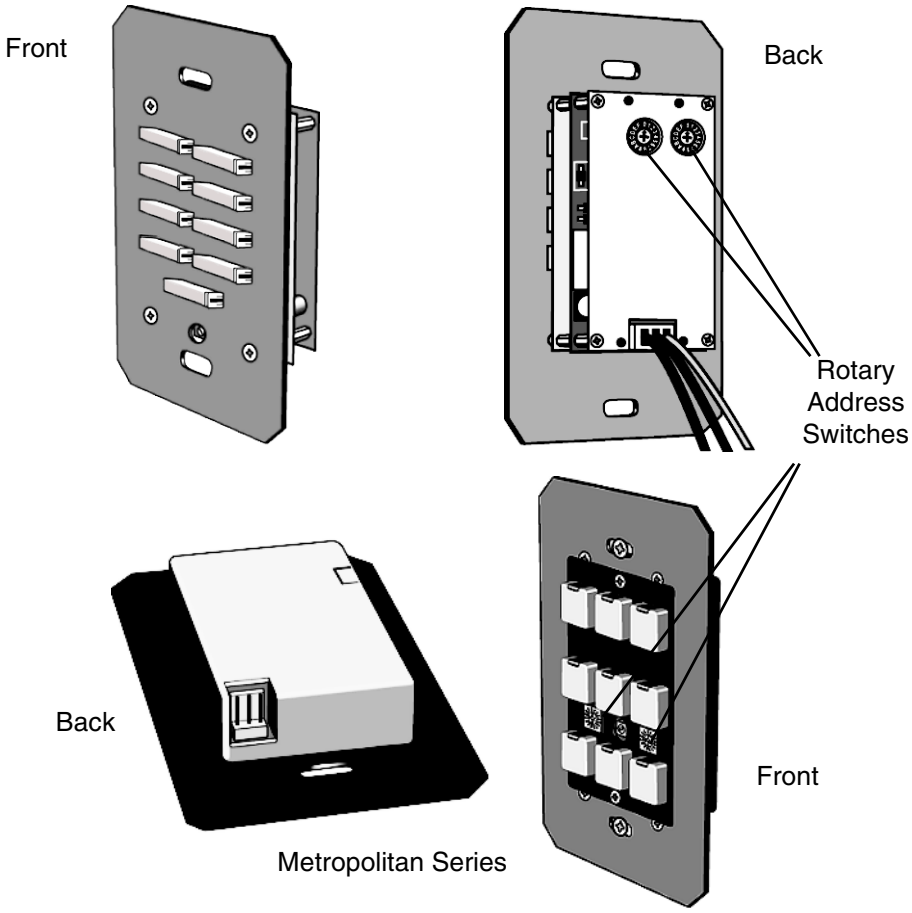


Keep the control station in its protective plastic bag until all construction work is completed.

2. Each keypad is custom labeled and designed for a specific location in the home. The keypad address is indicated on the box label. Refer to the Keypad Design Schedule to identify the keypad address for each keypad.

   Each keypad is assigned a unique keypad address. This address is set at the factory, but you should verify that it is correct before installing the keypad, and change it if necessary.

   Two rotary switches are located on each keypad. The location of the rotary switches depends on the keypad model, as shown in the following two illustrations (the rotary address switches on Metropolitan Series keypads are on the front).



3. Cut a small slit in the protective plastic bag, and plug the 3-pin connector into the keypad. The connector is designed to fit one way—if it does not plug in easily, try turning it around. If connected incorrectly, it will eventually ruin the keypad.

4. Place the keypad in the backbox, and mount it using the screw provided. (Refer to the installation instructions included with the keypad for more details.)

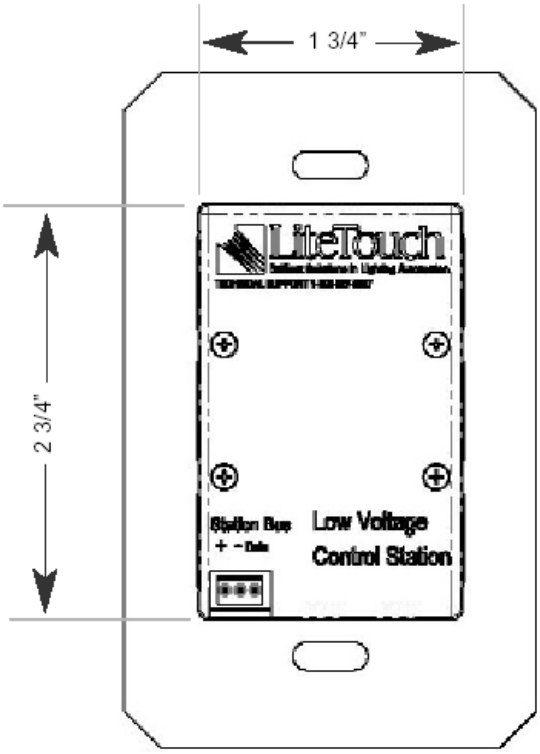
5. When installed in the backbox, the circuit board must not touch the sides of the backbox. Adjust the keypad until it has clearance on all sides.

6. When construction work is complete, unfasten the keypad from the backbox and remove the protective bag. Mark the keypad address on the backplate label, vacuum out the backbox, and re-install the keypad.

Install Metropolitan Series Keypads

The Metropolitan Series keypad has an enclosed backbox to help protect it from dust and static charges that can occur during transportation, as well as from the drywall dust associated with construction.

To install a Metropolitan keypad, plug the pre-wired connector into the keypad (see the figure below).

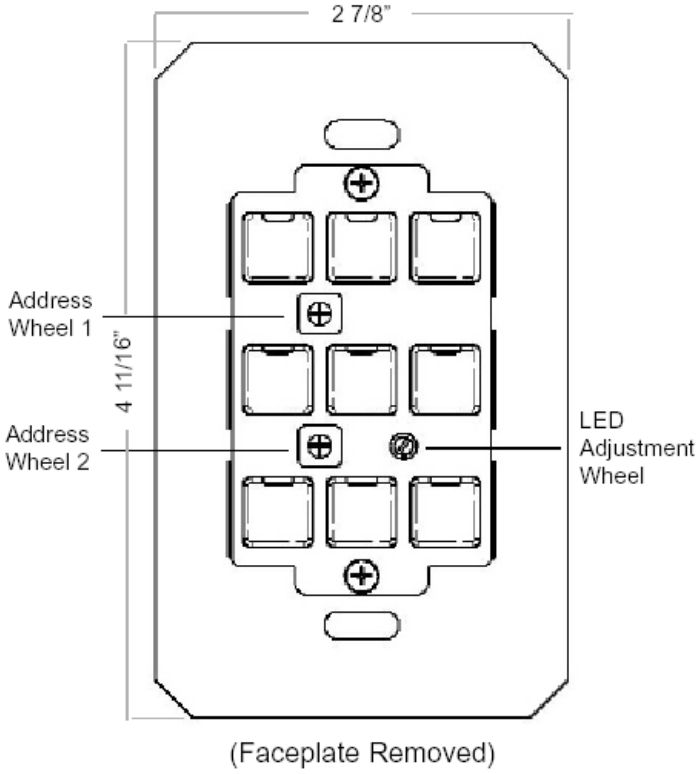


Use the enclosed screws to secure the keypad to the wall box, and attach the faceplate.

To ensure proper fit of the keypad, do not use retrofit or metallic backboxes. Retrofit and metallic boxes typically do not have corner space to accommodate proper Metropolitan Keypad fit. The minimum space requirements for single-gang and double-gang backboxes are noted in the illustrations in “Metropolitan Series Dimensions and Variations” on page 35.

Address and LED Adjustment

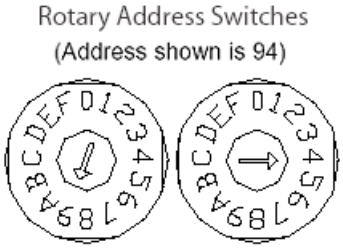
If the keypad address is not already set, set the address. The address settings wheels and the LED adjustment wheel are located under the faceplate on the front of the keypad as shown below.



(Faceplate Removed)

Set the Address

To set the address, turn each dial until the arrow points to the correct number in the address (see image below). The rotary switch on the left is used to set the first number (e.g., 9 of 94), and the rotary switch on the right is used to set the second number (e.g., 4 of 94).



Addresses indicated at the time of order are preset at the factory.

Adjust the LED

If installing a Metropolitan keypad with the backlit option, use the LED adjustment wheel to adjust the brightness level of the backlit engraving. The location of the LED adjustment wheel is shown in the image above.

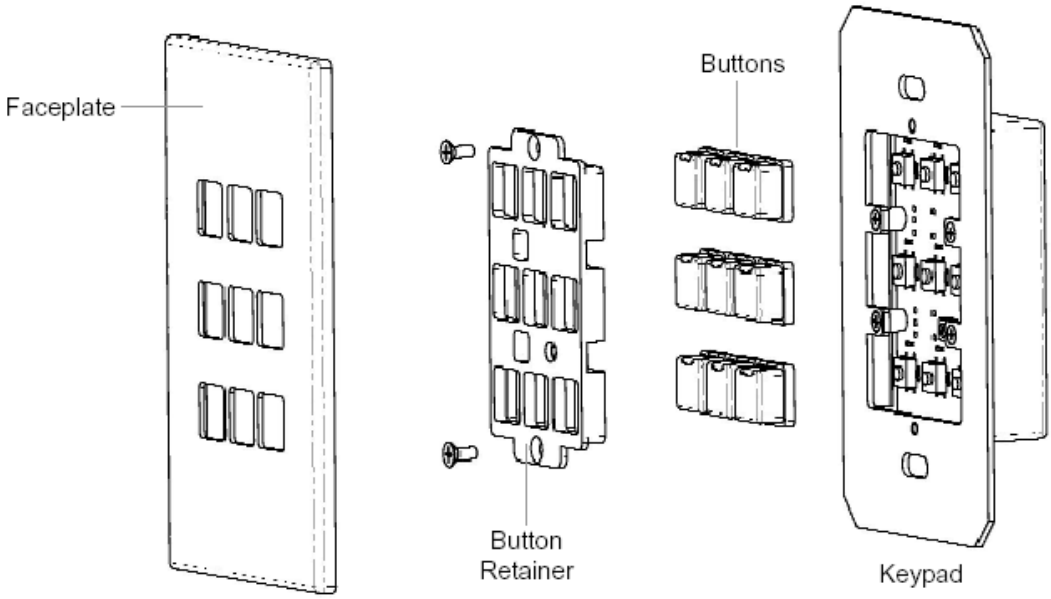
If installing a Metropolitan keypad **without** the backlit option, use the LED adjustment wheel to activate Night Light mode.

Change Button Configuration

To change the button configuration on a Metropolitan Series keypad, do the following.

1. Remove the faceplate.

2. Remove the button retainer using a mini-screwdriver to remove the retainer screws on the top and bottom (see image below).



3. Remove or add buttons as needed.

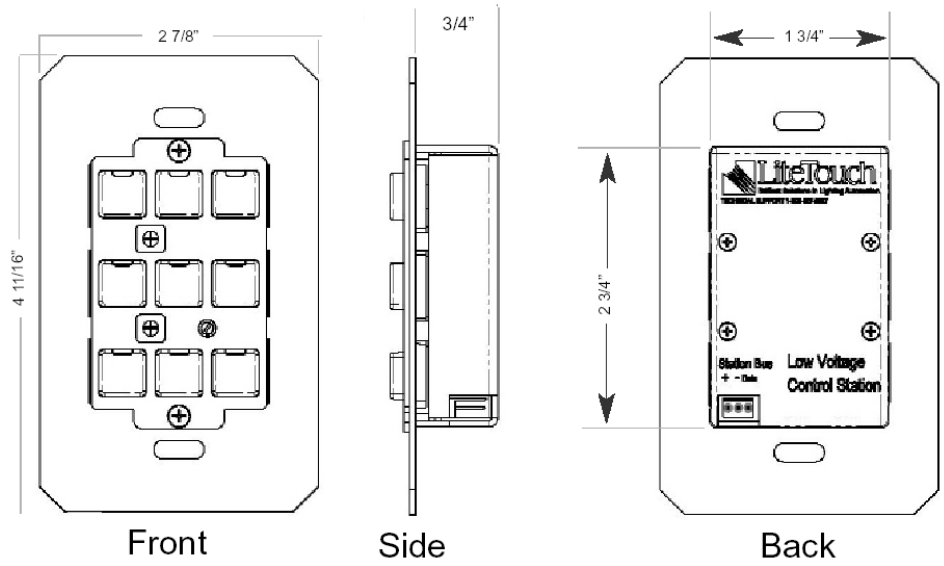
4. Place the button retainer back on the keypad, bottom edge first, and snap it in place. Then reattach the screws.

5. Reattach the faceplate.

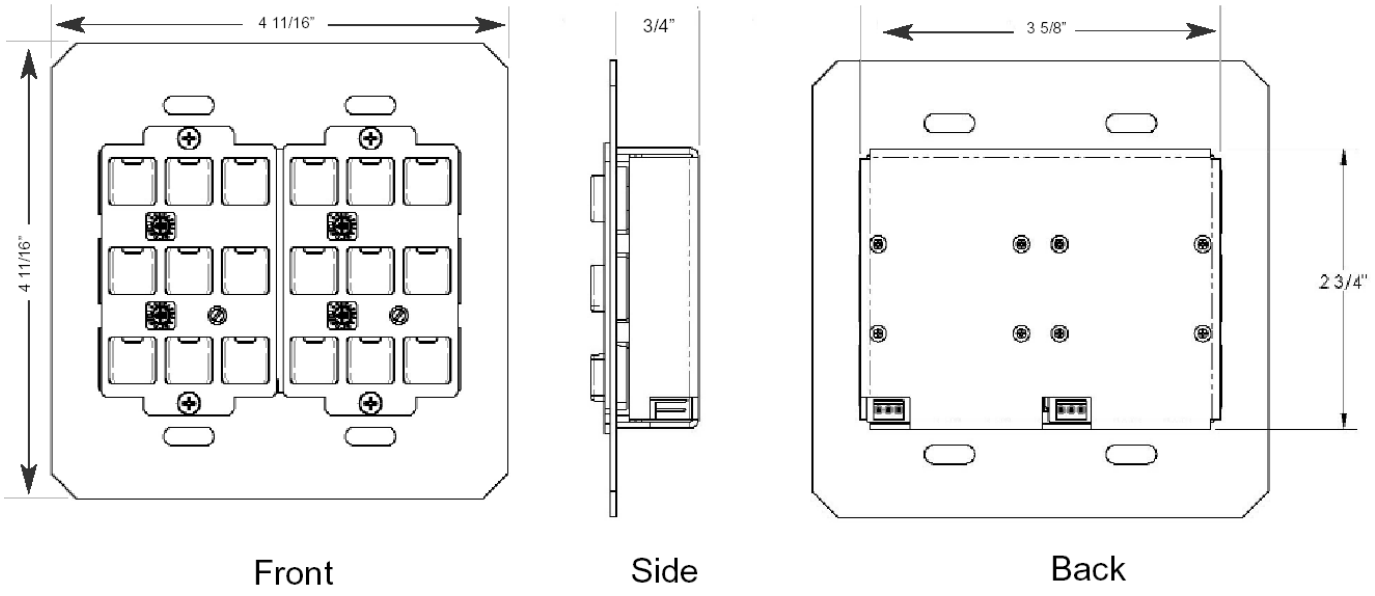
Metropolitan Series Dimensions and Variations

The following images show the dimensions and possible variations of Metropolitan Series keypads.

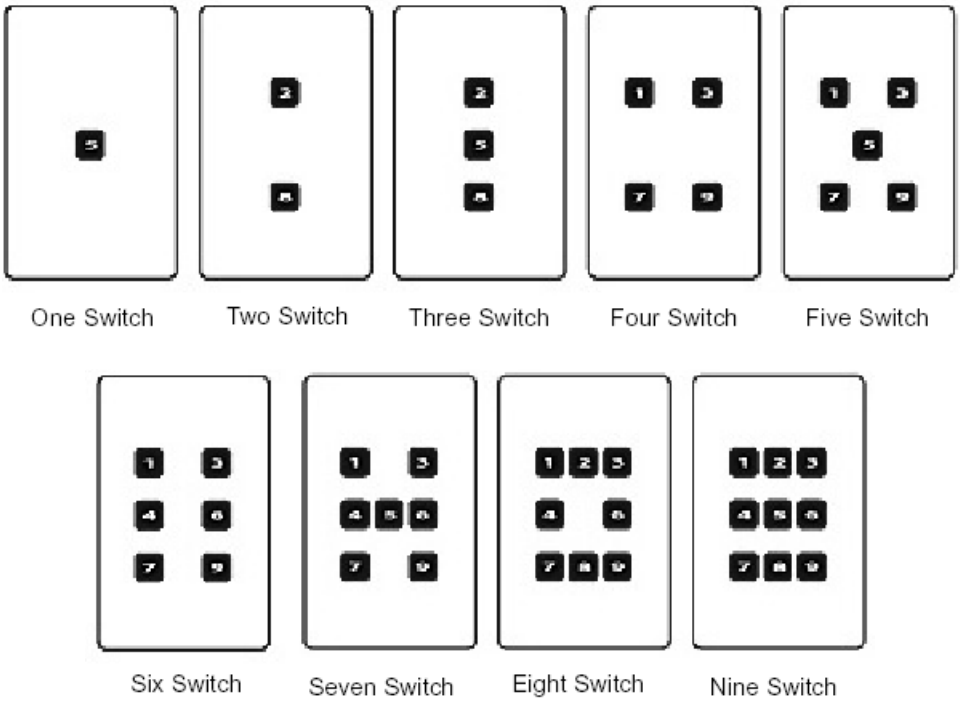
Single-gang Metropolitan Series Keypad



Double-gang Metropolitan Series Keypad



Keypad Configurations



Install Coastal Keypad

The Coastal keypad has an enclosed backbox to help protect it from dust and static charges that can occur during transportation, as well as from the drywall dust associated with construction.

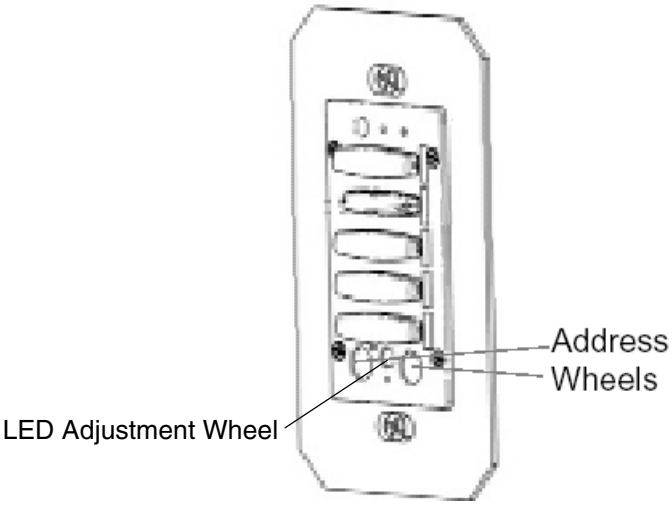
To install a Coastal keypad, plug the pre-wired connector into the keypad (see the figure below).

Use the enclosed screws to secure the keypad to the wall box, and attach the faceplate.

To ensure proper fit of the keypad, do not use retrofit or metallic backboxes. Retrofit and metallic boxes typically do not have corner space to accommodate proper Coastal Keypad fit. The minimum space requirements for single-gang and double-gang backboxes are noted in the illustrations in “Coastal Dimensions and Variations” on page 41.

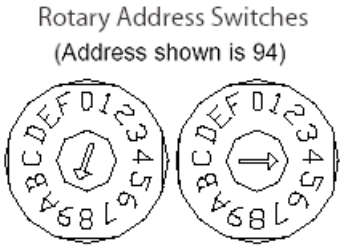
Address and LED Adjustment

If the keypad address is not already set, set the address. The address settings wheels and the LED adjustment wheel are located under the faceplate and the center panel on the front of the keypad as shown below.



Set the Address

To set the address, turn each dial until the arrow points to the correct number in the address (see image below). The rotary switch on the left is used to set the first number (e.g., 9 of 94), and the rotary switch on the right is used to set the second number (e.g., 4 of 94).



Addresses indicated at the time of order are preset at the factory.

Adjust the LED

If installing a Coastal keypad with the backlit option, use the LED adjustment wheel to adjust the brightness level of the backlit engraving. The location of the LED adjustment wheel is shown in the image above.

If installing a Coastal keypad **without** the backlit option, use the LED adjustment wheel to activate Night Light mode.

Change Button Configuration

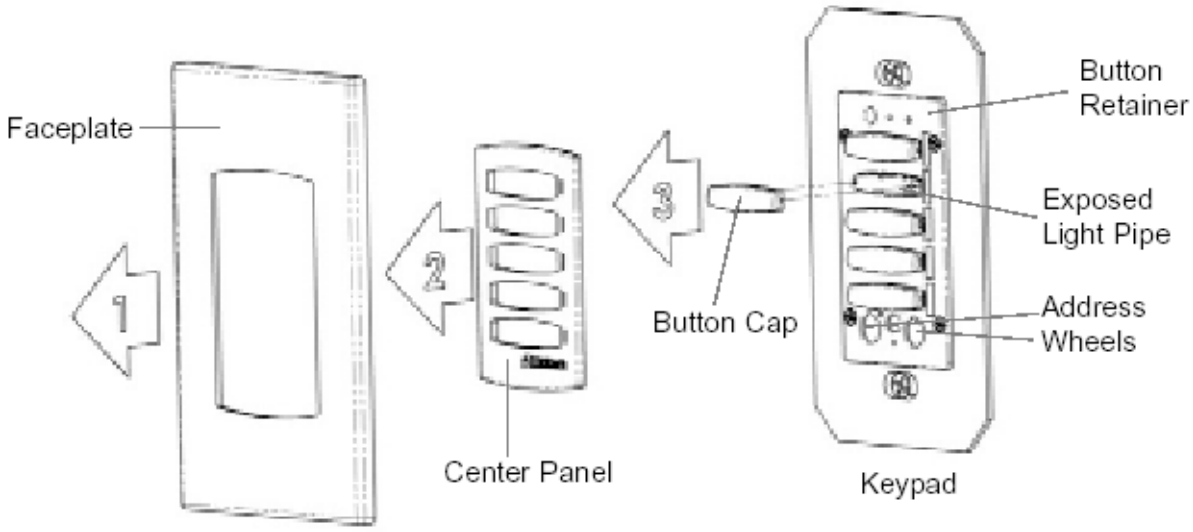
To change the button configuration on a Coastal keypad, do the following.

1. Remove the faceplate.

2. Remove the center panel.

3. To replace a button cap, gently remove the old button cap and replace it with the new one by pressing it firmly on the button.

4. To add or remove buttons, remove the button retainer by unscrewing the four screws on the sides of the button retainer.



5. Add or remove buttons as described in the following sections.

Add Buttons

To add a button to a Coastal keypad, do the following.

1. From the back of the button retainer, remove the black button block-off plate from the desired button position.

2. Replace the block-off plate with a light pipe.

3. Place the button retainer back on the keypad, bottom edge first, and snap it in place. Then reattach the screws.

4. Attach the new center panel.

5. Place a button cap on the new light pipe.

6. Reattach the faceplate.

Remove Buttons

To remove a button from a Coastal keypad, do the following.

1. From the back of the button retainer, remove the light pipe from the desired button position.

2. Replace the light pipe with a black button block-off plate.

3. Place the button retainer back on the keypad, bottom edge first, and snap it in place. Then reattach the screws.

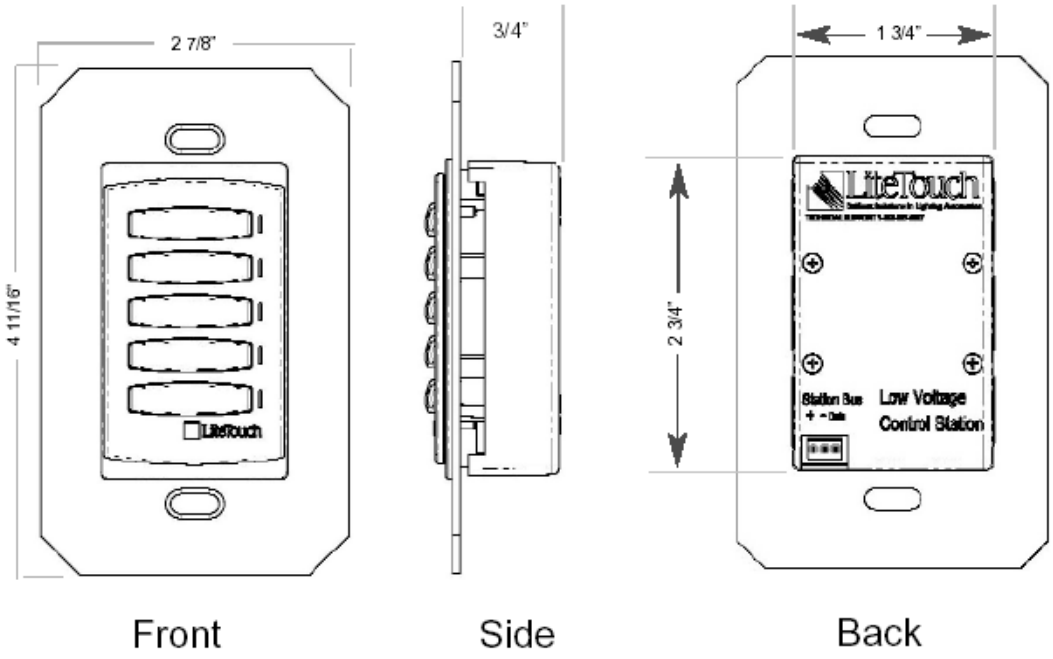
4. Attach the new center panel.

5. Reattach the faceplate.

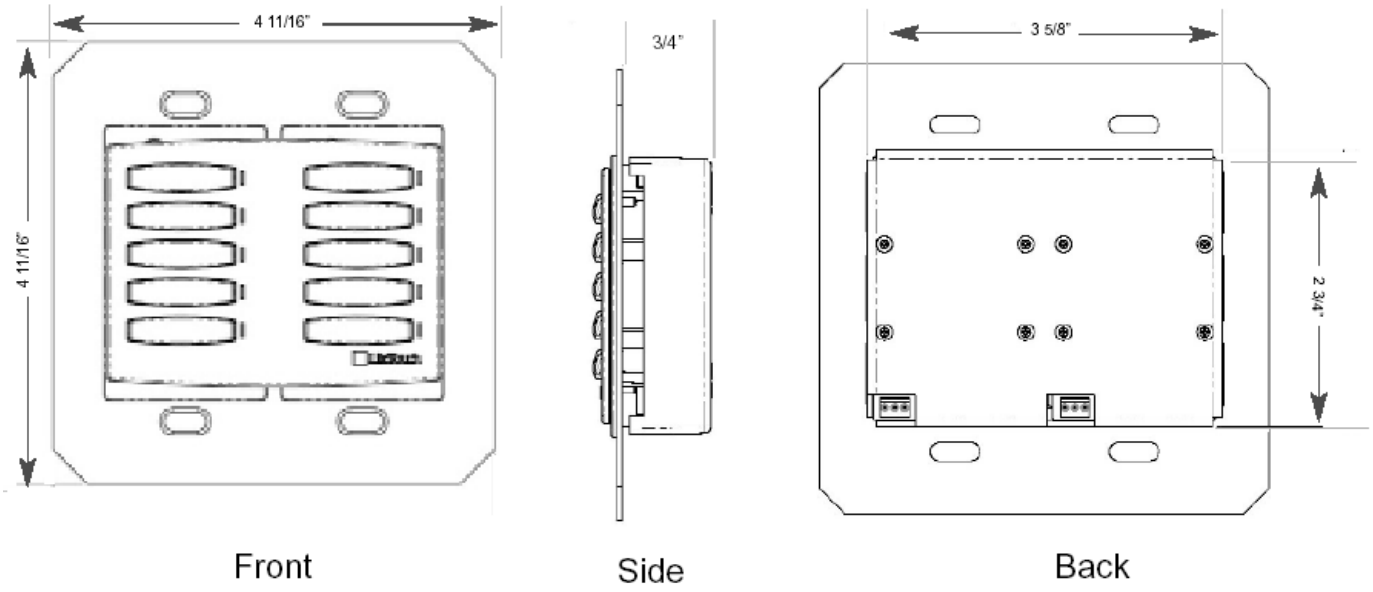
Coastal Dimensions and Variations

The following images show the dimensions and possible variations of Coastal Series keypads.

Single-gang Coastal Keypad

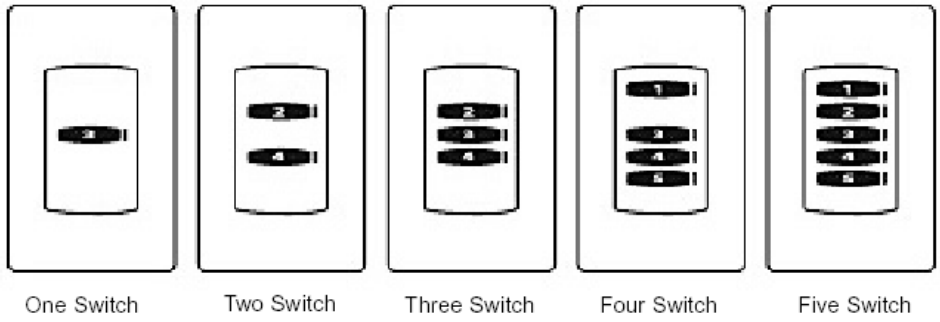


Double-gang Coastal Keypad

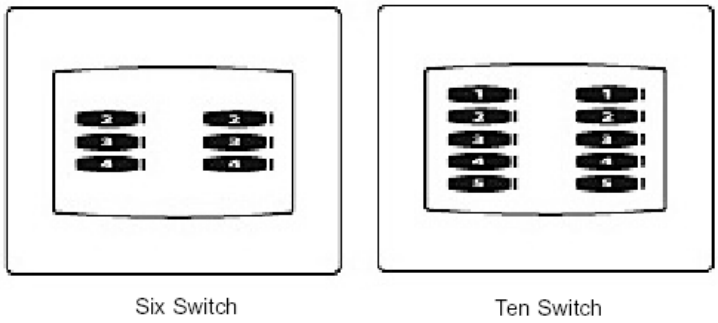


Keypad Configurations

Standard Single Gang



Standard Double Gang



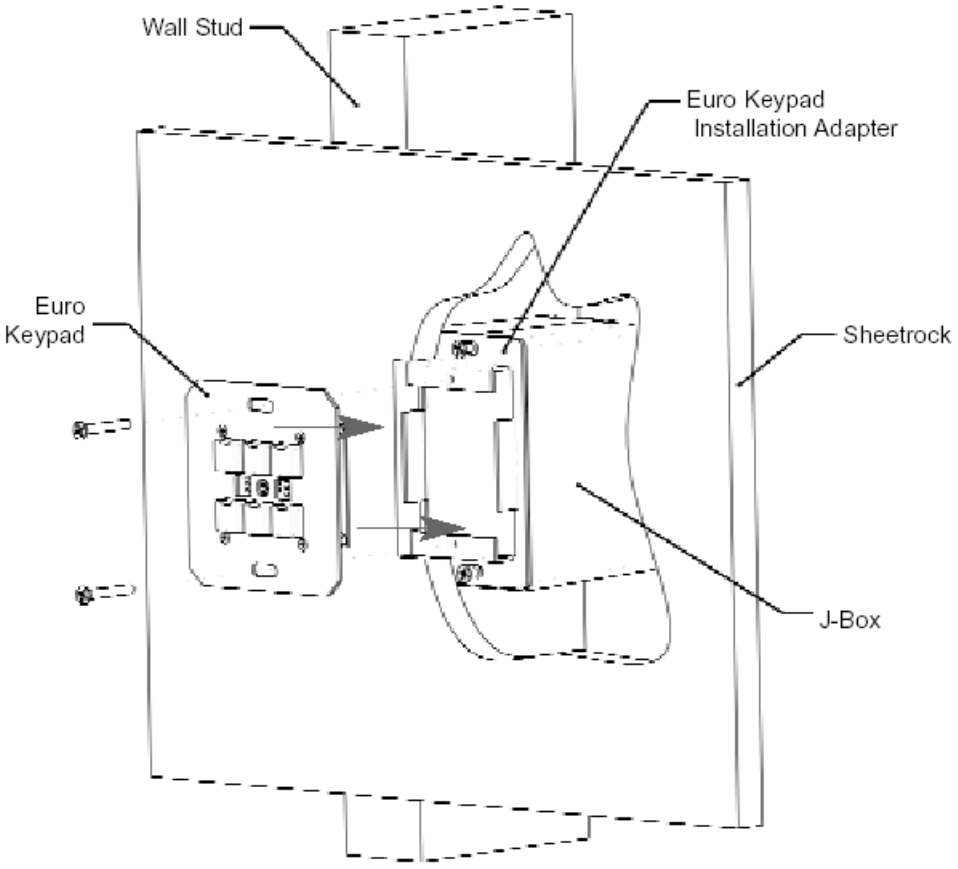
Install Euro Keypad

The Euro keypad has an open backbox. To help protect it from dust and static charges that can occur during transportation, as well as the drywall dust associated with construction, install the keypad after drywall finishing is complete.

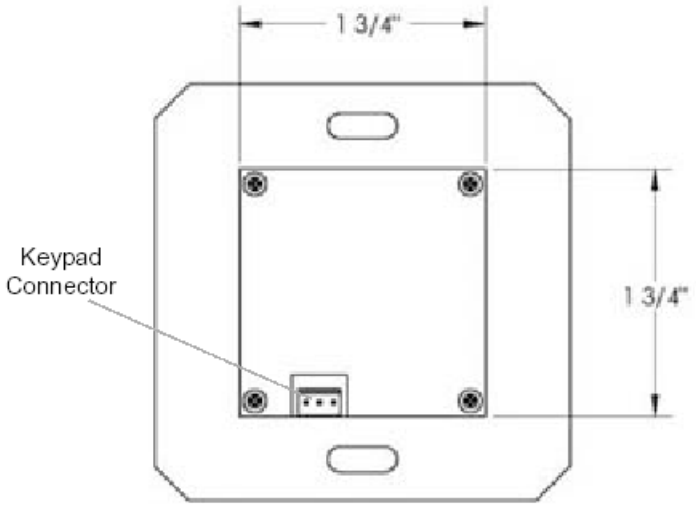
1. A Euro Keypad Installation Adapter is required for U.S. installation into a standard U.S. J-box. Before cutting the drywall, attach the Euro Keypad Installation Adapter to the J-box (see below).

NOTE ☞ When installing a standard U.S. J-box for a Euro keypad, mount it flush with the stud rather than the traditional offset mounting.

2. Closely cut the drywall around the protruding portion of the Euro Keypad Installation Adapter. (If you cut a standard sized J-box hole the keypad faceplate will not cover the hole.)



3. Plug the pre-wired connector into the keypad.



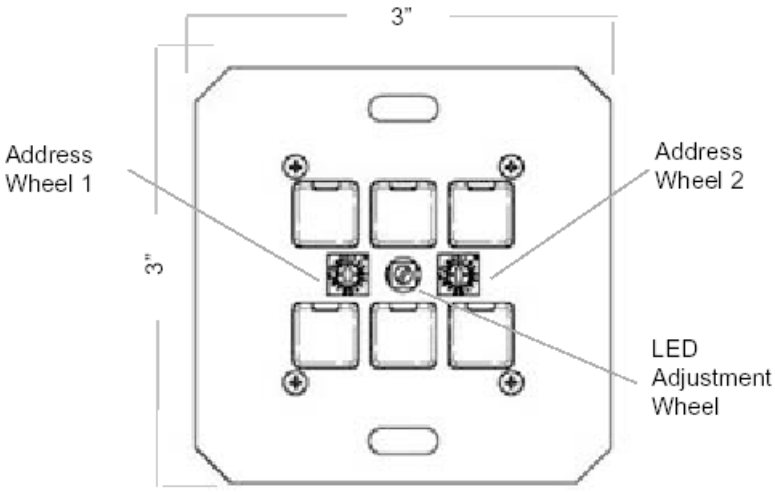
4. Use the enclosed screws to secure the keypad to the wall.

5. Attach the faceplate.

The minimum space requirements for single-gang and double-gang backboxes are noted in the illustrations in “Euro Dimensions and Variations” on page 45.

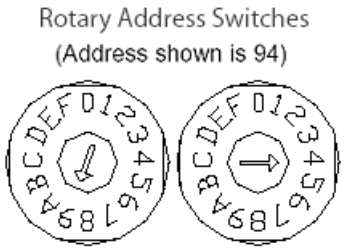
Address and LED Adjustment

If the keypad address is not already set, set the address. The address settings wheels and the LED adjustment wheel are located under the faceplate on the front of the keypad as shown in the image below.



Set the Address

To set the address, turn each dial until the arrow points to the correct number in the address (see image below). The rotary switch on the left is used to set the first number (e.g., 9 of 94), and the rotary switch on the right is used to set the second number (e.g., 4 of 94).



Addresses indicated at the time of order are preset at the factory.

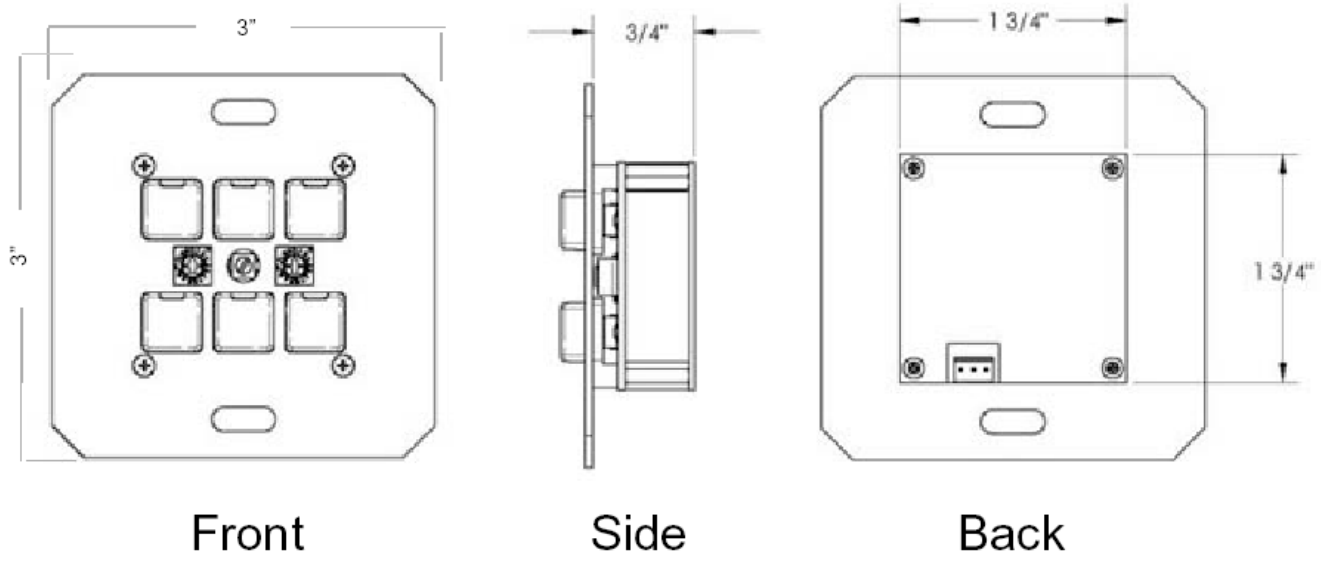
Adjust the LED

Use the LED adjustment wheel (see the figure on page 44) to activate the Night Light mode.

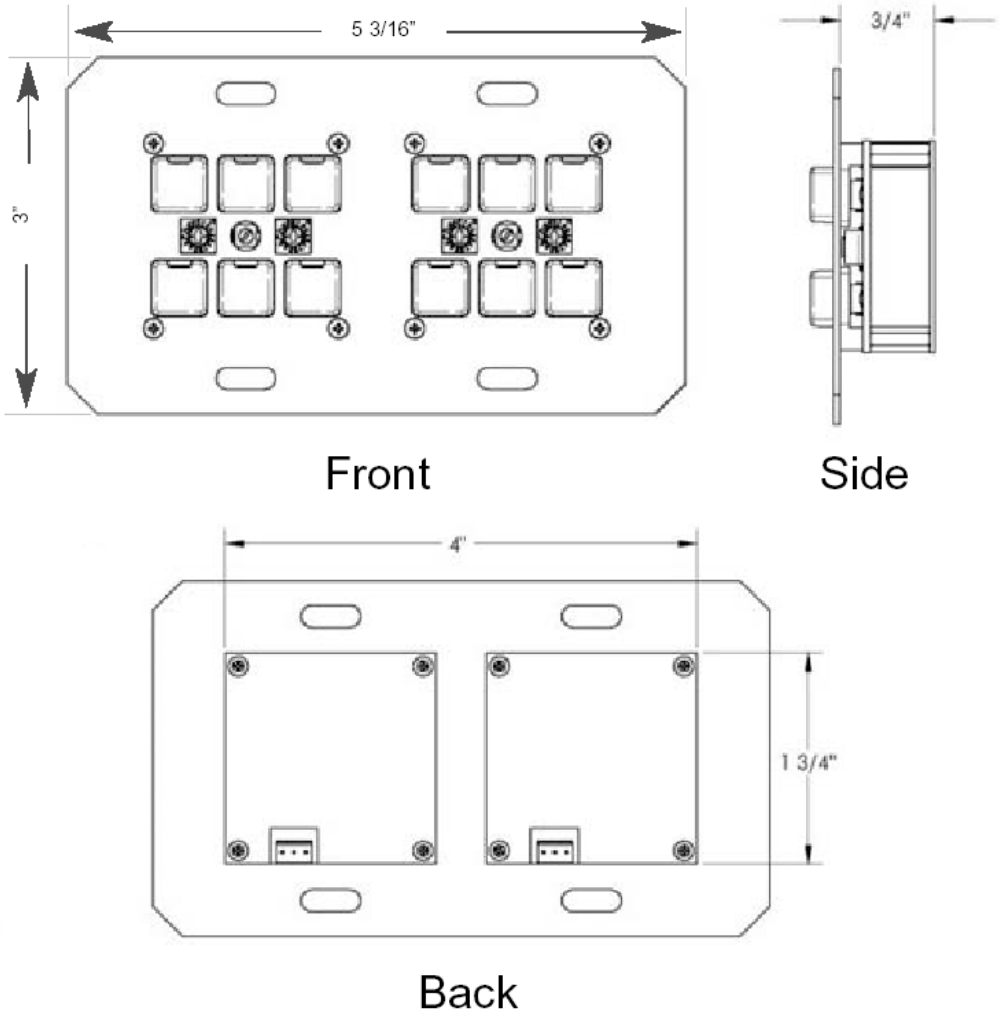
Euro Dimensions and Variations

The following images show the dimensions and possible variations of Euro Series keypads.

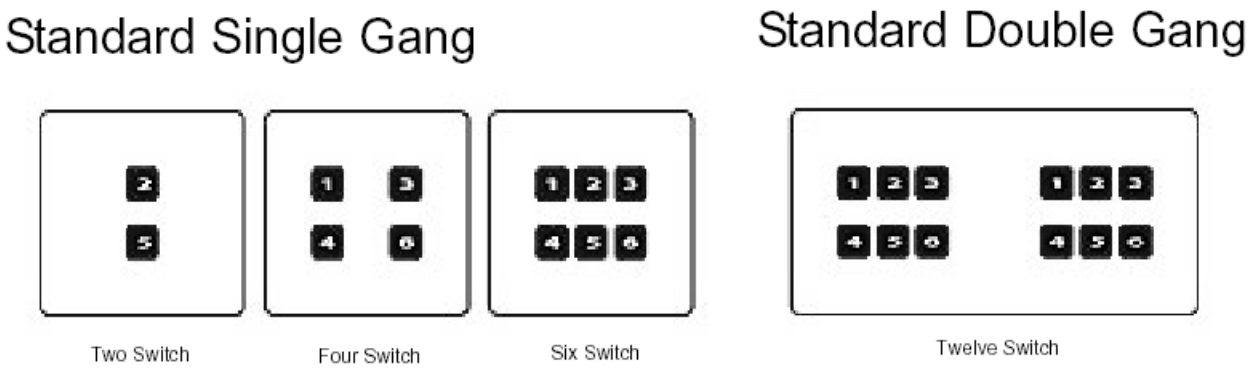
Single-gang Euro Keypad



Double-gang Euro Keypad



Keypad Configurations



Install SatiLite Wall-Box Dimmer

The SatiLite wall-box dimmer is a simplified wall and box dimmer keypad using Metropolitan Series buttons. It is available in two models:

- Simple one-button dimmer that can be connected to the module bus.
- Two-button unit with one simple dimmer switch and one fully programmable switch that can be connected to both the module and keypad bus.

Following are the connectors and wiring for the SatiLite wall-box dimmer:

Module and keypad bus wiring:
(RJ-45 connector using eight wires) The module bus wiring connects the SatiLite dimmer loads to the module bus so SatiLite loads may be controlled from other keypads in the system. Keypad bus wiring connects the SatiLite to the CCU so the SatiLite buttons may control other loads in the system.

Keypad bus connector:
(standard Litetouch 3-pin keypad control connector) Normally, you will only use this connector if you want keypad bus communications only. This allows SatiLite buttons to control other loads in the system but does not give other keypads control of the SatiLite loads. Keypad bus communication is also carried in the RJ-45 cable (see above).

Line voltage wiring:
The SatiLite wall-box dimmer has five wires for line voltage wiring. This includes connections for hot, neutral, and ground as well as outgoing connections for the load and carrier wires.

You can connect up to 16 SatiLite dimmers in series. All SatiLite dimmers in a series are connected to the LiteTouch system's keypad bus and module bus via an 8-wire cable (Cat5 cable) with RJ-45 connectors.

The line voltage wiring and keypad/module bus wiring is explained in the following sections.

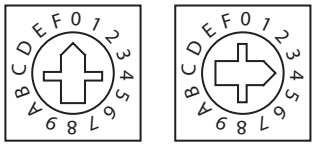
 CAUTION	To reduce the risk of overheating and possible damage to other equipment, do NOT use a SatiLite dimmer to control a receptacle, a motor operated appliance, a fluorescent lighting fixture, or a transformer-supplied appliance.

Set the SatiLite Module/Keypad Address

If the wall-box dimmer address is not already set, set the address. The address is used as both the module address and keypad address. With the Standard and Compact CCUs, the address must be a decimal value. To set the address, turn each dial until the arrow points to the correct number in the address (see image below).

The rotary switch on the left sets the first number (e.g., 0 of 04), and the rotary switch on the right sets the second number (e.g., 4 of 04).

Rotary Address Switches
(Address Shown is 04)



Addresses indicated at the time of order are preset at the factory.

Pre-wire SatiLite

Use standard three-strand house cable for the line voltage wiring. Two additional wires can be added where needed to accommodate three-way wiring requirements.

If you are using one or more SatiLite dimmers in a stand-alone application, only the line voltage wiring is required.

If you plan to link the SatiLite dimmers to the LiteTouch system, you will also need to install the communications wiring using 8-wire network cable (category 5 or Cat5 cable). You can buy Cat5 cable at most electronics or computer suppliers. Pre-wire the cable as follows:

1. Run Cat5 cable from one SatiLite wall-box dimmer to the next until each SatiLite location in the series has Cat5 cable running to it.

2. Also run a cable between the nearest enclosure location and the first SatiLite dimmer in the series. At the SatiLite end, the cable must be Cat5; at the enclosure/CCU end, it must be a LiteTouch cable. At some point along this run, convert the Cat5 cable to LiteTouch wiring (see “Split SatiLite Cat5 Cable into LiteTouch Cables” on page 50).

CAUTION	Do not exceed 16 SatiLite dimmers in a single run. Do not exceed 1000 feet of Cat5 cable length in a single Satilite run.

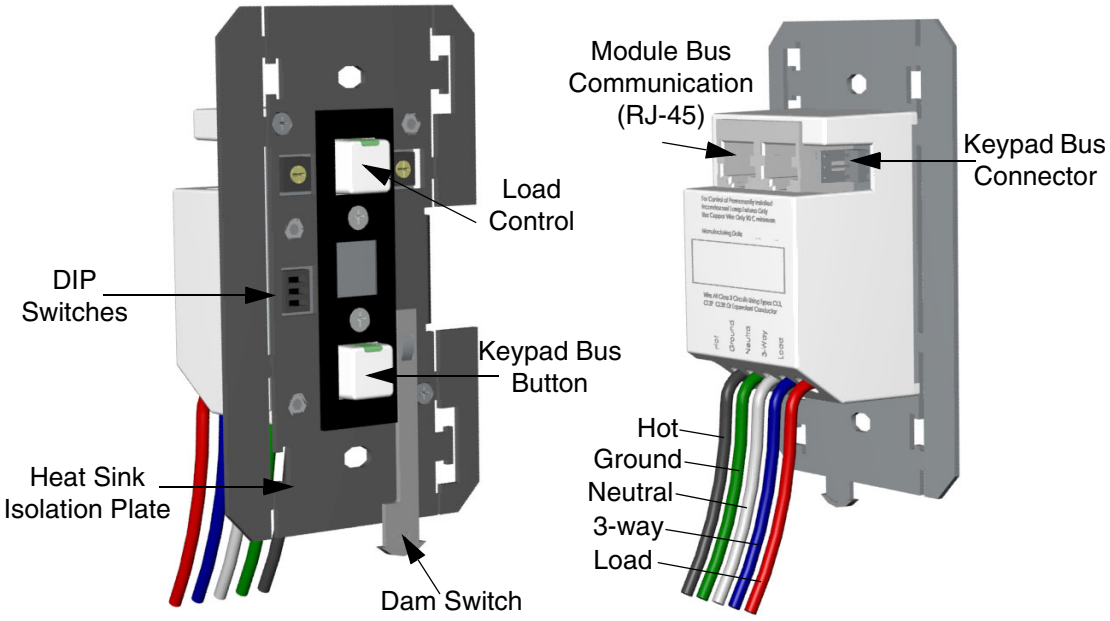
Wire Communications Between SatiLite Dimmers

Do the following to run the communication wiring between one SatiLite dimmer and the next in a series:

1. Using the Cat5 cable run in the pre-wiring, crimp an RJ-45 Ethernet connector to the end of each cable in each wall box. Cat5 wiring insulation must run up to the RJ-45 connector. Do not strip off additional insulation.

CAUTION	There is a risk of fire if insulation on the Cat5 cable is removed beyond the connector.

2. Plug each cable into the RJ-45 connector on the back of the SatiLite dimmer (see figure below).



3. Continue until all Cat5 cables in a run are connected to SatiLite dimmers.

4. THE LAST KEYPAD IN EACH SERIES MUST BE TERMINATED FOR THE SATILITE SERIES TO OPERATE. Terminate the last keypad in each series by turning DIP switch 3 (located in the front of the keypad) to on. If there is only one SatiLite dimmer in the series, it must be terminated. (Refer to "SatiLite DIP Switch Settings" on page 55.)

Enable/Disable SatiLite with Dam Switch

The "dam" switch is used to enable or disable the SatiLite dimmer to prevent the CCU from inadvertently turning the load on during fixture adjust-

ment. The dam switch is located on the bottom edge of the SatiLite dimmer (see figure above). Move the dam switch down to disable the keypad and move it up to enable the keypad.

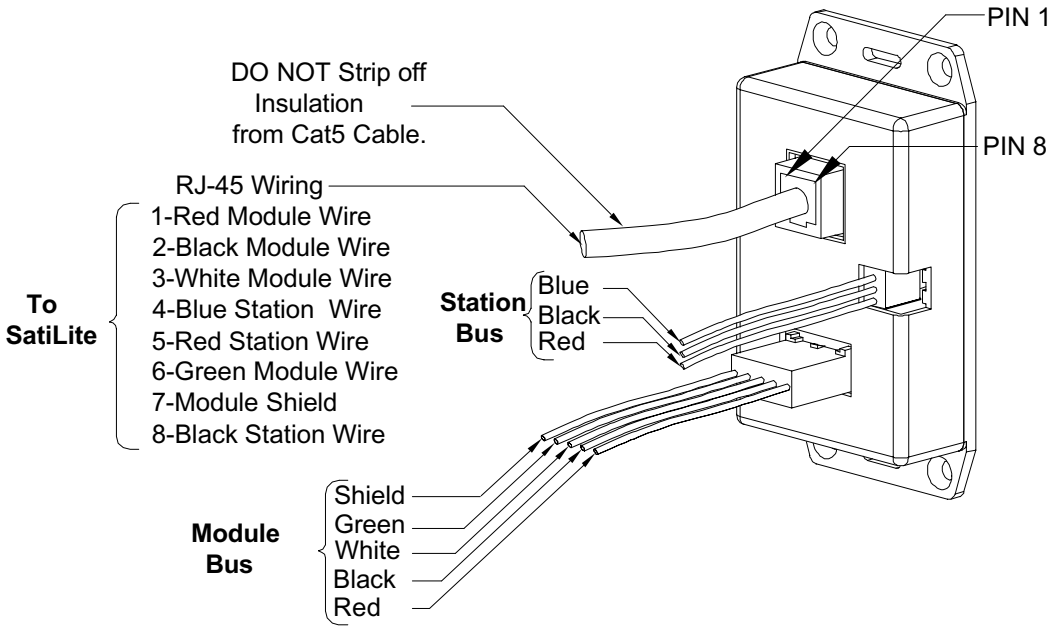
Multi-gang SatiLite Installation

To combine multiple SatiLite dimmers, break off the tabs on the side of each SatiLite in the multi-gang. Then insert the remaining flanges into the matching cutouts to interlock them. This will enable them to fit together properly in multi-gang installations.

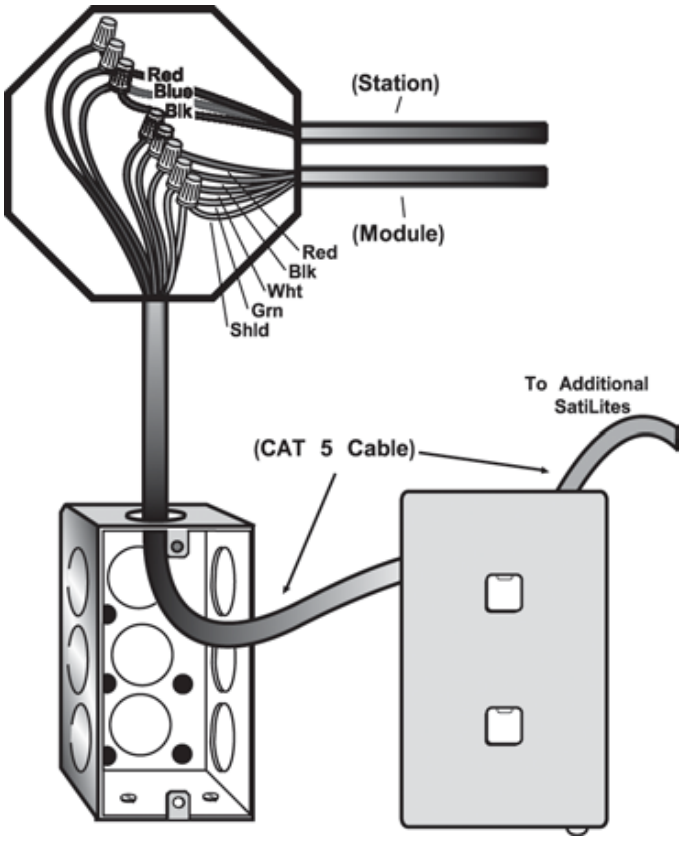
Split SatiLite Cat5 Cable into LiteTouch Cables

You need to convert the Cat5 cable used to wire the SatiLite communications to LiteTouch cables that can be connected to a module in an enclosure (module bus) and to the CCU (keypad bus) (see page 48). You can make the conversion using either of the following methods:

- Use a CCU to SatiLite adapter (catalog number 08-2020-04) to separate the 8-wire cable into five wires for the module bus and three wires for the keypad bus. The adapter is shown in the following figure.



- Manually separate the eight wires in the Cat5 cable into two LiteTouch cables, as shown in the following figure.



Connect the SatiLite Module Bus Cable

Refer to the previous section for information on splitting the Cat5 cable into module bus and keypad bus cables.

The module bus cable carries the red, black, white, green, and shield wires from the Cat5 cable to the module bus. Do one of the following to connect the module bus cable to a module in an enclosure for each run of SatiLite dimmers:

1. Attach the wires from the module bus cable to the connector on the transorb board in an enclosure.

OR

2. Attach a LiteTouch module data connector to the enclosure end of the module bus cable. (Refer to the image on page 62 for the correct connector pin-outs.) Plug the cable into the DATA OUT port on the last module in the enclosure that is connected to the data homerun. Verify that a cable is connected to the DATA IN port on the same module.

Connect the SatiLite Keypad Bus Cable

Refer to "Split SatiLite Cat5 Cable into LiteTouch Cables" on page 50 for information on converting the Cat5 cable to module bus and keypad bus cables.

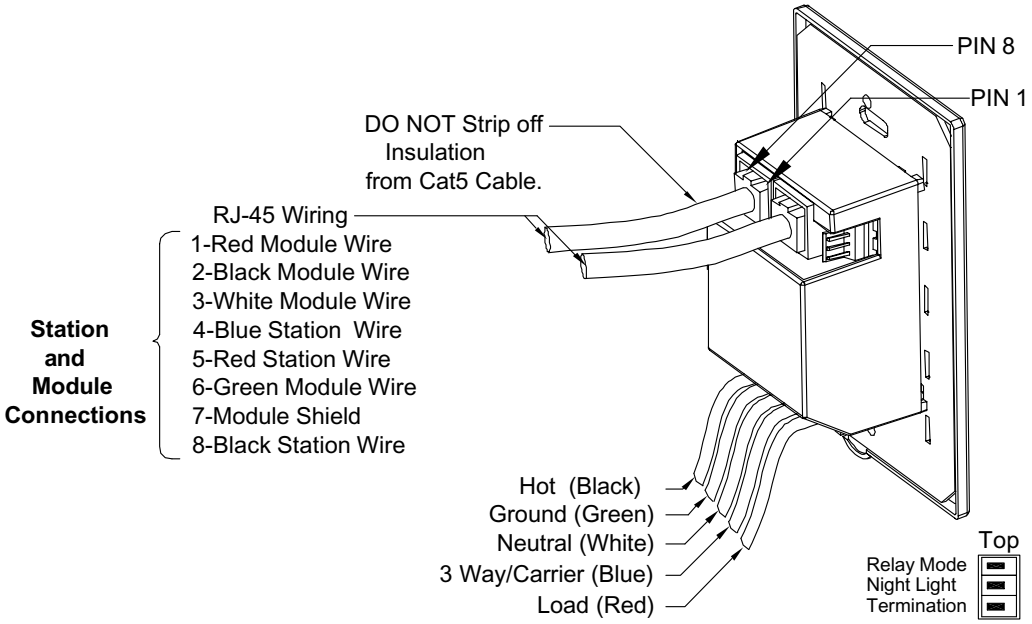
The keypad bus cable carries red, blue, and black wires from the Cat5 cable to the CCU. To connect the keypad bus cable to the CCU, connect these three wires to the CCU as shown in "Wire the CCU" on page 59.

Keypad Bus Connector:

Normally, you will only use the keypad bus connector on the SatiLite dimmer if you want keypad bus communications only (enables SatiLite buttons to control other loads in the system but does not give other keypads control of the SatiLite loads). If you are not using the RJ-45 connector for module bus communications, you can connect keypad bus communication wiring to the CCU using the 3-pin keypad bus connector on the back of the SatiLite dimmer. Refer to the image in "Wire Communications Between SatiLite Dimmers" on page 49 for the connector location. The connector uses the same connection as standard LiteTouch keypads.

Connect SatiLite Line Voltage Wires

The following image shows the line voltage wire connections on a SatiLite dimmer.



Note: if both RJ-45 jacks are not used, remove face plate and turn on dip switch 3 on Capture plate to activate termination.

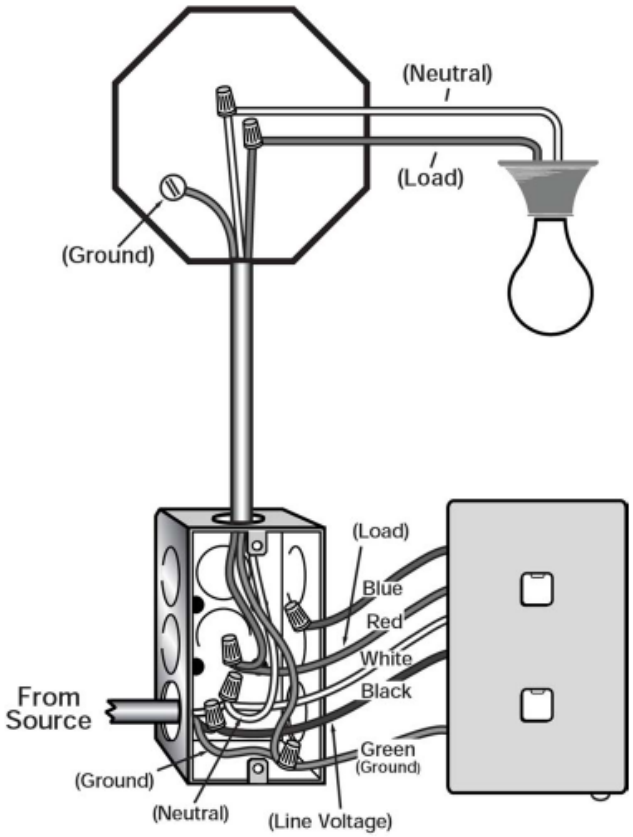
Connect line voltage wires hot (black), neutral (white), and ground (green or bare) to the matching SatiLite line voltage wires as follows:

SatiLite Wire	Line Wire
Black wire	Hot black wire
White wire	Neutral white wire
Green wire	Green or bare cooper ground wire
Blue wire	Three-way or carrier (only if three-way is needed)
Red wire	Red or black load wire on load side

NOTE ☞ Follow standard wall switch wiring practices. Tie ground wires together and tie neutral wires together.

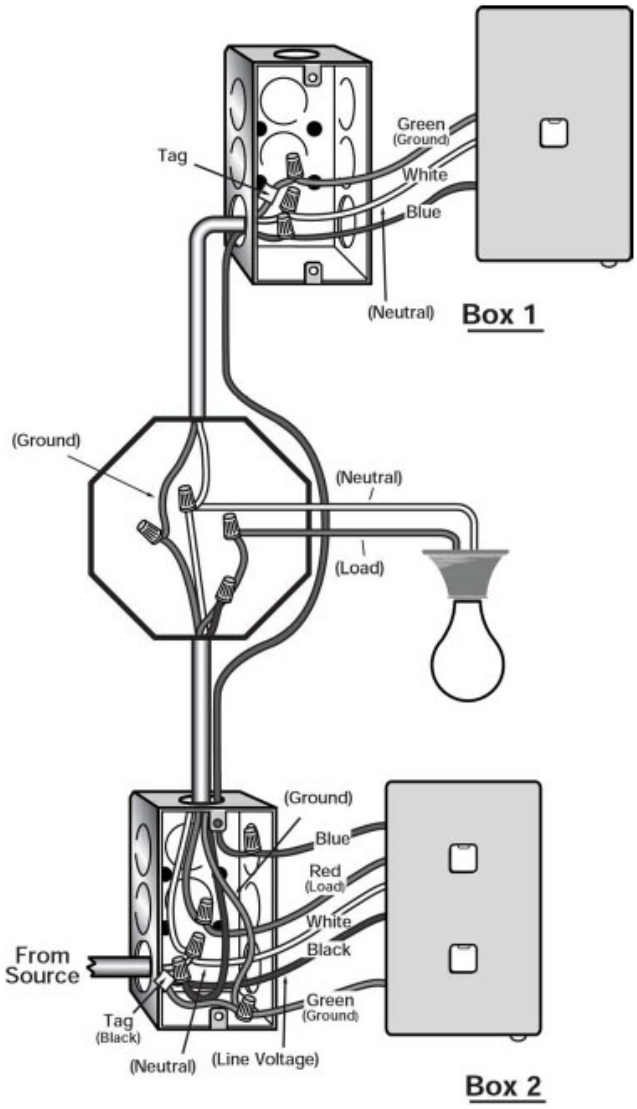
Single Location Control

For single location control, run load (red or black), neutral (white), and ground (green or bare) wires to the fixture, as shown in the following image. Blue is not used.



Double Location Control (Three-Way Wiring)

The following figure shows double location control (three-way wiring).



Wire double location control as follows:

Primary Keypad Wiring

1. Run the line voltage wiring to the primary box: hot (black), neutral (white), and ground (green or bare).
2. In the primary box (box 2 in image) tie all neutrals (white) together, including the wire from the SatiLite dimmer.
3. Tie all grounds together (green wire and bare wire), including the green wire from the SatiLite dimmer.
4. Connect the hot (black) line wire to the SatiLite's black wire.
5. Connect a load (red or black) wire to the SatiLite's red wire.

Fixture Wiring

1. Run the load (red or black), white (neutral), and ground (green or bare) from the primary SatiLite dimmer to the fixture.
2. Run the white (neutral), and ground (green or bare) from the fixture to the three-way keypad.

Carrier Wiring

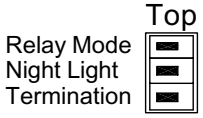
1. Tie a carrier (blue) wire to the blue wire in the primary SatiLite dimmer.
2. Run the carrier wire to the three-way keypad.

Three-Way Keypad Wiring

1. In the three-way SatiLite dimmer box, tie the white wires together, including the wire from the SatiLite dimmer.
2. Tie the ground wires together, including the green wire from the SatiLite dimmer.
3. Tie the carrier (blue) wires together.

SatiLite DIP Switch Settings

There are three DIP switches on the SatiLite dimmer. The DIP switch is located on the front of the keypad and has the following orientation.



Dip Switch 1 The top DIP switch places the dimmer in relay mode. When in relay mode, the only possible responses are 100% on and 100% off. Any commands sent to the SatiLite for any level other than *off* will turn the unit *on* to 100%. As it is still a dimmer, the heat generated during this mode will be at maximum.

Dip Switch 2 The middle DIP switch turns on and off the night light feature. The night light feature keeps all non-lit LEDs at a dim glow so the keypad can be found in the dark.

Dip Switch 3 The bottom DIP switch terminates the last unit in the SatiLite series. If the unit is the last or only unit, the DIP switch should be turned on, otherwise it should be off.

NOTE ☞ When finished setting up the keypad, make sure the "dam" switch (located at the bottom edge of the SatiLite dimmer) is in the **up** position, which sets the SatiLite to normal operation (see "Enable/Disable SatiLite with Dam Switch" on page 49).

Replace SatiLite Buttons

To replace the buttons on a SatiLite wall-box dimmer, do the following.

1. Turn off power to the SatiLite at the breaker.
2. Remove the faceplate.
3. Remove the two screws that hold the button retainer in place in the center of the SatiLite, and remove the button retainer and buttons.
4. Insert the new buttons and secure the button retainer again using the two screws you removed.
5. Replace the faceplate and turn power back on.

Install the CCU

NOTE ☞ The CCU should be properly grounded using 12-gauge wire.

5000LC

The 5000LC is the latest generation, rack-mount, fully upgradable, central control unit. Full system design and programming for the 5000LC can be implemented using LiteWare3.5, LiteTouch's most powerful and user-friendly software design tool.

Dimensions

The dimensions of the 5000LC are 14" H x 16" W x 5" D. It is designed for flush mounting. Because it is five inches deep, it can only be recessed in a 2" x 6" wall. If recessed into a wall, you will need to design a proper recess to accommodate the CCU.

Internal Power Supply

The 5000LC has an internal power supply (to operate only the CCU) with the following ratings:

Input: 100-240 VAC, 50/60 Hz
Output: 5 VDC, 3 Amp

Keypad/Module Ports

The 5000LC has four keypad ports and four module ports and uses screw terminals for connecting the wires. Multiple wires may be attached to all port connections.

Refer to "5000LC CCU" on page 156 for more technical information.

Available Cards for the 5000LC

The 5000LC system uses computer style cards to house the majority of its components, including the central processing unit, system interface, modem connection, and so on. By using cards, the CCU is more easily upgraded and repaired.

Monitor Card

The monitor card contains:

- CCU power switch
- Status display of keypad/module communications (shows occurrences of modules' "transmit," "receive," and "keypad port" status, as well as keypad activity)
- Surge protection for the module bus. The 5000LC's surge protection is contained in its internal power supply.

The monitor card is required and must be installed in the card slot on the right (marked on the front frame just below the slot). It is the only card that will fit in this slot. Other cards can be inserted into any slot. For information on the monitor card status display, refer to "Monitor Card" on page 115.

CPU Card

The CPU card is the central processing card for the CCU and stores the control program file. It is available in two versions, as follows:

Ethernet/Serial Enabled
The Ethernet/serial enabled CPU card has one Ethernet port, which allows you to connect devices to the 5000LC via a local area network, and one RS-232 serial port. The Ethernet port also provides for easier remote access than do the serial ports on the standard CPU card. The Ethernet port adds several capabilities to the 5000LC including remote diagnostics, remote programming changes, and simple connection to various devices (including the PocketLT load level adjustment tool).

NOTE ☞ The Ethernet/serial enabled CPU card is shipped with a static IP address of 192.168.0.3 and is DHCP (Dynamic Host Control Protocol) disabled. If you want to use the Ethernet/serial enabled CPU card in an existing LAN, contact your network administrator to help you set up the card with your network's settings. Use XPort Installer (on LiteTouch's Web site, www.litetouch.com) to change the IP address and enable DHCP. If you have enabled DHCP with XPort Installer, when connecting the 5000LC to your network, cycle the 5000LC's power off and back on to force the server to assign an address to the 5000LC.

Serial
The serial CPU card has two RS-232 ports, either of which can be used for uploads, and no Ethernet port.

A snaking or rolling figure eight on the status display indicates that the CPU card is working properly. For more information on the CPU card status display, refer to "CPU Card" on page 115.

C2000 (Connection) Card

The C2000 card is the "connection card" that supports C2000 keypads. When the CCU starts up, the CPU card transfers a copy of the switch to load programming to the C2000 card. This does not include any user programming or special functions—only switch to load information. The card's main purpose is to communicate with the keypads and the modules. When a keypad button is pressed, the CPU cards tells the C2000 card to perform the specified action.

If the CPU card fails or locks up, the connection card continues to receive button requests and is capable of turning loads on and off, even without the CPU card functioning (a backup system that reduces the risk of a system-wide failure).

Modem Card

The modem card comes standard with the 5000LC but is not required. If a modem link is to be used, it requires a dedicated telephone line. You can also use an RS-232 port to transfer the main program or software upgrades to the CCU.

Communication Ports

Communication ports, which vary depending on your installation, are available on the cards. Possible communication ports include:

- Ethernet port (optional) on the Ethernet/serial enabled CPU card.
- Three or four RS-232 serial ports (one or two on the CPU card, one on the C2000 card, and one on the modem card).

Use the communication ports for any of the following purposes:

- Upload a firmware upgrade. Instructions are included with the upgrade explaining which port to use (e.g., CPU card, C2000 card, etc.). (The Ethernet port cannot be used to upload firmware.)
- Upload a new control program file to the CPU card.
- Perform system diagnostics.
- Communicate with other devices (either LiteTouch devices or system integration third-party devices) either over a local area network via the Ethernet port or via the RS-232 port for serial communications. (While any RS-232 port can be used, use the RS-232 port on the connection card last, as this is the busiest card in the system.) Information on system integration is covered in the *LiteTouch System Integration* manual.

Standard CCU

The Standard CCU contains a user interface on the front panel that you can use to make small programming changes, perform diagnostics, make definition checks, and so on. System design and programming for the Standard CCU can be implemented using LiteWare software, which is then converted to a DOS program for upload to the Standard CCU. Refer to the *LiteWare* manual for instructions on uploading the program to the CCU using a DOS utility.

The Standard CCU has a modem option and an RS-232 port to download the control program.

Dimensions

The case dimensions of the Standard CCU are 8¾" H x 12" W x 2¼" D.

Keypad/Module Ports

The Standard CCU has four keypad ports and four module ports. Wires connect to a connector, which is plugged into the port. Multiple wires may be attached to the connectors.

Refer to the LiteTouch data sheet on the Standard CCU for more technical information.

Compact CCU

The Compact CCU is similar to the Standard CCU but is smaller and contains no user interface. All programming, testing, and diagnostics must be done via the RS-232 port. System design and programming for the Compact CCU can be implemented using LiteWare software, which is then converted to a DOS program for upload to the Compact CCU. Refer to the *LiteWare* manual for instructions on uploading the program to the CCU using a DOS utility.

The Compact CCU does not have a modem option. You must use the RS-232 port to download the control program.

Dimensions

The dimensions of the Compact CCU are 8½" H x 12¼" W x 1" D.

Keypad/Module Ports

The Compact CCU has two keypad ports and two module ports. Wires connect to a connector, which is plugged into the port. Multiple wires may be attached to the connectors.

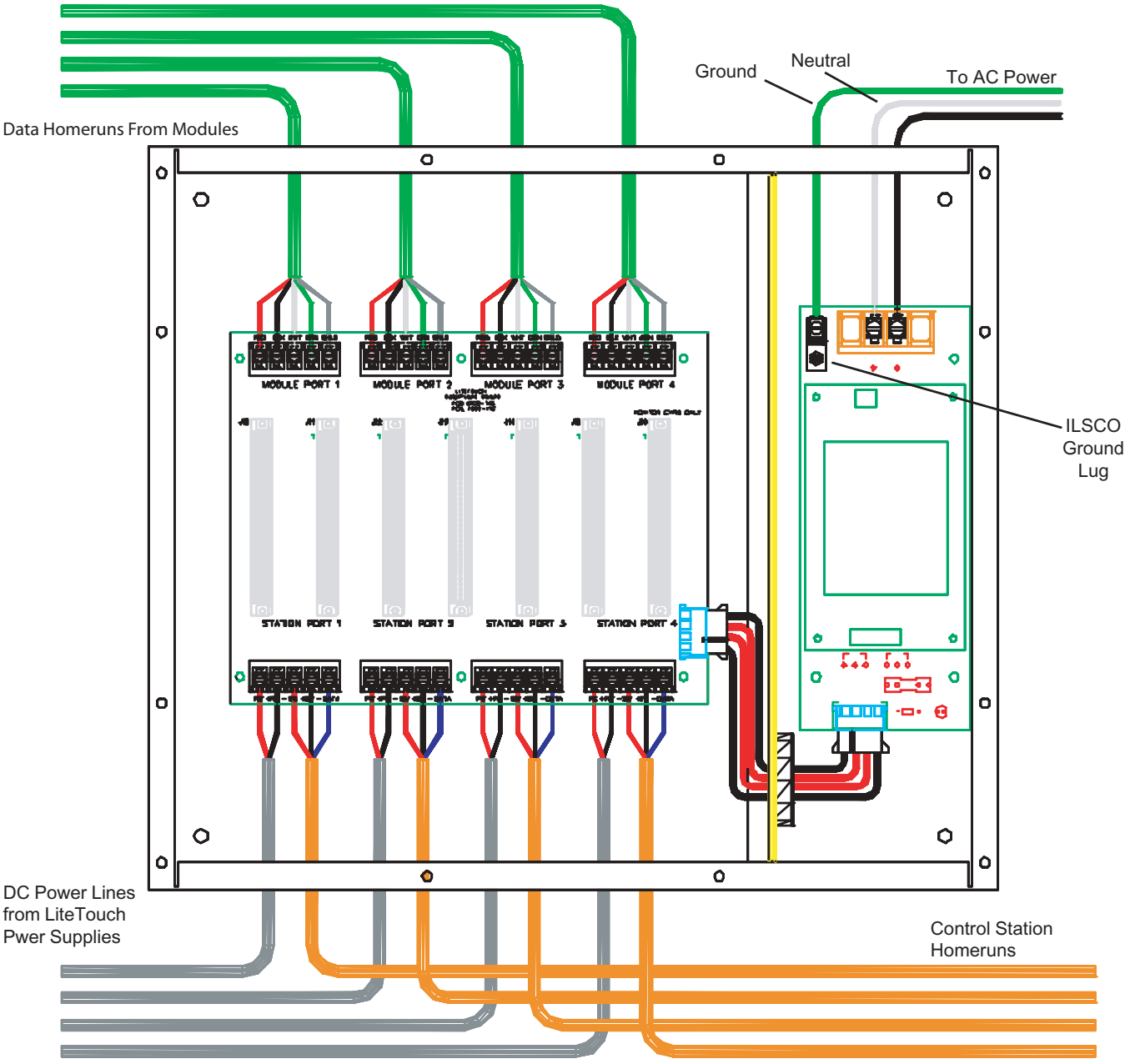
Refer to the LiteTouch data sheet on the Compact CCU for more technical information.

Wire the CCU

Once the CCU is installed, you can complete the wiring, which includes the following:

- Connect data cables to modules and the transorb board
- String enclosures together (large installations or multiple enclosures)
- Connect the data homeruns to the CCU module ports
- Connect the keypad homeruns to the CCU keypad ports
- Run an AC power line to the CCU (5000LC only)

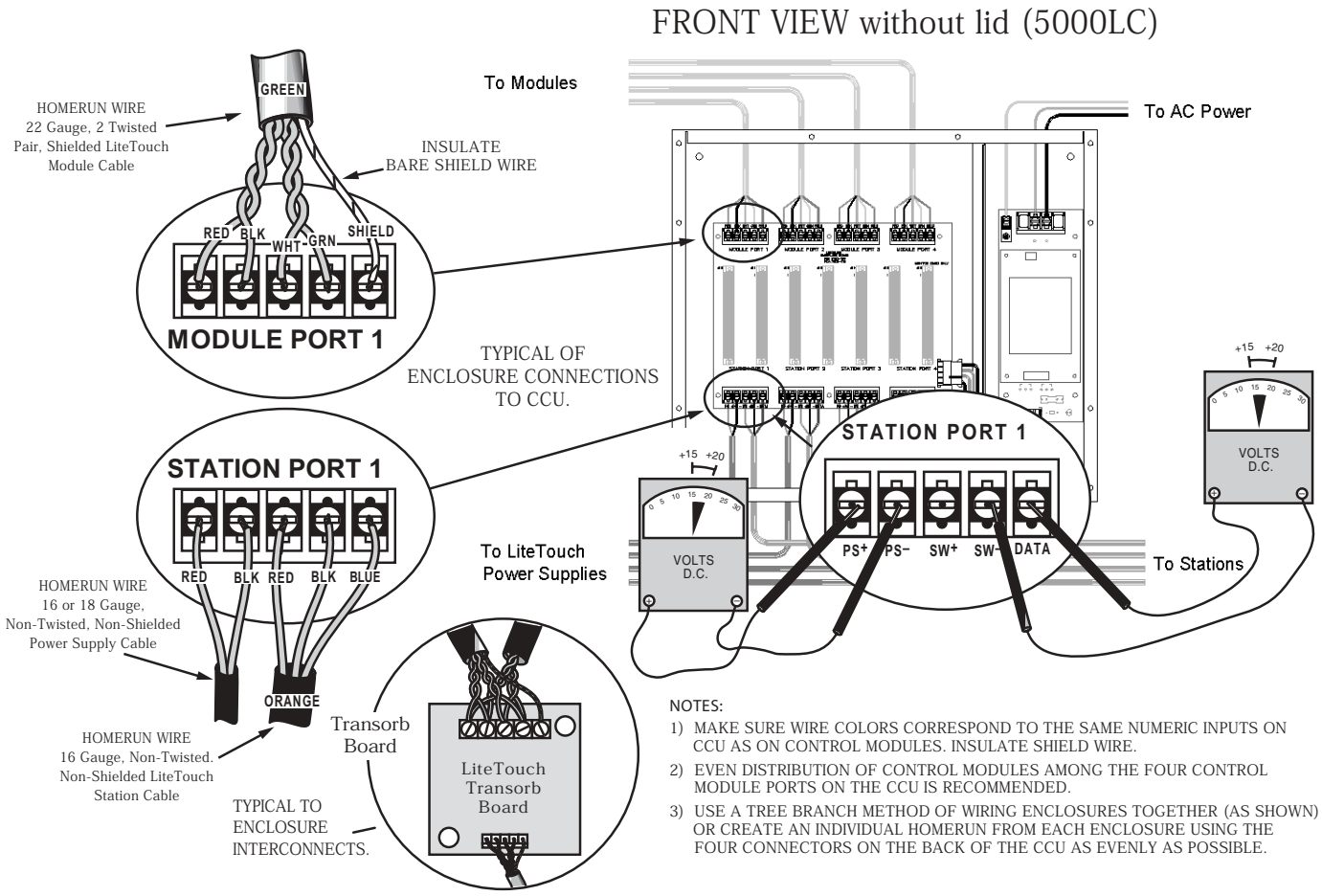
The following 5000LC wiring diagram shows the keypad, power, and data connections, and the AC power connection to the power supply.



Green indicates data wiring from the control modules to the CCU module ports, orange indicates keypad homeruns routed to the CCU keypad ports, and black indicates wiring from the power supplies to the CCU keypad ports.

NOTE ☞ With the Standard and Compact CCUs, you connect the wires to connectors rather than to a screw terminal. However, the wiring configuration is the same.

The following 5000LC diagram shows module port and keypad port terminal detail and overviews the wiring process.



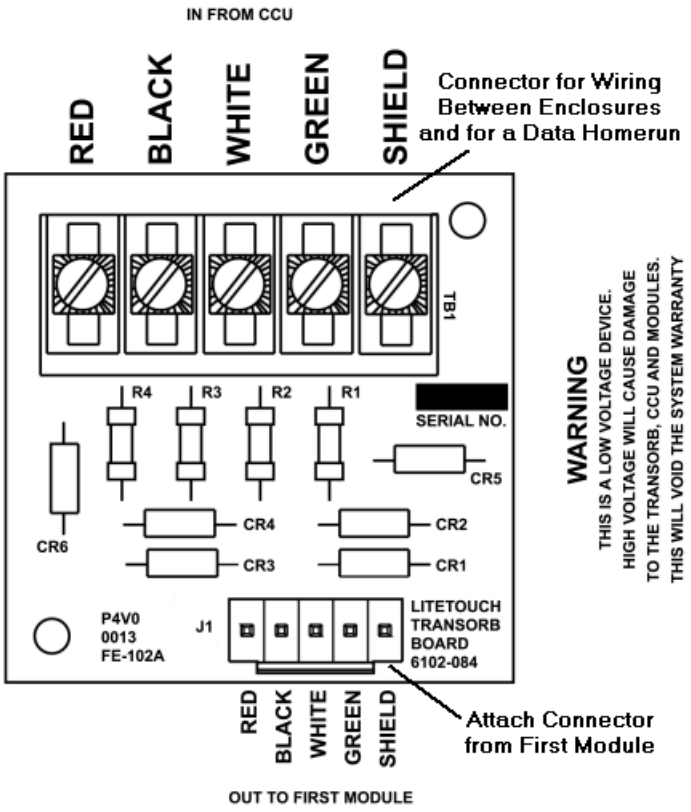
Connect Modules with Data Cables

The module to CCU data wiring handles communications between the modules and the CCU. The DATA OUT of each module is a fully buffered retransmission port.

Do the following to connect the cables between control modules:

1. The low voltage side of each module has two data ports: DATA IN and DATA OUT. A data cable is provided with each module.

Plug a data cable into the five-pin connector on the transorb board, and plug the other end into the DATA IN port on the first module.



2. Connect another data cable to the DATA OUT port on the first module and to the DATA IN port on the second module.

3. Continue to connect a cable to the DATA OUT port of one module and the DATA IN port of the next module until all control modules in the enclosure are connected.

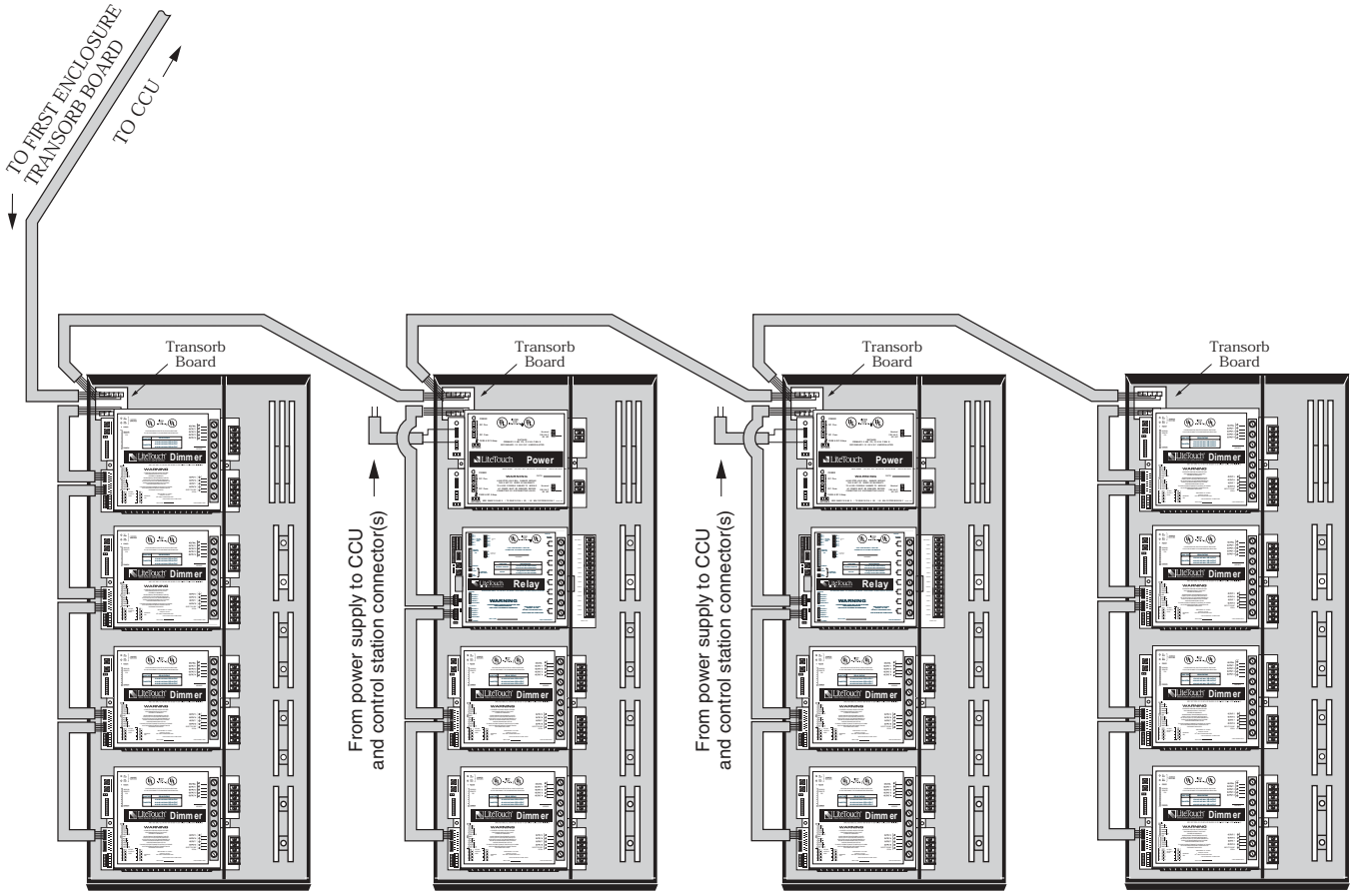
NOTE ☞ Data wiring does not connect to power supplies, momentary contact data input modules, or maintained contact data input modules. All modules that must be included in the data wiring have DATA IN and DATA OUT ports.

When finished, all control modules in each enclosure should be connected in a string to the first module (top module), which is connected to the transorb board via the 5-pin connector.

String Enclosures Together

In large installations (more than eight enclosures), or when you have multiple enclosure locations, you can string enclosures together to reduce the number of data homeruns to the CCU. While this helps to simplify the wiring, you should be aware that an early circuit breaker failure in the

string leaves all modules beyond the failure without communication to the CCU.

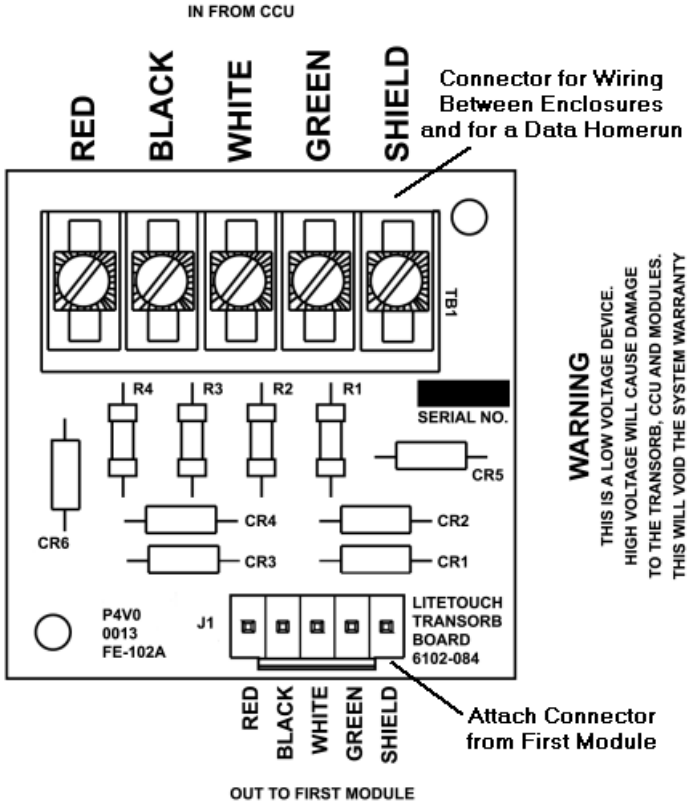


NOTE ☞ The shield wire (drain wire) in the data cable must be connected to each module, to each transorb board, and to the CCU. It serves as a ground reference for communications.

LiteTouch number 08-2105-01 wire is recommended for data wiring. It contains two twisted-pair, 22-gauge wires and an insulated bare shield wire. The cable is shielded with mylar. The table below shows LiteTouch wire colors. The cable color used for data wiring is green.

LiteTouch Wire Colors
Red
Black
White (spare)
Green
Bare (shielded)

Wire a data line from the transorb board on one enclosure to the transorb board on the next enclosure (see previous illustration). Connect the wires to the screw terminals at the top of the board, as shown below.



Be sure to connect all five wires, including the shield wire.

Connect Data Homeruns

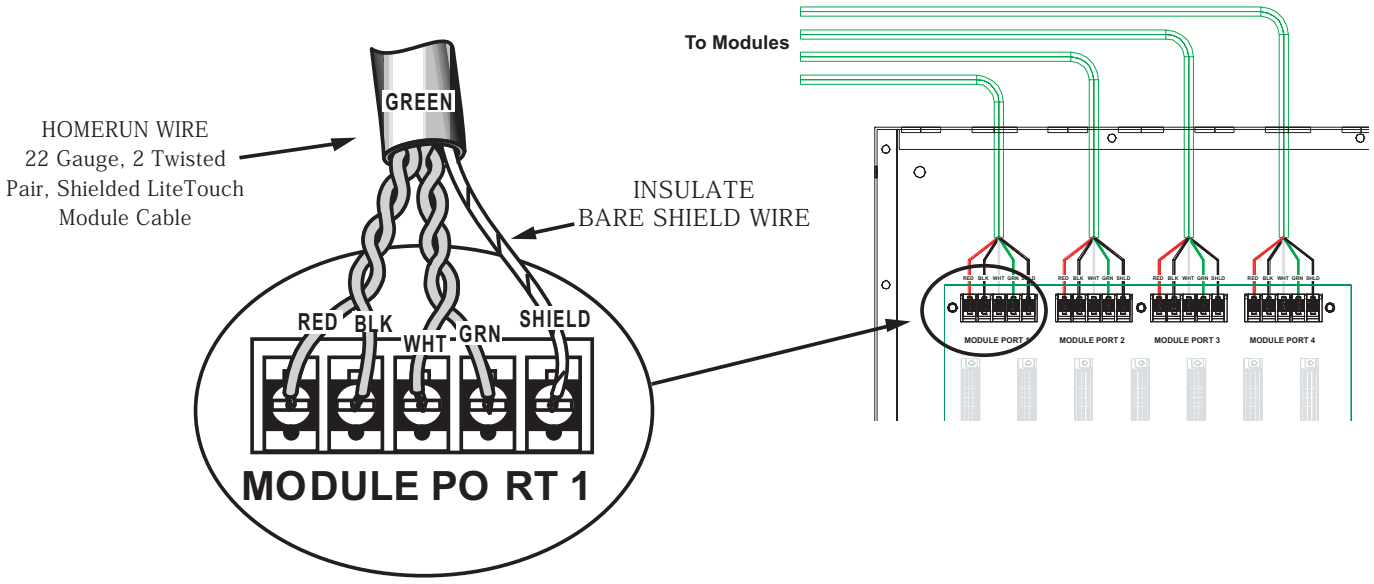
LiteTouch number 08-2105-01 wire is recommended for data wiring. It contains two twisted-pair, 22-gauge wires and an insulated bare shield wire. The cable is shielded with mylar.

The cable color used for data homeruns is green.

1. Connect the data homerun cable to the screw terminals at the top of the transorb board on the enclosure or the first enclosure of a string. Be sure to connect all wires, including the shield wire.

   If you are connecting an enclosure string, connect the data homerun to the same terminal as the data line connecting the enclosures.

2. At the CCU there are four module ports (two on the Compact) for connecting data homeruns. Connect the data homeruns to the module ports as shown below.

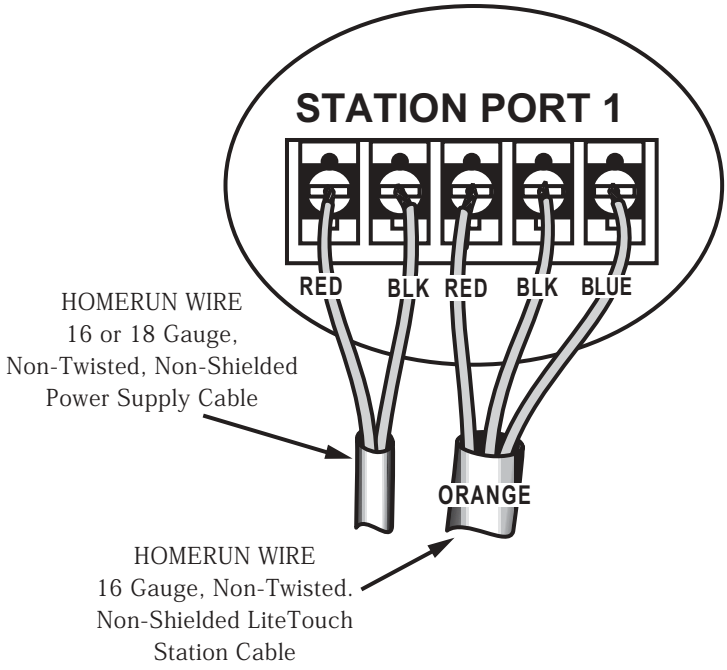


3. Distribute the data runs as evenly as possible between the ports. Make sure that all wires are connected, including the shield wire.

Connect Keypad Homeruns

Each keypad port on the CCU has five screw terminals. Connect keypad homeruns and power supply leads to the ports as follows:

Keypad Homeruns	
SW+	Red
SW-	Black
DATA	Blue
Power Supply Leads	
PS+	Red
PS-	Black



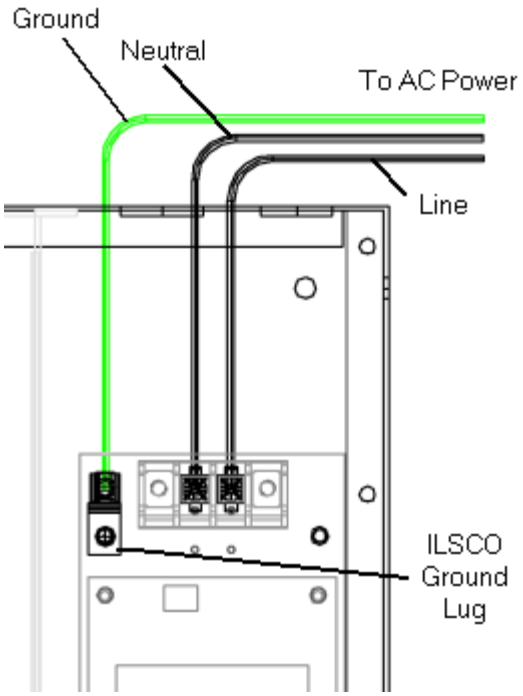
Multiple keypad homeruns can be connected to each port. Distribute the keypad homeruns as evenly as possible between keypad ports. Make sure that any long runs with a high number of keypads are also distributed evenly.

NOTE ☞ You can connect only two power supplies (four amps total) to any one keypad port on the CCU. If more power is required for a keypad homerun, you can bypass the keypad port or add a power supply to the keypad homerun. Refer to "Add Extra Power Supplies for Keypad Homeruns" on page 26 for more information.

Run AC Power Line to the CCU (5000LC only)

The 5000LC has its own power supply (to power the CCU only). It uses AC line voltage and is rated at three amps.

To route power to the CCU, remove the cover on the right side of the CCU and route the line in through the top right side (see figure below for location of connectors).


Ground
Neutral
To AC Power
Line
ILSCO
Ground
Lug

NOTES

Start and Test System 5

After the LiteTouch lighting control system has been completely installed, you should power it up and test the modules, test for DC power, and perform system tests on the CCU.

Refer to "Installation Checklist" on page 1, Chapter 3, "Install Boxes and Wiring," and Chapter 4, "Install LiteTouch Components" for information on installing the system.

Initial Power-Up

To power up the LiteTouch system, verify that the system has no electrical shorts, then turn on all circuit breakers associated with the system.

NOTE ☞ All circuit breakers must be on for proper operation; a module that isn't powered on won't pass data on to the next module.

After the system is powered up, test the modules and DC power as described in the following sections.

Test Modules

All modules except data input modules have a green power LED. Verify that the green power LED on each module is lit. Then do the following to test output voltage on each module:

1. Locate the DIP switches on the low voltage side of each module. These are used to turn loads on and off manually. Change one of the switches to the "on" position. This should light a red LED and apply power to the associated output.

2. Use a voltage meter to check the output voltage.

3. If input power is indicated (green LED) but output power (red LED) is not, turn power off to the enclosure and check the module's external fuse. If you cannot get the module to function properly, contact LiteTouch technical support for assistance.

NOTE ☞ On a dimmer module, if no loads are connected to the outputs and you manually turn on a load with a DIP switch, all loads receive power at 120 VAC. This is due to "triac leakage voltage," which occurs because the minimum wattage (three watts) per line feed has not been met.

Test DC Power

Do the following to test DC power:

1. With a volt meter, check to see if you have between 15 VDC and 24 VDC at each power supply.

NOTE: ☞ A LiteTouch power supply is unregulated, which means the voltage will vary depending on how heavy the draw on the power supply. Problems can occur if voltage drops below 15 VDC.

2. Check the input voltage (PS+ PS–) and then the output voltage (SW+ SW–) at each keypad port. The two readings should be the same.

3. Read the voltage on each of the keypad data lines ("DATA" on the 5000LC CCU, "D" on Standard and Compact CCUs). The data line should read .5 to 1 volt less than the SW line at each port.

4. Check the voltage at the end of the keypad homerun to verify the degree of voltage drop on the line. You can expect some voltage drop, but if the voltage drops below 15 VDC you will need to boost the power on the line (see "Add Extra Power Supplies" on page 14 for information).

   You only need to check voltage at keypads if you are experiencing problems on the lines.

Test 5000LC CCU System

Once the LiteTouch system is running, you need to determine if all control modules and keypads are communicating with the 5000LC. Communication occurs regardless of CCU programming (switch to load assignments).

You can identify some problems after startup using the readouts on the CCU's monitor card and CPU card. Refer to Chapter 6, "Troubleshooting" on page 103 for information. You can also use the CP5000 utility to run diagnostics on a LiteTouch system's keypads and modules, as well as to upload and download files and directly test keypads.

The LiteTouch CP5000 utility is used to communicate with the 5000LC through a direct serial connection or a modem connection. The CP5000 utility allows you to perform several functions, including:

- Test keypad functionality remotely
- Upload and download program files
- Download and upload the LiteTouch Voice Menu (LVM) file that contains settings for 5000LC modem communications
- Edit the LVM file (using the LVM Editor)
- Upgrade the firmware in the CPU card, C2000 card, or modem card (direct serial connection only)
- Run LiteTouch system diagnostics
- Set the CCU clock

The CP5000 utility is installed with LiteWare3.5.

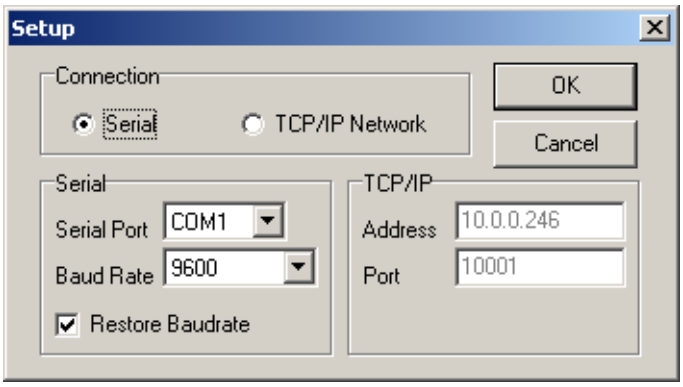
Begin by setting up communications. Communications between the computer and 5000LC can be established via the Ethernet port (if the Ethernet/serial enabled CPU card is installed), serial port, or modem (see "Set Up Serial Communications" below, "Set Up TCP/IP Communications" on page 73, or "Set Up Modem Communications" on page 74).

Set Up Serial Communications

To establish communications via a serial port, connect the serial cable to an available serial port on the 5000LC and to a serial port on the computer before turning on the computer. You can connect the serial cable to the CCU with power turned on. Then do the following to set up communications using the CP5000 utility:

1. Click **Start**, **Programs**, and **LiteTouch**, then select **CP5000**. The 5000LC Control Panel is displayed (see page 78).

2. Select **Setup** from the Communications menu, and the following dialog box is displayed.



3. Under "Connection," click **Serial**, then select from the following options:

Serial Port
Select the computer's serial port from the drop-down list. A message informs you if your selection is incorrect when the CP5000 utility attempts communications.

Baud Rate
Select the baud rate from the drop-down list. When communications are established, the CCU's baud rate is automatically set to match this selection.

Restore Baud Rate
This option is selected by default. If selected, when the serial cable is disconnected from the computer, the 5000LC serial port baud rate is returned to its previous setting. (Remember that you will need to change it in the CP5000 utility each time you establish computer communications.)

If you want the baud rate to remain at the setting selected in this dialog box, even when the computer is disconnected, click to remove the checkmark.

4. Click [**OK**] to save and exit the dialog box.

5. Refer to "CPU Configuration" on page 78, "Diagnostics" on page 82, "Keypad" on page 85, and "Control Module" on page 87 for information on using the CP5000 utility to test communications.

Set Up TCP/IP Communications

If your 5000LC is equipped with an Ethernet/serial enabled CPU card, you can use the TCP/IP function in the CP5000 utility to establish network communications with the 5000LC.

To establish communications via the Ethernet port, connect a network cable to the Ethernet port on the 5000LC and to your network. If you are connecting a computer to the 5000LC, you need to use a cross-over network cable. You can connect the network cable to the CCU with power turned on.

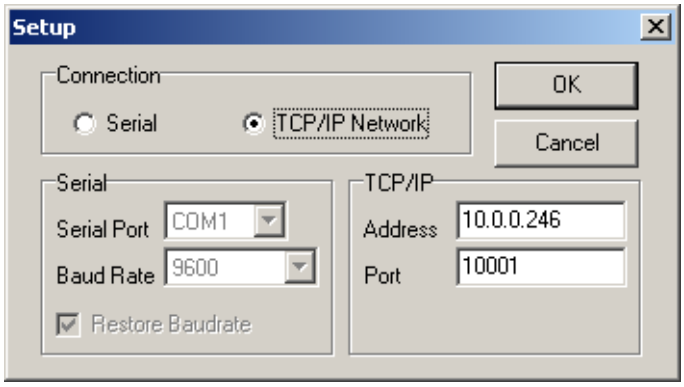
NOTE ☞ To use a network connection with the 5000LC, you must be using the Ethernet/serial enabled CPU card and 5000LC firmware version 1.31 or later. To use the CP5000 utility via the Ethernet port, you must use CP5000 version 2.3 or later.

NOTE ☞ Your computer must be set to the same subnet as the Ethernet/serial enabled CPU card to communicate with it via the CP5000 utility.

Do the following to set up communications using the CP5000 utility:

1. Click **Start**, **Programs**, and **LiteTouch**, then select **CP5000**. The 5000LC Control Panel is displayed (see page 78).

2. Select **Setup** from the Communications menu, and the following dialog box is displayed.



3. Under "Connection," click **TCP/IP Network**, then select from the following options:

   Address
   Enter an IP address for the Ethernet/serial enabled CPU card. If the card is using its originally assigned address, enter the number from the sticker on the front of the card. If the server has assigned the 5000LC a different address, you need to obtain the address from the network administrator.

   Port
   Enter the 5000LC port number, which is 10001.

4. Click **[OK]** to save and exit the dialog box.

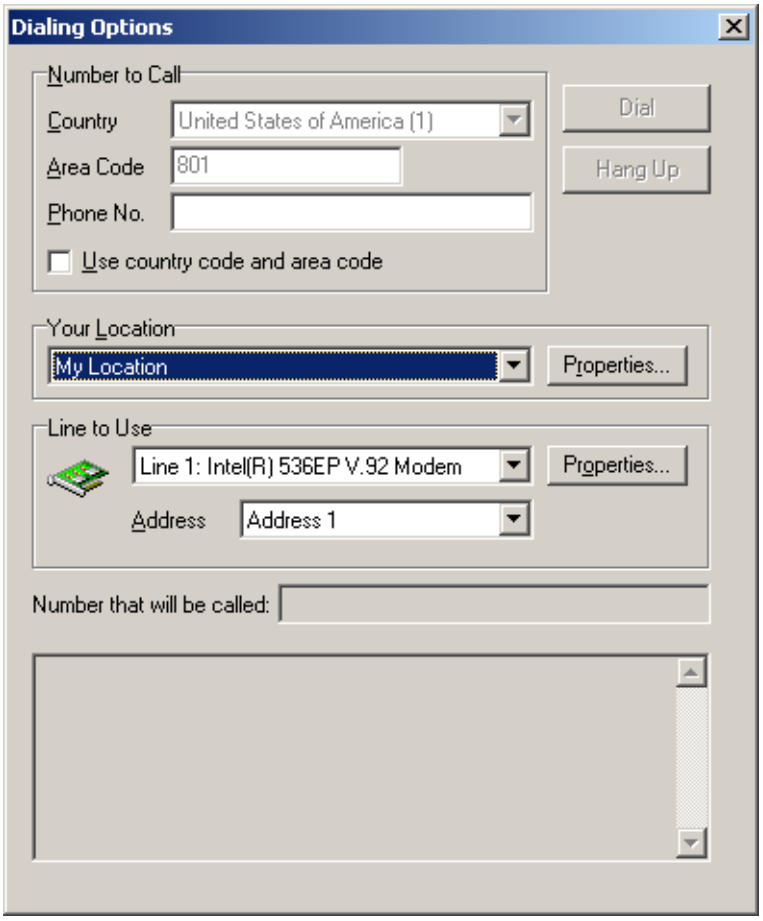
5. Refer to "CPU Configuration" on page 78, "Diagnostics" on page 82, "Keypad" on page 85, and "Control Module" on page 87 for information on using the CP5000 utility to test communications.

Set Up Modem Communications

Do the following to set up communication via modem in the CP5000 utility:

1. Click **Start**, **Programs**, and **LiteTouch**, then select **CP5000**. The 5000LC Control Panel is displayed (see page 78).

2. Select **Dial Modem** from the Communications menu, and the following dialog box is displayed.



Number to Call
Enter the modem telephone number. Select the country code and enter the area code if needed. Check the "Use country code and area code" box to include these codes when dialing.

Your Location
If more than one location is defined, select the location from the drop-down list.

Line to Use
If the correct modem and address are not shown, make a different selection from the drop-down lists.

3. Click **[Dial]** to connect. When your computer attempts a modem connection with the 5000LC, the 5000LC answers with a beep. After a few seconds, it will attempt a modem connection.

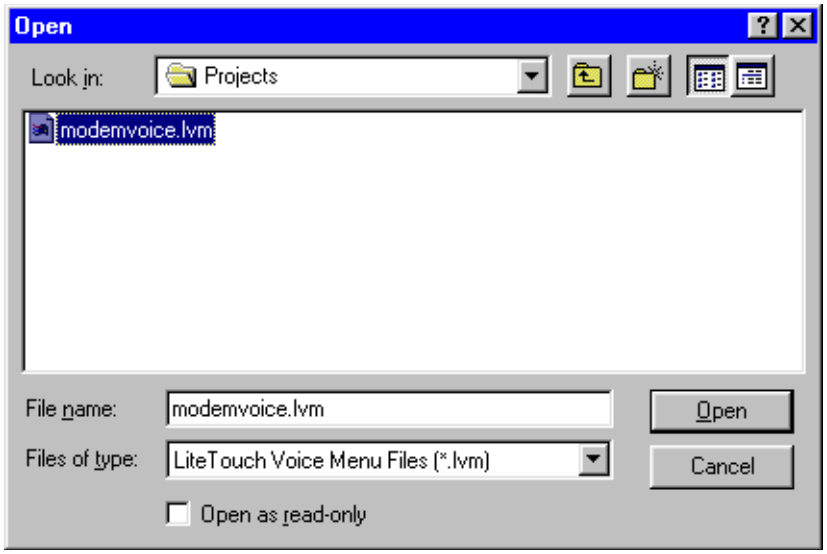
4. Refer to "CPU Configuration" on page 78, "Diagnostics" on page 82, "Keypad" on page 85, and "Control Module" on page 87 for information on using the CP5000 utility to test communications.

LVM Editor

The LVM (LiteTouch Voice Menu) file contains settings for the modem. The default LVM file must be downloaded from the 5000LC modem (refer to "From Modem" on page 79). You can then use the LVM Editor to update the LVM file.

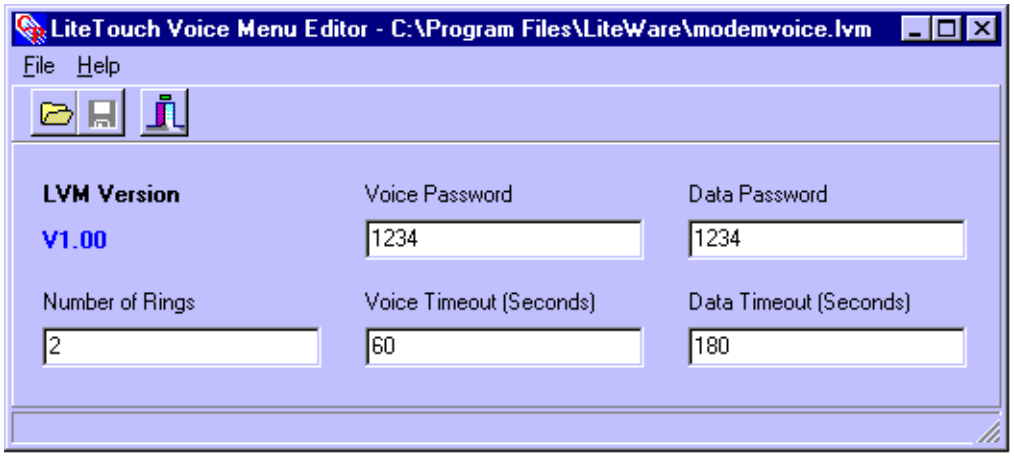
1. Select **LVM Editor** from the Tools menu. The empty LVM Editor is displayed.

2. Click  on the LVM Editor toolbar, and the following dialog box is displayed.



   The *Projects* folder is selected. If necessary, change to a different folder.

3. Click the LVM file that you want to edit, and click **[Open]**. The modem settings in the file are displayed in the LVM Editor.



4. Make changes as needed to the following fields:

   Number of Rings
   This is the number of times the phone will ring before the modem answers.

   The 5000LC supports a voice mode through the modem connection that the end user can use to activate switches remotely via the telephone. Refer to "Voice Mode" on the next page for more information. The "Voice" settings are used to set up a password and timeout for this mode.

   Voice Password
   A password, or security code, is required to access the voice switch activation feature. Enter a new code to change the default password.

   Voice Timeout
   This is the number of seconds of inactivity in voice mode before the connection times out and disconnects.

   Data Password
   The data password has not yet been implemented. You can change the default password if desired.

   Data Timeout
   This is the number of seconds of inactivity in data mode (i.e., using the CP5000 utility) before the connection times out and disconnects.

5. Click  on the toolbar to save changes to the LVM file.

6. Click  on the toolbar to close the LVM Editor.

7. Refer to "To Modem" on page 79 for information on uploading the updated file to the modem.

Voice Mode

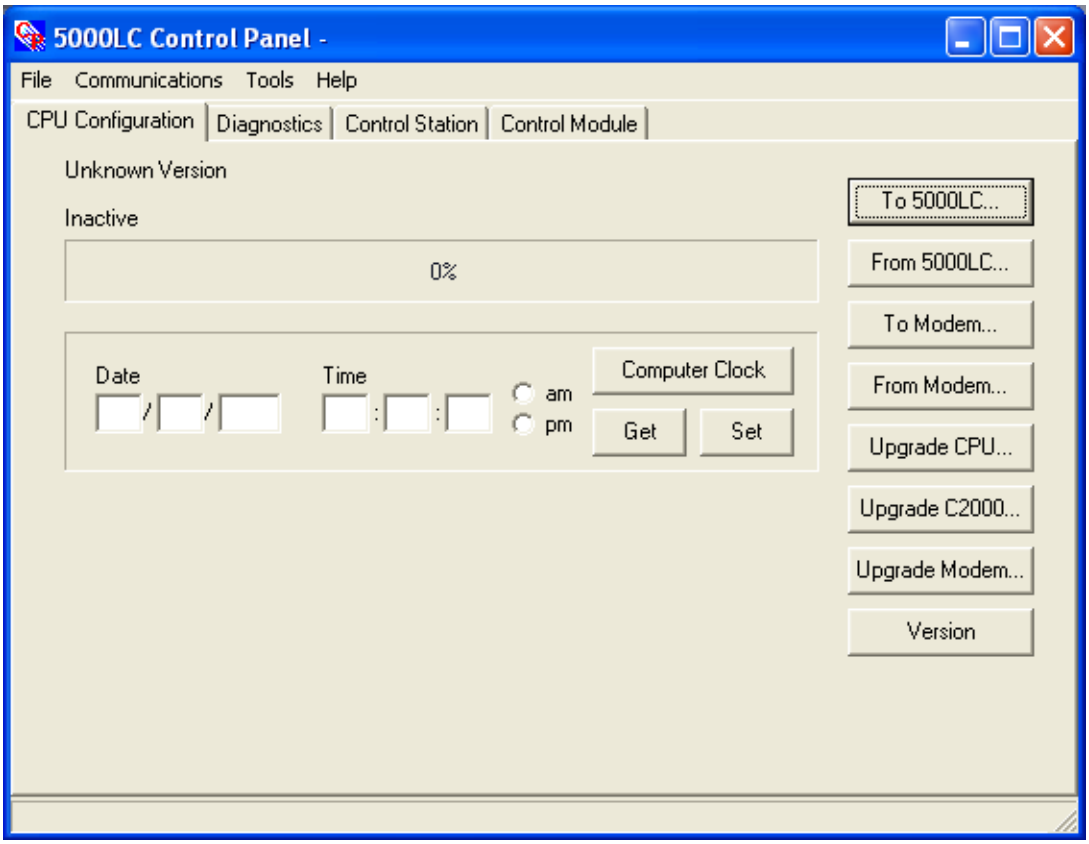
The 5000LC supports a voice mode through the modem that allows switches to be controlled remotely via telephone (e.g., turn lights on/off, start a whirlpool, etc.). Voice mode is primarily an end-user function.

To use voice mode, dial the telephone number of the modem. The modem answers and a recorded voice asks for the security code. Enter the code or password using the telephone keypad. The keypad ID and a button number are then requested, which are also entered on the telephone keypad. The loads associated with the button are activated.

You need to set up a "voice password" for the end user to use voice mode (see above). You may also want to set up a keypad (or a "virtual" keypad) specifically for voice mode activation and program it with all functions that the user would want to activate remotely. (A virtual keypad is a keypad program that has no physical keypad counterpart in the LiteTouch system.) This keypad is typically assigned an address of "99" so it can be remembered easily.

CPU Configuration

Use the options on the CPU Configuration tab to download or upload program files, upgrade firmware files, or set the 5000LC's clock.



Computer Clock Click this button to retrieve the current time and date from your computer's clock. The date and time are displayed on the left. The time does not automatically update; it is updated each time you click [**Computer Clock**]. You will want to get the current time just before setting the CCU clock. You can manually edit the entries if necessary.

Get Click this button to get the current setting from the CCU clock to determine if it needs to be reset. The date and time are displayed on the left.

Set With the current time shown in the boxes below the buttons, click **[Set]** to send the date and time to the CCU's clock. Because the time is not automatically updated, you should click this button immediately after updating the time, or you can manually adjust the time to a few seconds ahead.

To 5000LC Click **[To 5000LC]** to upload a program file to the 5000LC. A dialog box is displayed with the *LiteWare3.5* folder selected. If necessary, change to a different folder (e.g., *Projects*). All program files (files with a ".prg" extension) are displayed. Click the file that you want to upload to the 5000LC, and then click **[Open]**.

From 5000LC Click **[From 5000LC]** to download the program file from the 5000LC. A dialog box is displayed with the *LiteWare3.5* folder selected. If necessary, change to a different folder (e.g., *Projects*). Type the name that you want to give the downloaded program file, and click **[Save]**.

To Modem This option is used to upload a modified LVM (LiteTouch Voice Menu) file to the 5000LC's modem. The LVM file contains settings for the modem (see "LVM Editor" on page 76 for information). The upload is typically done directly through the serial port as it is much faster than the modem connection. Connect the serial cable from the computer to the modem card's serial port.

Click **[To Modem]** to upload the file. A dialog box is displayed with the *LiteWare3.5* folder selected. If necessary, change to a different folder (e.g., *Projects*). Click on the LVM file that you want to upload to the 5000LC, and click **[Open]**.

From Modem This option is used to download the LVM (LiteTouch Voice Menu) file from the 5000LC. You need to download the LVM file to change the modem settings (see "LVM Editor" on page 76 for information). The download is typically done directly through the serial port as it is much faster than the modem connection. Connect the serial cable from the computer to the modem card's serial port.

Click **[From Modem]** to download the file. A dialog box is displayed with the *LiteWare3.5* folder selected. If necessary, change to a different folder (e.g., *Projects*). Type the name you want to give the LVM file and click **[Save]**.

If you change the LVM file, you need to upload the modified file to the modem using the **[To Modem]** option (above).

Upgrade CPU Periodic upgrades are made available to the 5000LC cards' firmware. Contact LiteTouch or visit our Web site at www.litetouch.com for information.

NOTE ☞ You must upgrade the firmware for all 5000LC cards at the same time for the system to function. This includes the CPU card, the C2000 card, and the modem card.

Connect the computer's serial cable to the serial port on the CPU card. (You can connect it to either of the two serial ports.)

Before upgrading firmware, click **[Version]** to display the current version of firmware used by the card, and verify that the upgrade is newer.

Click **[Upgrade CPU]** to update your CPU card's firmware. A dialog box is displayed with the *LiteWare3.5* folder selected. If necessary, change to a different folder (e.g., *Projects*). All CPU firmware files (files with a ".cpu" extension) in the folder are displayed. Click the file that you want to upload to the CPU card, and then click **[Open]**. The new firmware file is uploaded to the CPU card.

Upgrade C2000

Periodic upgrades are made available to the 5000LC cards' firmware. Contact LiteTouch or visit our Web site at www.litetouch.com for information.

Connect the computer's serial cable to the serial port on the C2000 card.

Before upgrading firmware, click **[Version]** to display the current version of firmware used by the card.

Click **[Upgrade C2000]** to update your C2000 card's firmware. A dialog box is displayed with the *LiteWare3.5* folder selected. If necessary, change to a different folder (e.g., *Projects*). All C2000 firmware files (files with a ".c20" extension) in the folder are displayed. Click the file that you want to upload to the C2000 card, and then click **[Open]**. The new firmware file is uploaded to the C2000 card.

Upgrade Modem

Periodic upgrades are made available to the 5000LC cards' firmware. Contact LiteTouch or visit our Web site at www.litetouch.com for information.

Connect the computer's serial cable to the serial port on the modem card.

Before upgrading firmware, click **[Version]** to display the current version of firmware used by the card.

Click **[Upgrade Modem]** to update your modem card's firmware. A dialog box is displayed with the *LiteWare3.5* folder selected. If necessary, change to a different folder (e.g., *Projects*). All modem firmware files (files with a ".mdm" extension) in the folder are displayed. Click the file that you want

to upload to the modem card, and then click **[Open]**. The new firmware file is uploaded to the modem card.

Version Click **[Version]** to retrieve the current version of your CPU, C2000, and modem cards' firmware.

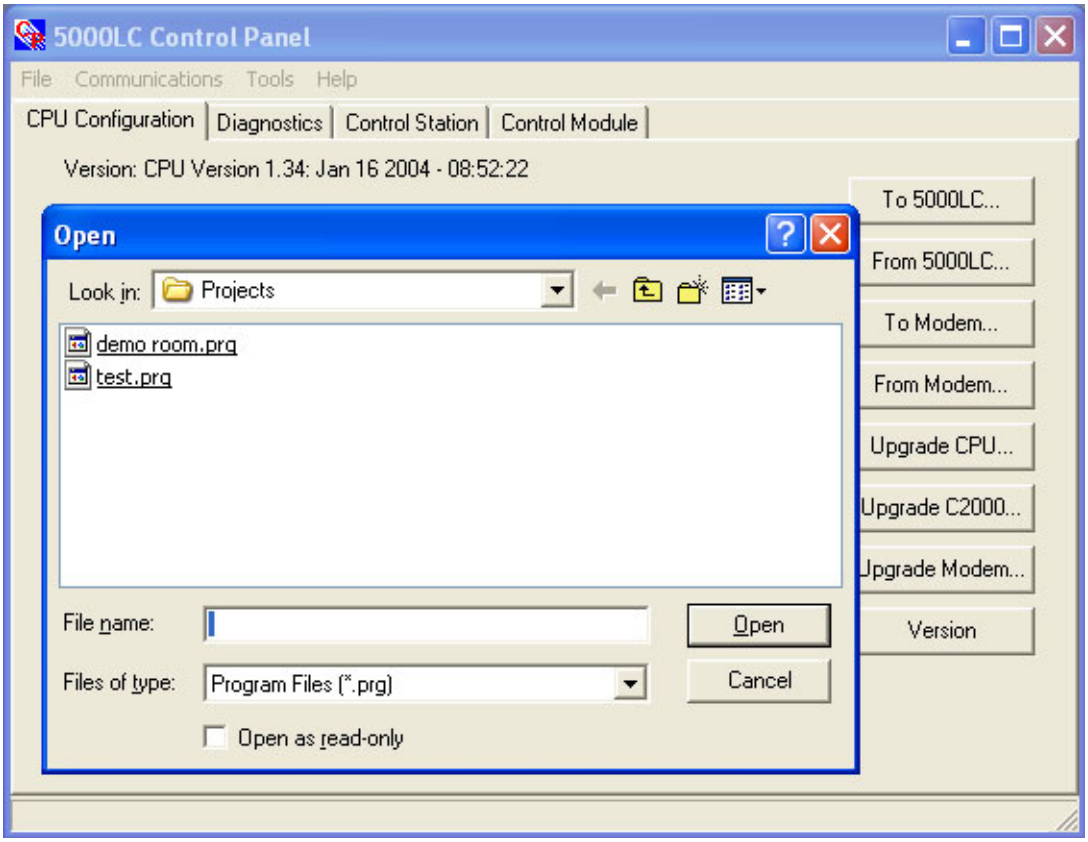
Open PRG File

If the lighting control system's program file is open when you use the Diagnostics, Keypad, and Control Module functions, the effectiveness of testing and diagnosing problems with the 5000LC is significantly increased. Do the following to open the program file in the CP5000 utility.

1. Download the program file (files with a ".prg" extension) from the 5000LC using the **From 5000LC** option (see page 78).

2. Save the program file to your computer.

3. In the CP5000 utility, pull down the File menu, and click **Open PRG File** to load the program file.



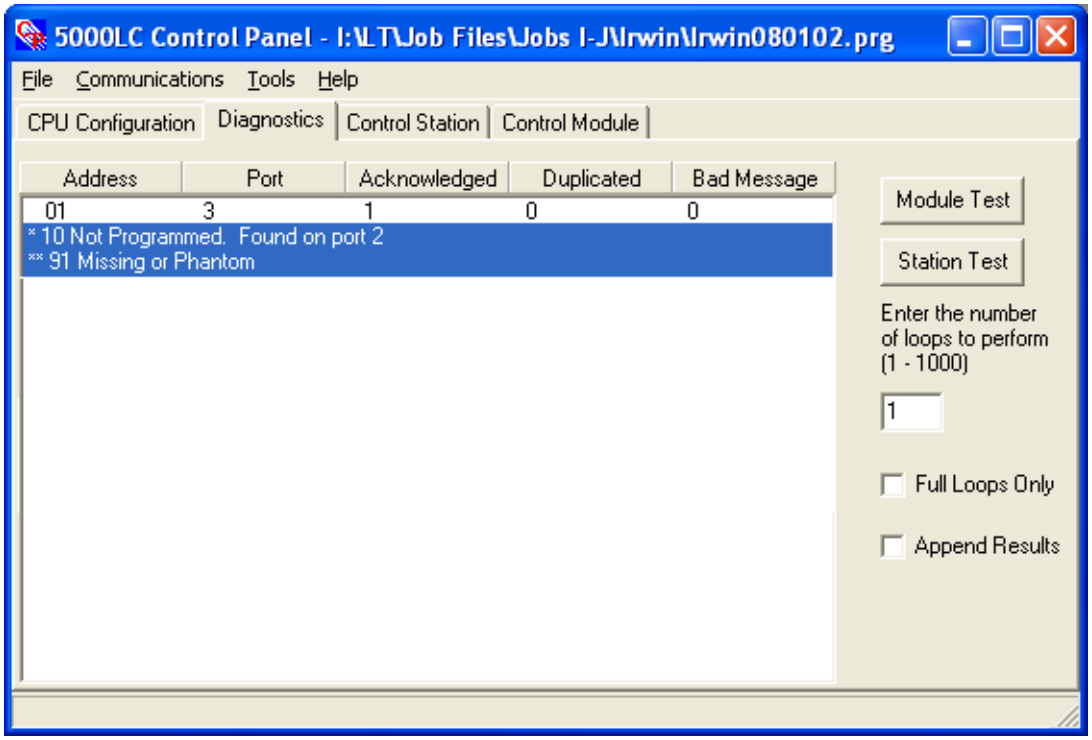
4. Select the program file you want to load, and click **[Open]**. The selected program file is loaded.

Diagnostics

Use the options on the Diagnostics tab to run control module and keypad tests on the LiteTouch system. The results of the tests are displayed in the test results box of the Diagnostics tab. You can also save test results to a text file, and you can print them.

Module Test

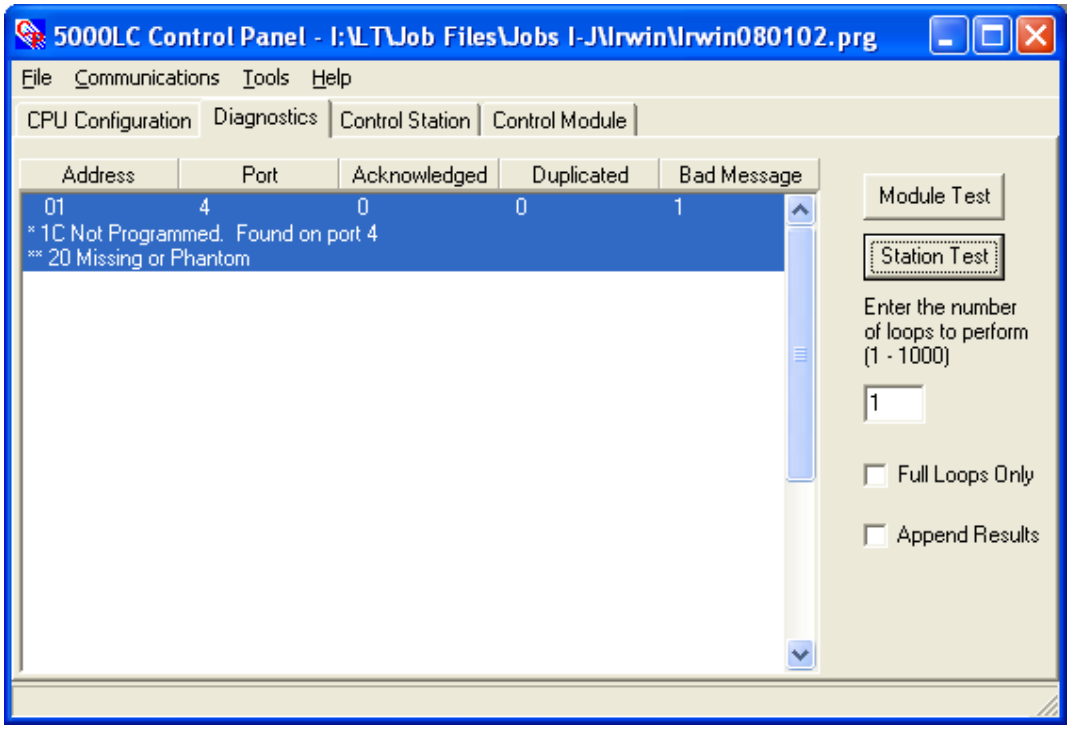
Click **[Module Test]** to start the control module communications test. Enter the number of loops that you want the test to run in the text box (from 1 to 1000). The more loops run, the more thorough the test. After the test has started, the button changes to **[Cancel Test]**, which you can click to stop the test at any time (the test stops after the current loop is completed).



If the program file is open (see "Open PRG File" on page 81), test results for all modules specified in the program file, as well as responses from any modules that are not in the program file, are listed in the test results box (see "Test Results" on page 84). Modules that do not respond are identified as "missing or phantom," and modules that respond but are not in the program file are identified as "not programmed" (see screen above). If the program file is not open, only modules that respond during the test are listed. Non-responding modules must be identified by their absence.

Keypad Test

Click **[Keypad Test]** to start the keypad test. Enter the number of loops that you want the test to run in the text box (from 1 to 1000). The more loops run, the more thorough the test. After the test has started, the button changes to **[Cancel Test]**, which you can click to stop the test at any time (the test stops after the current loop is completed).



If the program file is open (see "Open PRG File" on page 81), test results for all keypads specified in the program file, as well as responses from any keypads that are not in the program file, are listed in the test results box (see "Test Results" on page 84). Keypads that do not respond are identified as "missing or phantom," and keypads that respond but are not in the program file are identified as "not programmed" (see screen above). If the program file is not open, only keypads that respond during the test are listed. Non-responding keypads must be identified by their absence.

Full Loops Only The first loop of a keypad or module test is always a complete loop that attempts communication with every address (00 through FF). If more than one loop is specified for the test, subsequent loops will only check addresses that responded during the first loop. If you want to attempt communication with every address during every loop, select this option. This can help to identify keypads or modules that are reporting inconsistently; however, testing will take much more time if this option is selected.

Append Results Select this option if you want the current test results to be appended to the end of the previous test results. You can only append test results from similar tests (i.e., you can append results from multiple keypad tests, but you cannot append keypad test results to module test results). This option does not change how the test is conducted, only how the results are displayed.

Test Results

Test results are displayed in the test results box of the Diagnostics tab in the following columns:

Address This column lists the module or keypad addresses that responded to the test. Addresses consist of two hexadecimal digits ranging from 00 to FF and are physically set to each keypad and/or module with adjustable addressing wheels. The addresses are listed in hexadecimal address order. Addresses reporting more than once (on different ports) appear as multiple entries in this column.

Port The CCU port (1 through 4) to which the module or keypad is assigned is displayed in this column. Duplicate addresses (on different ports) are easily recognized due to the order in which the addresses are listed and appear as multiple entries on separate ports. Duplicate address responses on the same port are listed in the "Duplicated" column.

Acknowledged The number in this column should increment by one with every test loop completed for each keypad or module. If the keypad or module is communicating properly, the final number in this column will be equal to the number of loops specified for the test. If the final result is less than the number of loops run, this could indicate that the keypad or module is malfunctioning. Errors are typically indicated in the "Bad Message" column.

Duplicated (only applies to keypad tests) This column lists any duplicate responses from a keypad with the same address on the same port. Only duplicate responses from keypads that are separated by a significant distance are reported. Keypads with the same address that are close together are not reported due to communication speeds.

Bad Message Incorrect responses from addressed keypads or modules are indicated in this column. A bad message may result from inconsistent responses from a keypad or module, which could be an indication of a potential failure. Typically, this results in a mixture of "acknowledged" and "bad message" responses with neither equaling the number of loops run.

"False" bad messages may result from either of the following:

- Infrared (IR) keypads may respond with a bad message due to the lack of the ninth LED.
- During a module test, if an address that is not physically present reports a "bad message," it may be caused by a 6-channel module at the previous address. 6-channel dimmer and relay modules respond with an additional character causing the next address (if nonexistent) to appear to have an invalid response.

Save Diagnostics

Select **Save** from the File menu to save the data displayed in the Diagnostics tab to a text file. A Save As dialog box is displayed with the *Projects* folder selected. If necessary, change to a different folder. Type the name that you want to give the text file in the "File name" text box, and click **[Save]**. The file is saved in a standard text file (.txt) format and can be opened in most text editors.

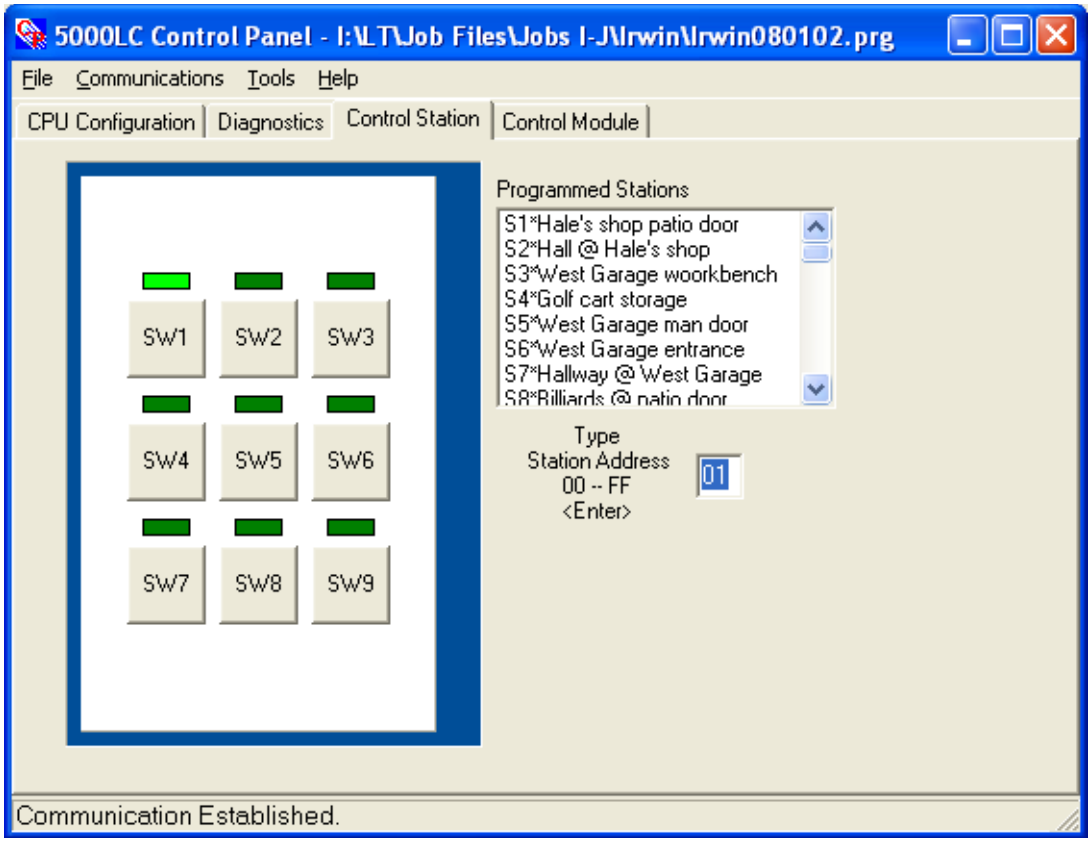
Print Diagnostics

To print the data displayed in the Diagnostics tab, select **Print** from the File menu. A standard Windows Print dialog box is displayed. Click **[OK]** to print the report. The report includes all data shown in the test results box.

To select a different printer, paper source, or page orientation before you print the report, select **Print Setup** from the File menu. Click **[OK]** to save the print setup.

Keypad

The Keypad tab contains a diagram of a nine-button keypad, which you can use to simulate operation of any keypad in the LiteTouch system. The keypad diagram consists of keypad buttons and LEDs, which you can use to actually operate buttons on a keypad and receive feedback at the computer.



If the program file is open (see "Open PRG File" on page 81), in the Programmed Keypads list, use the scroll bars to locate the keypad that you want to operate and click it. Its address is entered into the "Keypad Address" box, and the keypad's simulated LEDs are updated to reflect the current status of the keypad. The simulated keypad is ready to operate (see "Keypad Simulation" below for additional information).

If the program file is not open, enter the address of the keypad you want to test (00 to FF) and press **<Enter>** on your keyboard. After a valid keypad address is entered, the simulated LEDs are updated to reflect the current status of the keypad.

Keypad Simulation

The diagram has nine buttons so that all keypad types are represented. If the keypad you want to simulate has less than nine buttons, use only the appropriate button positions (shown in the following tables) in your simulation. For example, if you entered the keypad address for a six-button "S" series keypad, use only buttons 1, 3, 4, 6, 7, 9 on the simulated nine-button keypad to control the actual keypad.

"S" Series Keypad	
Number of Buttons	**Button Position**
1	5
2	2, 8
3	2, 5, 8
4	1, 3, 7, 9
5	1, 3, 5, 7, 9
6	1, 3, 4, 6, 7, 9
7	1, 3, 4, 5, 6, 7, 9
8	1, 2, 3, 4, 6, 7, 8, 9
9	1, 2, 3, 4, 5, 6, 7, 8, 9

"H" Series Keypad 1–5 Button	
Number of Buttons	**Button Position**
1	6
2	4, 6
3	2, 4, 6
4	2, 4, 6, 8
5	2, 4, 6, 8, 9

"H" Series Keypad 6–9 Button	
Number of Buttons	**Button Position**
6	3, 4, 5, 6, 7, 8
7	3, 4, 5, 6, 7, 8, 9
8	1, 2, 3, 4, 5, 6, 7, 8
9	1, 2, 3, 4, 5, 6, 7, 8, 9

"E" Series Keypad 1–4 Button (Single Gang)	
Number of Buttons	**Button Position**
1	1
2	1, 3
3	1, 2, 3
4	1, 2, 3, 4

"E" Series Keypad 5–8 Button (Dual Gang)	
Number of Buttons	**Button Position**
5	1, 2, 3, 4, 5
6	1, 2, 3, 4, 5, 6
7	1, 2, 3, 4, 5, 6, 7
8	1, 2, 3, 4, 5, 6, 7, 8

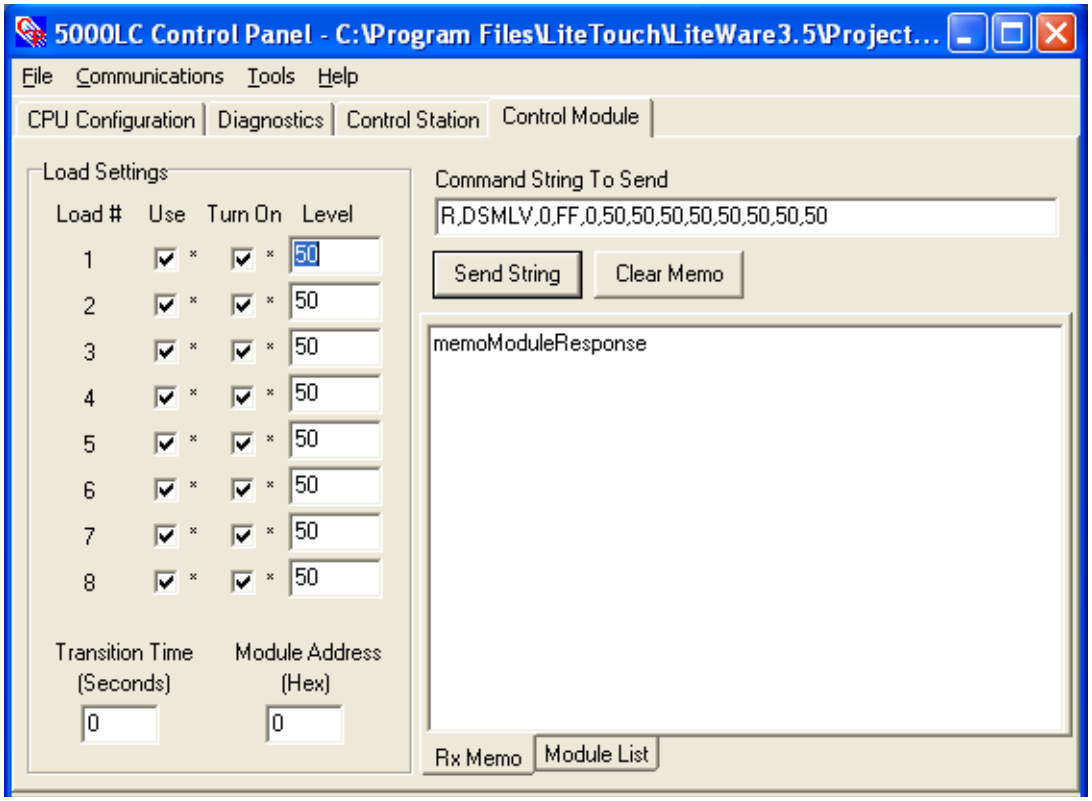
Click a button or click and hold the mouse button to initiate press, hold, and release actions on any button. As you press and release, the LED updates to show the button's status.

LEDs do not automatically update on the simulated keypad if another source affects the loads (e.g., a user activating a switch). To see the current state of an LED on the screen, type the address and press **<Enter>** again.

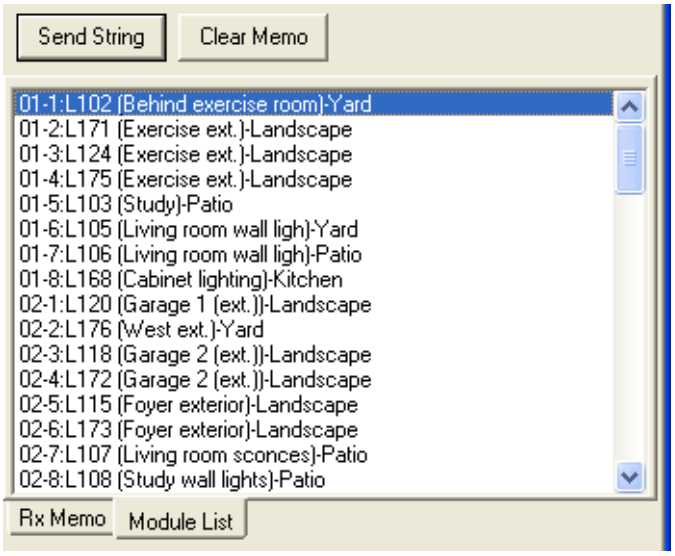
Control Module

The Control Module tab allows you to test CCU-to-module communications. You specify a module to test and what you would like the module to do with each of its assigned loads. You can then see the response that the control module makes both on-screen and by checking the load directly.

NOTE ☞ To use the Control Module tab, you must be using 5000LC firmware version 1.31 or later and the CP5000 utility version 2.3 or later.



Module List If the program file is open (see "Open PRG File" on page 81), click the **Module List** tab to select the module you want to test. The address is inserted into the "Module Address" box.



Module Address If the program file is not open, enter the address of the module to be tested.

Load Settings This section is designed to be used with all types of standard line voltage modules. A load level can be specified for dimmer modules. The level for a relay module is always either 100 (full) or 0 (off).

Use
Select this option if you want to use the load included in the test.

Turn On
Select this option if you want the load to be turned on to the specified level. If not selected, it is turned on at level 0.

Level
Enter the dim value for the load, with 100 being full and 0 being off.

Transition Time Specify in seconds the ramping time for the load to read the specified level.

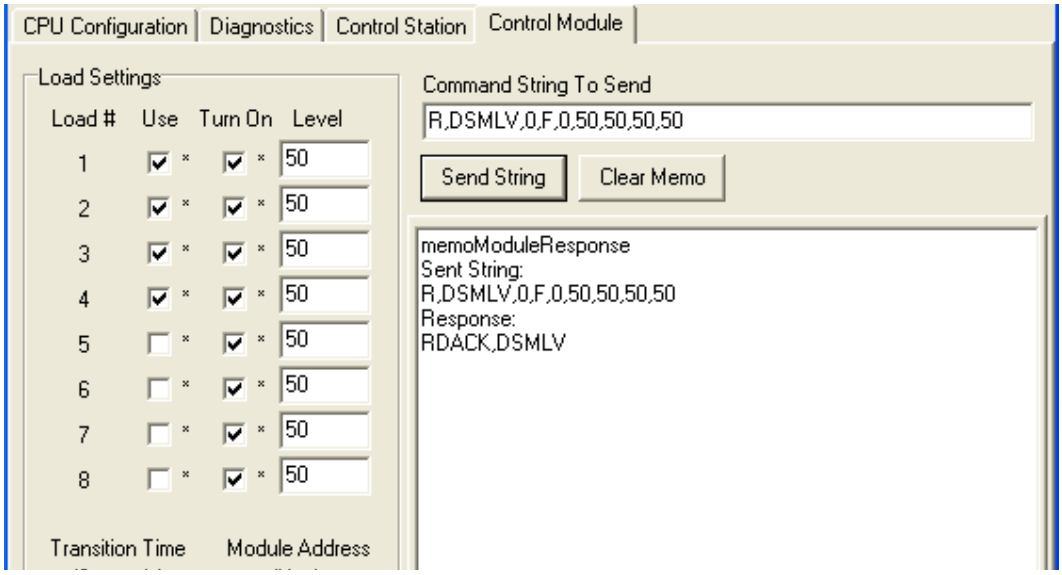
Command String to Send This is the command string that is sent to the 5000LC. It is shown for reference only and should not be changed.

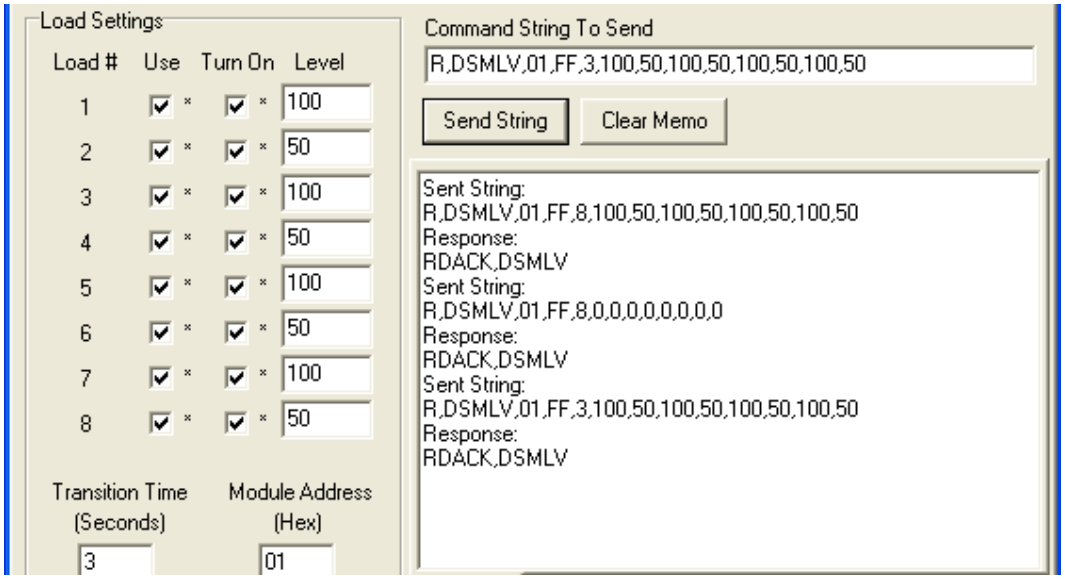
Send String Click [**Send String**] to send the string in the "Command String to Send" box to the specified module.

Rx Memo Click the **Rx Memo** tab to display all messages generated as a result of the communication.

Clear Memo Click [**Clear Memo**] to remove all messages from the "Rx Memo" box.

The following images show two control module tests and the resulting messages.





Test Standard CCU System

Once the LiteTouch system is running, you need to determine if all control modules and keypads are communicating with the CCU. Communication occurs regardless of CCU programming (switch to load assignments).

Do the following to perform the built-in communication tests at the Standard CCU's front panel. (Refer to the *Standard CCU Programming Manual* for additional information.)

1. Press the **<OPTION>** key on the front of the CCU. The Options menu is displayed with the following options:

   1-System Parameters
   2-System Tests
   3-LiteTouch Phone Numbers
   4-Pack Memory
   5-Diagnostics

2. Press **<2>** to select **System Tests**. A menu is displayed with the following three options:

   1-Toggle Switch Display Flag (Now Off)
   2-Control Module Communication Test
   3-Keypad Communication Test

3. Press the applicable key to select an option. Refer to the instructions for each test in the following sections.

Toggle Switch Display Flag

This function is used to test whether or not a specific switch is functioning. With the System Tests menu displayed, press **<1>** on the CCU front panel to toggle the function on and off. The "(Now On)" or "(Now Off)" message to the right of the menu option indicates its status.

Press **<1>** until the flag indicates (Now On). This changes the state of the LED (irrespective of the state of the load). If the keypad and switch are functioning properly, the keypad address, the switch pressed, and the load number to which the keypad is wired are displayed on the CCU screen.

NOTE ☞ The Switch Display Flag must be turned off for normal system operation.

Control Module Communication Test

Even when a LiteTouch system appears to operate correctly when buttons are pressed, a module may still malfunction. The control module communication test helps to identify periodic or infrequent errors. With the System Tests menu displayed, press **<2>** on the CCU front panel to start the test.

The control module test runs up to 99 loops. During each loop, a response is requested from all control modules in the system. While the test is running, the following information is displayed:

Control Module Communications Test
Press any key to end after current loop
Loop 01 Address 00

The address increments quickly from 00 to 99, at which time the loop count increments. If no control modules are found during loop 1, the test stops and the following message is displayed:

No Control Module Found.
Press any key to go on.

If any control modules are found, the test continues until loop 99 is reached or any key is pressed. If a key is pressed, the test continues until the current loop is finished. When the test is finished, the results are shown as follows:

Test Result s (press a key to continue):
01 Reported Every Loop
14 Missed Reporting on 02 loop(s).
95 Programmed but not reporting

All possible messages are shown in the above example.

All modules that were found and all modules that are programmed but did not report during at least one loop are listed. Press **<Enter>** to display any additional modules. When the entire list is displayed, press **<Enter>** again to return to the menu.

If a module reported on every loop, the module is functioning properly. If a module missed reporting on one or more loops, a problem exists. The most common problem is a broken wire. Modules will often communicate at least some of the time with a broken communication wire. If a module is programmed but does not report, either the module is defective, there is an error in its programming, it is not powered up, or it may have a phantom load. All problems must be found and corrected to ensure proper system operation.

After correcting any problems, run the control module communication test again. Continue to correct problems and test until all 99 loops test error free.

Keypad Communication Test

With the System Tests menu displayed, press **<3>** on the CCU front panel to start the keypad communication test. This test runs through the following five stages:

1. Each keypad port is tested for basic integrity.
2. All LEDs on all keypads are turned off.
3. A response is requested from all keypads.
4. All LEDs on all keypads are turned on.
5. A response is requested from all keypads.

The LiteTouch system must be inactive (e.g., no switch presses, etc.) during the test. If a switch is pressed during the test, no loads are activated and an error is logged. A message warns you of this at the start of the test:

The System will be inoperative during
the keypad communication tests.
Switch presses will be logged as errors.
Press any key to go on.

Ports Tested for Basic Integrity

The keypad communication test starts by testing the basic integrity of the keypad ports. The keypad port numbers correspond to the following connector numbers indicated on the back of the CCU:

Port 1 - TB5, Port 2 - TB6, Port 3 - TB7, Port 4 - TB8

Press any key on the keypad (except <CANCEL>) to continue, and the following message is shown:

Pressing CANCEL will abort keypad test.
Testing CCU port controllers

If a problem is detected, the following message is displayed:

Pressing CANCEL will abort keypad test.
Testing CCU port controllers
Port 1 is Non-Functional
Press any key to go on.

This message indicates one of two things: either the CCU is defective or the keypad data line is being held low. To determine the cause of the problem, remove the connector from the non-functional port and run the test again. If the error occurs again, the problem is in the CCU; if it does not, the problem is in the keypad line. Normally, a broken or open power wire causes this problem.

LEDs Turned Off

After all the ports have passed the basic integrity test, all keypad LEDs are turned off. This is indicated by the following message:

Pressing CANCEL will abort keypad test.
Turning off all switch LEDs
address -> 00

The address increments quickly from 00 to FF.

Response Requested from Keypads

After all LEDs are turned off, a response is requested from all keypads, as indicated by the following message:

Pressing CANCEL will abort keypad test.
Searching for keypads
address -> 00

The address again increments quickly from 00 to FF. During this part of the test there are two possible error messages, as follows:

Reporting out of order
This error normally indicates that someone has pressed a switch during the test. It may also indicate that a keypad run is receiving an excessive amount of interference and may need to have additional pull-up resistors added to the data line. Pull-up resistors can be added at both the CCU and at the end of a keypad run. (Contact LiteTouch for assistance if you need to add pull-up resistors.)

Keypad reporting for the second time
A keypad reporting for the second time normally indicates that two keypads have the same address. (They must be connected to different ports on the CCU for the test to detect this problem.) This error must be corrected for the system to properly update the keypad LEDs.

If either of these errors are detected, the test stops. Press **<Enter>** to continue.

LEDs Turned On

After the keypad search is complete, all LEDs on all keypads are turned on, as indicated by the following message:

Pressing CANCEL will abort keypad test.
Turning on all switch LEDs
address -> 00

The address increments quickly from 00 to FF.

Response Requested from Keypads

After all the LEDs are turned on, a response is again requested from all keypads, as indicated by the following message:

Pressing CANCEL will abort keypad test.
Searching for keypads
address -> 00

The address increments quickly from 00 to FF. During this part of the test, there are three possible error messages:

Reporting out of order
(See above.)

Keypad reporting for the second time
(See above.)

Keypad not reporting with LEDs on.
This error message normally indicates one of two conditions:

- The keypad run has insufficient power and needs an additional power supply
- The power and ground wires are not sufficient in size to carry the required current.

If the output of the power supply is not falling below the minimum value, use the spare wire provided in the LiteTouch keypad wiring to double the ground. If this does not improve the response, you may need to add an additional power supply to the center or end of a keypad run. Refer to "Add Extra Power Supplies" on page 14 for information.

When the final search is complete, all keypads found during the searches are listed in address order. If more are found than can be displayed on a single screen, press **<Enter>** to see the additional keypads.

NOTE ☞ Following the test, all LEDs on all keypads are **on**. To turn all of the LEDs off, run the test again, and press **<CANCEL>** after the LEDs are turned off.

Power Bus Monitor Test

In addition to the control module and keypad communication tests, you can run a power bus monitor test to check module communication.

The LiteTouch system was designed to "talk around" problems in the control module wiring, if possible. Every possible attempt is made to activate a load when a switch is pressed. Therefore, all modules may appear to be communicating during the control module communication test even though there is a misplaced or broken wire. To assure 100% operation of the system, the control module wiring must all be intact.

A power bus monitor is provided with each CCU. To make sure all modules are operating properly, you should check the LEDs on the power bus monitor. The power bus monitor will not respond correctly if there are any wiring problems. Refer to "Test Communications by Enclosure" on page 110, "Test Communications by Module" on page 111, or the documentation provided with the power bus monitor.

Switch Definition Test

Switch to load assignments are referred to as "definitions" in that you are defining which switch types control which loads. To test switch definitions, manually press each switch to determine if the load(s) responds as programmed.

If a switch does not respond correctly, one of the following is indicated:

- The switch has been programmed incorrectly.
- The affected load is wired to a module output different from that stated in the documentation.

You can confirm these errors by examining the switch assignment at the CCU and comparing it to the documentation.

Pack Memory

You should "pack" the CCU's memory after viewing and modifying switch assignments. The CCU works best when the memory is packed.

Press the <OPTION> key on the front of the CCU. The Options menu is displayed:

1-System Parameters
2-System Tests
3-LiteTouch Phone Numbers
4-Pack Memory
5-Diagnostics

Press <4> to select **Pack Memory**. Every possible keypad address and then every possible module address is displayed on the screen as the memory is packed.

Test Compact CCU System

Once the LiteTouch system is running, you need to determine if all control modules and keypads are communicating with the CCU. Communication occurs regardless of CCU programming (switch to load assignments).

A PC compatible computer (normally a laptop) with the LiteTouch Compact utilities (LiteTouch 2000 Programs) installed is required to perform the control module and keypad communication tests. Do the following to start the tests from the LiteTouch 2000 Programs menu:

1. Connect the PC computer to the Compact CCU, serial port to serial port.
2. Either restart Windows in MS-DOS mode, or open an MS-DOS window.

3. Type **LT** at the DOS prompt. The LiteTouch 2000 Programs menu is displayed.

4. Type **4** to select **Standard/Compact Communications**. The following prompt appears:

   Which serial port are you using (1 or 2)?

5. Type the number of the serial port on the computer to which the serial cable is connected. The following prompt appears:

   Select Baud Rate (1 - 6)?

6. For a Compact CCU, type **1** to select 9600 baud.

   The utility attempts to connect to the CCU. If it fails, the error message "Cannot establish communications with the Central Controller..." is displayed. Verify that the cable is fully seated to both connectors and that you correctly identified the serial port, then try again. Make sure you select the 9600 baud rate.

   When connected, the following menu is displayed:

   1 - Download program from CCU to disk
   2 - Upload program from disk to CCU
   3 - Read/Update CCU time
   4 - Module Comm. Test
   5 - Keypad Comm. Test
   6 - Quit

Options 4 and 5 are used to perform the module and keypad communication tests. Refer to the instructions for each test in the following sections.

Refer to the *Compact CCU Programming Manual* for information on the other options.

Module Communication Test

Even when a LiteTouch system appears to operate correctly when buttons are pressed, a module may still malfunction. The control module communication test helps to identify periodic or infrequent errors. Type **4** at the communications menu to start the test.

The control module communication test runs up to 25 loops. During each loop, a response is requested from all control modules in the system. While the test is running, the following information is displayed:

Control Module Test Active
Clearing Module Test Array
Running Test Loop Number 1

The loop count increments from 1 to 25.

The test continues until loop 25 is reached or any key is pressed. If a key is pressed, the test continues until the current loop is finished. When the test is finished, the following message is displayed:

Obtaining Test Result s for Module 00

The module address increments quickly from 00 to FF. When finished, the test results are shown as follows:

Control Module Test Results
Module 01 responded every loop
Module 02 ERROR -> responded only 23 times in 25 loops
Module 03 IS ASSIGNED BUT IS NOT RESPONDING

All possible messages are shown in the above example.

All modules that were found and all modules that are programmed but did not report during at least one loop are listed. Press **<Enter>** to display any additional modules. When the entire list is displayed, press **<Enter>** again to return to the menu.

If a module reported on every loop, the module is functioning properly. If a module missed reporting on one or more loops, a problem exists. The most common problem is a broken wire. Modules will often communicate at least some of the time with a broken communication wire. If a module is programmed but does not report, either the module is defective, there is an

error in its programming, it is not powered up, or it may have a phantom load. All problems must be found and corrected to ensure proper system operation.

After correcting any problems, run the module communication test again. Continue to correct problems and test until all 25 loops test error free.

Keypad Communication Test

Type **5** at the communications menu to start the keypad communication test. This test runs through the following five stages:

1. Each keypad port is tested for basic integrity.
2. All LEDs on all keypads are turned off.
3. A response is requested from all keypads.
4. All LEDs on all keypads are turned on.
5. A response is requested from all keypads.

The LiteTouch system must be inactive (e.g., no switch presses, etc.) during the test. If a switch is pressed during the test, no loads are activated and an error is logged. When the test starts, a message indicates that the test is active:

Keypad Test Active

Ports Tested for Basic Integrity

The keypad communication test starts by testing the basic integrity of the keypad ports. The keypad port numbers correspond to the following connector numbers indicated on the back of the CCU:

Port 1 - CSP1, Port 2 - CSP2

If a problem is detected, a message similar to the following is displayed:

Port 1 is Non-Functional

This message indicates one of two things: either the CCU is defective or the keypad data line is being held low. To determine the cause of the problem, remove the connector from the non-functional port and run the test again. If the error occurs again, the problem is in the CCU; if it does not, the problem is in the keypad line. Normally, a broken or open power wire causes this problem.

After all ports have passed the basic integrity test, the following message is displayed:

Port 1 Okay Port 2 Okay

LEDs Turned Off

After all ports have passed the basic integrity test, all keypad LEDs are turned off. This is indicated by the following message:

Turning off all keypad LEDs. Current Address -> 00

The address increments quickly from 00 to FF. There are no error messages displayed during this time.

Response Requested from Keypads

After all LEDs are turned off, a response is requested from all keypads, as indicated by the following message:

Searching for keypads. Current Address -> 00

The address again increments quickly from 00 to FF.

There are two possible error messages that may appear at the end of the "response requested" portion of the test, as follows:

Reporting out of order
This error normally indicates that someone has pressed a switch during the test. It may also indicate that a keypad run is receiving an excessive amount of interference and may need to have additional pull-up resistors added to the data line. Pull-up resistors can be added at both the CCU and at the end of a keypad run. (Contact LiteTouch for assistance if you need to add pull-up resistors.)

Keypad reporting for the second time
A keypad reporting for the second time normally indicates that two keypads have the same address. (They must be connected to different ports on the CCU for the test to detect this problem.) This error must be corrected for the system to properly update the keypad LEDs.

If this portion of the test runs without errors, a message similar to the following is displayed:

Found 13 Keypads

LEDs Turned On

After the keypad search is complete, all LEDs on all keypads are turned on, as indicated by the following message:

Turning on all keypad LEDs. Current Address -> 00

The address increments quickly from 00 to FF.

Response Requested from Keypads

After all the LEDs are turned on, a response is again requested from all keypads, as indicated by the following message:

Searching for keypads. Current Address -> 00

The address increments quickly from 00 to FF. During this part of the test, there are three possible error messages:

Reporting out of order
(See above.)

Keypad reporting for the second time
(See above.)

Keypad not reporting with LEDs on.
This error message normally indicates one of two conditions:

- The keypad run has insufficient power and needs an additional power supply
- The power and ground wires are not sufficient in size to carry the required current.

If the output of the power supply is not falling below the minimum value, use the spare wire provided in the LiteTouch keypad wiring to double the ground. If this does not improve the response, you may need to add an additional power supply to the center or end of a keypad run. Refer to "Add Extra Power Supplies" on page 14 for information.

When the final search is completed, all keypads found during the searches are listed in address order. If more are found than can be displayed on a single screen, press **<Enter>** to display the additional keypads.

Power Bus Monitor Test

In addition to the control module and keypad communication tests, you can run a power bus monitor test to check module communication.

The LiteTouch system was designed to "talk around" problems in the control module wiring, if possible. Every possible attempt is made to activate a load when a switch is pressed. Therefore, all modules may appear to be communicating during the control module communication test even though there is a misplaced or broken wire. To assure 100% operation of the system, the control module wiring must all be intact.

A power bus monitor is provided with each CCU. To make sure all modules are operating properly, you should check the LEDs on the power bus monitor. The power bus monitor will not respond correctly if there are any wiring problems. Refer to "5000LC Status Indicators" on page 114 or the documentation provided with the power bus monitor.

Switch Definition Test

Switch to load assignments are referred to as “definitions” in that you are defining which switch types control which loads. To test switch definitions, manually press each switch to determine if the load(s) responds as programmed.

If a switch does not respond correctly, one of the following is indicated:

- The switch has been programmed incorrectly.
- The affected load is wired to a module output different from that stated in the documentation.

You can confirm these errors by examining the switch assignment at the CCU and comparing it to the documentation.

Troubleshooting 6

After installing a new LiteTouch system, refer to Chapter 5, "Start and Test System" on page 69 for initial testing procedures. This chapter contains information to help you determine possible causes and solutions for some of the problems you might encounter during testing or after the system is in operation.

Tools Needed

To perform troubleshooting on a LiteTouch system, you will need the following:

- Voltmeter
- Computer, typically a laptop (Standard CCU does not require a computer)
- Screwdrivers
- Appropriate diagnostics software, as follows:

5000LC	CP5000 utility
Compact CCU	utilities on the LiteTouch 2000 Programs menu
Standard CCU	resident utilities accessed via the CCU's front panel

Common Problems

Lightning Hit or Voltage Surge on System

Transient voltage surges and spikes can cause serious damage to unprotected electronic devices, including a LiteTouch control system. Transients can come from outside the home (lightning, grid switching, downed power lines, etc.) or inside the home (refrigerator, dryer, HVAC, etc.). Lightning and voltage surges can damage CCU ports or corrupt the firmware. Refer to "Transient Voltage Surge Suppression" on page 20 for information on protecting the system from voltage surges.

The 5000LC CCU monitor card contains some surge protection for the module bus. In addition, the 5000LC contains some surge protection in its internal power supply. If a 5000LC system is not working properly, especially after a lightning strike, the monitor card may have been damaged. Check the status indicators on the monitor card to see if the card and CCU are functioning properly (refer to "Monitor Card" on page 115).

NOTE ☞ Even though the 5000LC contains some surge protection, LiteTouch recommends that you install a Transient Voltage Surge Suppressor (TVSS). Refer to "Transient Voltage Surge Suppression" on page 20.

System Firmware

Periodic upgrades are made to the 5000LC cards' firmware. Contact LiteTouch or visit our Web site at www.litetouch.com to determine if upgrades are available.

Each card (CPU, C2000, Modem) has its own firmware. You must upload firmware to each card directly through its serial (RS-232) port. (Refer to "CPU Configuration" on page 78 for information.)

Closed Loop in a Keypad Run

Never connect both ends of a keypad homerun to the CCU keypad port. This causes the CCU to send information in both directions on the line, and the information is misinterpreted. For example, a keypad might interpret a button press as a button hold.

Incorrect Pigtail on Control Keypad

Older and newer model keypads use different style pigtails, and they are not interchangeable. Using the wrong pigtail will damage the keypad. Always use the pigtail that came with the keypad. The connector configurations on the two styles are opposite.

System Troubleshooting

LiteTouch systems are typically large and complex. To troubleshoot a problem in a large system, you need to isolate the problem area. There are three basic areas of a LiteTouch system in which a problem might occur:

- Switch to load programming (user programming)
- Keypad communications (CCU receives instructions for a switch action, and then based on the program, activates loads and updates LEDs)
- Control module communications (separate from keypad communications, the means by which the CCU activates loads)

Information to help with troubleshooting keypads, control modules, and the CCU is provided in the following sections.

CCU Diagnostics

To diagnose LiteTouch system problems, start by running the appropriate software diagnostic utility for your CCU, as follows:

- 5000LC
  CP5000 utility (see "Test 5000LC CCU System" on page 71)
- Standard CCU
  Resident utilities accessed via the CCU's front panel (see "Test Standard CCU System" on page 90
- Compact CCU
  LiteTouch 2000 Programs menu (see "Test Compact CCU System" on page 96)

Keypads

Problems at keypads may be caused by any of the following (in order of likelihood):

- Mistake in keypad programming
- Damage or loose connection in keypad homerun wiring
- Fault in keypad
- Fault in CCU keypad port

Refer to the following sections to isolate and identify problems with keypads.

Check Voltage

You should begin by checking voltage at the power supplies, keypad ports, and homeruns, as follows:

1. With a volt meter, check to see if you have between 15 VDC and 24 VDC at each power supply. If there is no reading, verify that the power supply is receiving power and that the external fuse is good.

NOTE: ☞ A LiteTouch power supply is unregulated, which means the voltage will vary depending on how heavy the draw on the power supply. Problems can occur if voltage drops below 15 VDC.

2. Check the input voltage (PS+ PS–) and then the output voltage (SW+ SW–) at each keypad port. The two readings should be the same.

3. Read the voltage on each of the keypad data lines ("DATA" on the 5000LC CCU, "D" on Standard and Compact CCUs). The data line should read .5 to 1 volt less than the SW line at each port.

   If the voltages are not correct, there is either a problem with the wiring between the keypad and the CCU or a problem with the keypad.

4. Check the voltage at the end of the keypad homerun to verify the degree of voltage drop on the line. You can expect some voltage drop, but if the voltage drops below 15 VDC you will need to boost the power on the line (see "Add Extra Power Supplies" on page 14 for information).

Test the Port

There are four individual keypad ports on the CCU. Begin by determining whether the problem is in the port or the keypad homerun(s) connected to the port.

1. If none of the keypads on the port are working (on one or more homeruns), disconnect the homerun(s) from the port.

2. Wire a working keypad directly to the port via the keypad's pigtail.

3. Press buttons on the keypad to see if the keypad works properly. On the 5000LC, the keypad port LEDs on the monitor card should flash with each button press.

   If the keypad does not appear to be working, the port may be defective, contact LiteTouch technical support for assistance. CCU ports are most commonly damaged by lightning or voltage surges.

NOTE ☞ You can also test a keypad port by disconnecting the homerun data line from the non-working port and connecting a homerun data line from a different port that you know functions properly.

If the keypad works when connected directly to the port, the problem is most likely in a keypad homerun or a keypad. If only one homerun was connected to the port, test the homerun as described in "Test the Homerun" below. If more than one homerun was connected to the port, identify which homeruns have a problem by connecting each homerun to the port separately. Then test each homerun that has a problem as described below.

Test the Homerun

If you determine that there is a problem in a homerun, it may be caused by a damaged wire (e.g., a nail driven through the cable), a loose connection (e.g., in the wire nut), or a defective keypad. If there may be problems with more than one homerun, disconnect all but one, and test them one at a time. To isolate the problem to fewer keypads, do the following:

1. Break the homerun in half and test each half as a first step in isolating the problem. You can break the run at any keypad box.

2. Break the section with the problem in half again. Test it, and break it in half again.

3. Continue until you have narrowed the problem to a few keypads.

4. Remove the keypads one at a time, and look for problems with the wire connections on each keypad.

5. If the problem appears to be a damaged wire, test the wires at the first keypad past the suspected area of damage. Check for voltage or continuity. If you locate a damaged wire, use the spare wire (white) to replace the damaged wire.

6. If you have determined that a keypad or keypads have a problem, follow the steps in "Test the Keypad" below to troubleshoot the problem.

Test the Keypad

If a keypad has power, the LED illuminates when you press one of its switches. If you press and hold a switch, the LED pulses four times if the data line is good and the keypad is communicating. If the keypad fails this test, there is either a bad wire or the keypad is defective.

1. Remove the suspected bad keypad and inspect the wires.

2. If you do not find a problem with the wires, replace the keypad with one that is known to function properly, and test again after replacement. Be sure to assign the address of the keypad you are replacing to the replacement keypad.

   If the new keypad works properly, the problem is with the replaced keypad. If the replacement also does not work, the problem is probably with the wiring or the programming.

3. To test a suspected bad keypad, remove the keypad from its electrical box and wire its pigtail directly to a port on the CCU. Press buttons on the keypad to test it. If it works, the problem is in the homerun wiring.

If the keypad does not work when connected to the port, the problem is either with the keypad or the programming.

4. On the 5000LC, open the CP5000 utility, select the Keypad tab, and enter the address of the keypad that is not functioning properly (see "Keypad" on page 85 for more information).

   You can also check the programming by opening the program file and selecting the keypad that is not functioning properly. Verify that the keypad address is correct and that the loads and functions were entered correctly. Refer to the programming manual for your CCU for more information (e.g., *LiteWare Design Manual* for the 5000LC).

5. If some switches on the keypad work and others do not, the non-functioning switches may be connected to modules or loads that have problems. Refer to the next section, "Control Modules" for information on locating control modules and loads that are not functioning properly.

Control Modules

If you suspect that one or more control modules are not operating or not communicating with the CCU, you need to search for the problem one data homerun at a time, and in each data homerun, one enclosure at a time. When a problem is identified in an enclosure, check for the problem at each control module. Problems in control modules may be caused by any of the following:

- Data wiring
- Input/output power at the control module
- Communications between a module and the CCU

The CCU communicates through the four control module ports as if they are one port. Even though a problem appears to be in one data homerun, there may be problems in other or all homeruns. Begin by disconnecting all but one homerun from the CCU and test the homeruns one at a time.

Inspect Data Wiring

The control modules in each enclosure are connected via data wiring to the transorb board, and the transorb board is connected to the CCU via a data homerun. Verify that all wiring is connected correctly, as follows:

1. Begin at the transorb board in the top-left corner of each enclosure. Verify that the first data cable is connected to the transorb board and to the DATA IN port on the first module.

2. Verify that the next data cable is connected to the DATA OUT port on the first module and to the DATA IN port on the second module, and so on, going from DATA OUT to DATA IN as you move sequentially through the modules.

3. Make certain that none of the cables are connected to the wrong port (e.g., from DATA OUT to DATA OUT).

4. Inspect the data cabling and make certain that all connectors are fully seated and that none of the wires or connectors have been damaged. If you suspect that a data cable may be damaged, replace it.

5. To test the modules, open the CP5000 utility (**Programs/LiteTouch/CP5000**). Select the Control Module tab and enter the module address that you want to test. Enter the level for each output, then click [**Send String**]. This returns the module's outputs, which are displayed in the data box. To turn on/off a load, select or deselect a box in the "Turn On" column.

NOTE ☞ Data wiring does not connect to power supplies, momentary contact data input modules, or maintained contact data input modules. All modules that must be included in the data wiring have DATA IN and DATA OUT ports.

Verify Module Input/Output Power

All modules except data input modules have a green power LED. Verify that the green power LED on each module is lit. This confirms that the module is receiving power. Then do the following to test output voltage on each module:

1. Locate the DIP switches on the low voltage side of each module. These are used to turn loads on and off manually. Change one of the switches to the "on" position. This should light a red LED and apply power to the associated output.

2. Use a voltage meter to check the output voltage.

3. If input power is indicated (green LED) but output power (red LED) is not, turn power off to the enclosure and check the module's external fuse. If the internal fuse is bad, the green LED will not light

NOTE ☞ On a dimmer module, if no loads are connected to the outputs and you manually turn on a load with a DIP switch, all loads receive power at 120 VAC. This is due to "triac leakage voltage," which occurs because the minimum wattage (three watts) per line feed has not been met.

Output Problems

If you are having problems with an output on a module, it is possible the output has short-circuited and burned the fuse. On dimmer modules without fuses, an output usually shorts in the "on" state. To verify this, check the LED on a switch that controls the output.

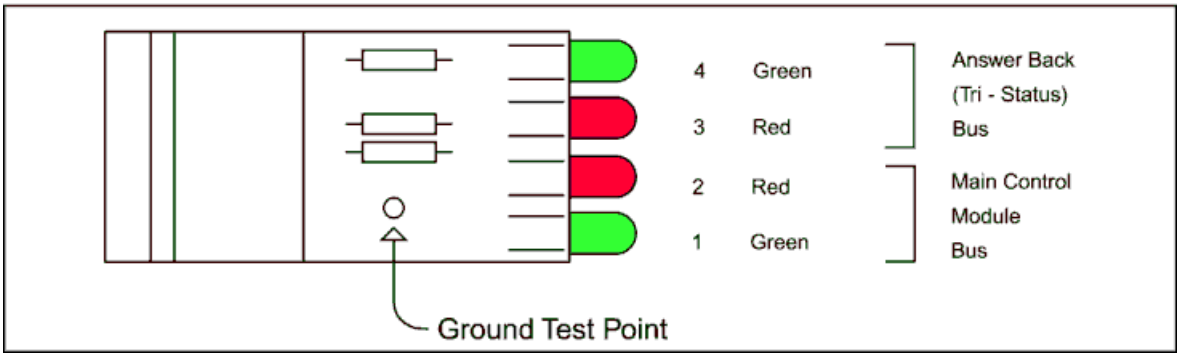
If the load does not turn on, check the programming for the load. If the programming is correct, the problem may be in the load itself. Try removing the load wire from the module and connecting it directly to line voltage.

Test Communications by Enclosure

A power bus monitor is included with each enclosure. Use the power bus monitor to locate control module communication problems by enclosure.

Connect the power bus monitor to the unused DATA OUT connector on the last control module in an enclosure. Leave the DATA IN cable connected.

Power Bus Monitor PC-2150



When you connect the power bus monitor, LED 1 (green) should be on and the other LEDs should be off.

If LED 1 (green) does not light, the problem is most likely in the enclosure. For information on finding the problem within the enclosure, see "Test Communications by Module" on page 111.

When the CCU transmits to a control module in the enclosure, LEDs 2, 3, and 4 (the top three) flash on.

When a control module transmits an answer back, LEDs 3 and 4 (the top two) flash on once per loop. Each transmission from the CCU should receive an answer from the module. Control modules only respond if they are called, with two exceptions:

- Power-up reset
- Power overload

If a red LED stays on, it indicates that there is no response from the loop.

NOTE ☞ On the Standard CCU, if you see transmissions on LEDs 3 and 4 without transmissions on LEDs 1 and 2, check to see if the CCU interface displays the first (or main) menu, as reset transmissions are only answered in the first menu.

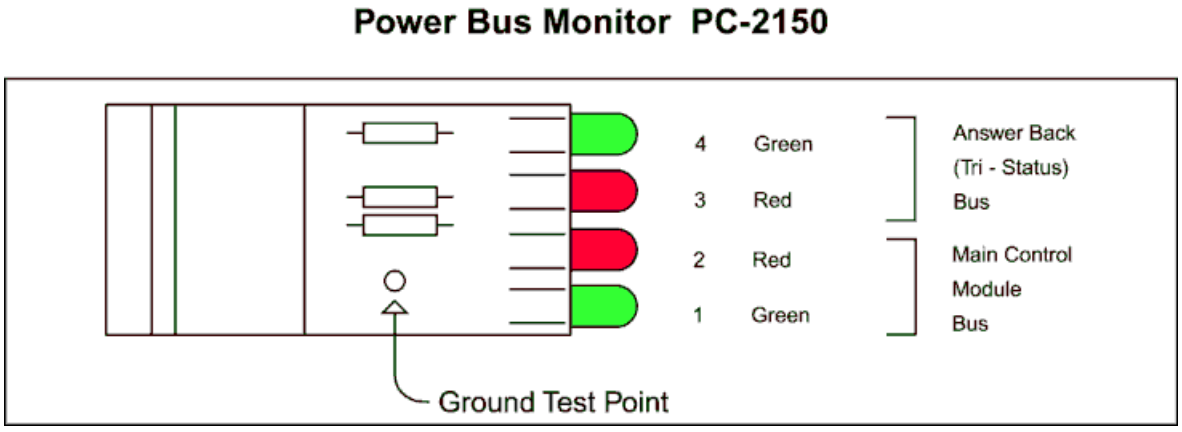
If the LEDs do not work as described above, the problem is most likely caused by one of the following:

- Problem in the data wiring between the CCU and the modules
- Bad module
- Problem with the power wiring (e.g., low voltage or 120 VAC where applicable)
- Bad transorb board
- Damaged module port

Test Communications by Module

If the power bus monitor did not work at the last control module in an enclosure (as described in the previous section), there may be a problem with one of the modules in the enclosure. Do the following to test module communications:

1. Start with the first module in the enclosure (at the top) and disconnect the data cable from the DATA OUT connector. Connect the power bus monitor to the DATA OUT connector.



LED 1 (green) on the power bus monitor should be on and the other LEDs should be off. If LED 1 is not lit, check to see if there is power to the CCU.

When the CCU transmits to a control module in the enclosure, LEDs 2, 3, and 4 (the top three) flash on.

When a control module transmits an answer back, LEDs 3 and 4 (the top two) flash on once per loop. Each transmission from the CCU should receive an answer from the module. Control modules only respond if they are called, with two exceptions:

- Power-up reset
- Power overload

NOTE ☞ On the Standard CCU, if you see transmissions on LEDs 3 and 4 without transmissions on LEDs 1 and 2, check to see that the CCU interface displays the first (or main) menu, as reset transmissions are only answered in the first menu.

If the LEDs do not work as described above, the problem is most likely caused by one of the following:

- Problem in the data wiring between the CCU and the module
- Bad module
- Problem with the power wiring (e.g., low voltage or 120 VAC where applicable).

2. If the first module performs correctly, disconnect the power bus monitor from the first module, and connect it to the DATA OUT port on the second module.

3. Identify the data cable that runs from the transorb board to the first module. Disconnect it from the DATA IN connector on the first module, and connect it to the DATA IN connector on the second module. This connects the second module directly to the CCU. Perform the power bus monitor test on the second module as described in step 1.

4. To test additional modules (past one and two), do one of the following:

   - To fully isolate each module during the test, you must either acquire (from LiteTouch) or make a longer data cable. Connect the power bus monitor to the third module's DATA OUT connection. Connect the longer data cable to the module's DATA IN connection and to the transorb board.

- If you do not have a longer cable, reconnect all tested modules to the transorb board, running the data cables from DATA OUT on the first to DATA IN on the second, and so on, until the third module is connected to the CCU. Connect the power bus monitor to DATA OUT on the third module and test it. Do the same to test a fourth module.

5. Test any additional enclosures on the homerun in the same manner, then disconnect it, connect the next homerun, and begin testing its enclosure(s).

Central Control Unit (CCU)

The CCU can be damaged or the software corrupted by voltage surges. Even though LiteTouch CCUs provide some surge protection, lightning and other severe voltage surges can potentially damage the CCU. In addition, voltage surges and shorts in keypad or control module homeruns can damage communication ports on the CCU.

Other CCU problems and solutions are described in the following sections.

CCU or System Lock-Up

If a CCU locks up, it stops communicating with keypads and control modules. If this happens, reset it using the method described in the following applicable section.

5000LC

If the status indicator on the CPU card is a solid figure "8," either the CPU card or the CCU is locked up.

- To reset the CPU card, press the **Reset** button located on the populated side of the CPU card in the top-right corner.
- To reset the CCU, turn the ON/OFF switch on the monitor card off, wait a few seconds, and then turn it back on.

Refer to "5000LC Status Indicators" on page 114 for information on other 5000LC status indicators.

Compact

Disconnect the keypad connectors from the two keypad ports on the CCU. This removes power to the CCU. Reconnect the two connectors to the CCU ports to power it back on.

Standard

Press the **OPTION** key on the front of the CCU. The Options menu is displayed. Press the **<5>** key to select **Diagnostics**. There are two reset options in the Diagnostics menu:

2-Reset CCU without clearing RAM
3-Clear RAM and reset CCU

For a full CCU reset, press **<3>**. To attempt a partial reset that retains the CCU's memory, press **<2>**.

Reset Full System

If brown-out conditions or other electrical fluctuations have caused the control modules to stop functioning properly, you may need to conduct a full system reset. Turn off all power to the system at the breaker box. The easiest method to reset the full system is to turn the residence's main breaker off, wait a few seconds, and then turn it back on. If this is not possible, turn all breakers associated with the system off and then back on one at a time.

Sluggish System

If the system responds sluggishly or malfunctions, it is most likely that there are definition errors in the user program or the program has become corrupted. In rare cases, a "rogue" keypad or module may slow down system operation.

If you suspect that the program has become corrupted, upload a new copy of the user program.

To conduct a definition check, press switches and determine if they perform the action for which they were programmed. If a switch does not perform the correct action, one of the following may be causing the problem:

- The switch has been programmed incorrectly.
- The specified load is not wired to the module output stated in the documentation.
- There is a communication problem on the keypad run.

You will need to do some research to solve this problem. If a switch assignment or module output is incorrect, you must accurately identify it and modify the user program.

5000LC Status Indicators

The status indicators on the 5000LC monitor card, CPU card, and C2000 card are described in the following sections.

Monitor Card

The monitor card on the 5000LC has LED status indicators to show communications to and from the control modules. The following table shows the status indicated by each LED when it is lit.

Tx1	CCU transmits to modules on port 1
Tx2	CCU transmits to modules on port 2
Tx3	CCU transmits to modules on port 3
Tx4	CCU transmits to modules on port 4
Rx1	CCU receives transmission from modules on port 1
Rx2	CCU receives transmission from modules on port 2
Rx3	CCU receives transmission from modules on port 3
Rx4	CCU receives transmission from modules on port 4
Keypad Port	When communications occur between the CCU and keypads, one or more of the keypad port status LEDs light to indicate which keypad port detected the communication.

The CCU memorizes which port a module is on and only sends communications through that port. After power is reset on the CCU, it sends communications on all ports until it determines which port each module is on. If necessary, reset the monitor card (by turning the ON/OFF switch off and back on) to test the indicators.

CPU Card

The CPU card on the 5000LC has a status indicator to show the current status of the CPU. The table below shows the meaning of each symbol that may appear on the status indicator.

Symbol	Indication
Snaking or rolling “8”	Card and CCU are working properly.
Solid “8”	Card or CCU is locked up. To reset the card, press the **Reset** button located on the populated side of the CPU card in the top-right corner. To reset the CCU, power the CCU off and back on.
Solid “E” (sideways “M”)	Modem failure
Solid “C”	Communication failure (C – F indicate some type of communication failure).
Flashing “U”	Upload failure, program upload was incomplete, upload the program again.

Symbol	Indication
Solid “A”	Astronomical system is being loaded (contact LiteTouch technical support).
Solid “F”	(FIFO) buffer is full. Reset the CCU to correct. This message could also indicate a problem with the program. Try uploading the program again.

C2000 Card

The C2000 card on the 5000LC has a status indicator to show the current status of the C2000 card. The table below shows the meaning of each symbol that may appear on the status indicator.

Symbol	Indication
Snaking or rolling “8”	Card is working properly.
Solid “8”	Card is locked up. To reset the card, press the **Reset** button located on the populated side of the C2000 card in the top-right corner.
Solid “C”	Communication failure (C – F all indicate some type of communication failure).
Solid “A”	Astronomical system is being loaded (contact LiteTouch technical support).
Solid “F”	(FIFO) buffer is full. Reset the CCU to correct. This message could also indicate a problem with the program. Try uploading the program again.

Repair of LiteTouch Equipment

If a LiteTouch technician has confirmed that you have a defective LiteTouch component (e.g., keypad, control module, or CCU), you can return it to LiteTouch for repair or replacement. You must obtain a return authorization number from LiteTouch Technical Support before returning any LiteTouch component.

If you have questions or need help troubleshooting a problem, call the LiteTouch Technical Hotline at 1.800.527.5527.

Technical Support

Before calling Technical Support, refer to the information in this manual and other applicable LiteTouch installation or operation manuals. Most information, including troubleshooting, can be found in the LiteTouch manuals.

If you have a question or a problem that you cannot resolve, contact LiteTouch Technical Support for assistance.

To save you time and avoid delays, please have all useful information available when you call. If you are calling about a component that may be defective, please have the component available when you call.

Other information that may be required includes:

- Catalog number and registration number
- Job name
- Firmware or software version

You can contact LiteTouch via any of the following:

Technical Support:
Phone: 1.800.527.5527
Email: support@litetouch.com

Office telephone: 1.801.486.8500

Fax: 1.801.486.8569

Address: 3400 South West Temple
Salt Lake City, Utah 84115

NOTES

LiteTouch Equipment A

This appendix contains descriptions, catalog numbers, and specifications for LiteTouch components.

Keypads For information on keypads, begin with "Keypads" below, and refer to the applicable section for each type of keypad thereafter.

Power Supply Modules For information on power supply modules, refer to "Power Supply Modules" on page 135.

Control Modules Information on control modules starts with "Inverse Phase Dimmer Module" on page 136. Refer to the applicable section for each type of control module thereafter.

Module Enclosures For information on module enclosures, refer to "Module Enclosures" on page 153.

CCU and Keypad Boxes For information on CCU and keypad boxes, refer to "CCU and Keypad Boxes" on page 154.

CCUs For information on CCUs, refer to "5000LC CCU" on page 156 and "Standard CCU" on page 157.

Remote Operating Equipment For information on remote operating equipment, refer to "Remote Modem" on page 159.

Keypads

Keypads are available with from one to nine switches in a single gang (E-series one to four switches). Multiple gang keypads are also available (from two to eight gangs). LiteTouch can custom punch multiple gangs to include A/V, security, HVAC controls, and so on. The switches have integrated LEDs for indicating load or scene status. Each keypad is equipped with a night light switch that can be turned on or off at the keypad. When activated, the homeowner is able to locate the keypad in a dark room.

When the loads are not in use, the LEDs glow with a 5% intensity. When pressed, the active LEDs are lit at 100% intensity.

Infrared handheld remotes are available for across-the-room wireless operation of keypads with infrared sensors. The infrared sensor is located in position number 9 on the S-series and H-series keypads. A remote IR sensor option is available for all three series of keypads.

Engineering Data

Supply voltage	16 - 20 VDC
Supply current	10 mA (no LEDs lit)
	100 mA (9 LEDs lit) nominal
	(One power supply module can power 20 9-button keypads or 35 5-button keypads)
Wiring to CCU	Three 16-gauge
Address combinations	256
Ambient operating temperatures	Minimum 32° F (0° C)
	Maximum 100° F (38° C)
Internal dimensions	3" H x 2" W x $1\frac{3}{8}$" D
External dimensions	$4\frac{5}{8}$" H x $2\frac{13}{16}$" W x $1\frac{1}{8}$" D
H-series buttons	$\frac{3}{16}$" H x $\frac{11}{16}$" W, protrudes $\frac{1}{16}$" from faceplate
S-series buttons	$\frac{7}{16}$" H x $\frac{7}{16}$" W, protrudes $\frac{1}{16}$" from faceplate (Note: the LED is located above the button on the faceplate)
E-series buttons	$\frac{23}{32}$" H x $\frac{23}{32}$" W, protrudes $\frac{1}{16}$" from faceplate (Note: the LED is located above the button on the faceplate)

INSTALLATION NOTE ☞ Use square-cornered, U.S. standard size backboxes to accommodate the inside dimensions of the keypads. Do not use plaster rings.

Programmable Switch Functions

Keypad switches can be programmed at the CCU to perform one of many possible functions. Available switch modes include the following:

Functions Supported by LiteTouch CCUs			
Dimming	Scene Toggle	Timed Flashing Interval	Conditional
On Master	Raise	Momentary On	Operation Sequential
Off Master	Lower	Dimming Master	Combination Locks

Functions Supported by LiteTouch CCUs (Continued)			
Toggle Master	Timed Interval	Open/Close	Switch Pointer
Motion Control			
Additional Functions Supported by 5000LC CCU Only			
Toggle	Scene Presets	Timed Toggle	

Specialty Keypads and Accessories

The Manual Override keypad is cosmetically similar to a standard, S-series, 6-button keypad but serves a different purpose. When a communication interruption disables the central control unit or keypads of a LiteTouch system, the Manual Override keypad allows the homeowner to turn on or off groups of lights and devices until normal operation is re-established.

A Manual Override keypad may be located up to 500 wire feet from its control module. Manual Override keypads are available in all keypad standard colors; however, the only button configuration available is the 6-button, S-series design.

Custom punch faceplates are available in the same colors and styles as standard keypads. Custom punches can match most conventional light switches, electrical outlets, telephone plugs, and cable connections.

The Slim-Line keypad facilitates a more subtle approach to lighting control. This 1½" wide keypad can incorporate up to five horizontal buttons (available with H-series buttons only). Its trim outline can be placed near door jambs, next to trim, or can even be inset into fixed furniture.

Engineering Data

Manual Override Keypad	
Supply voltage	16 - 20 VDC
Supply current	10 mA (no LEDs lit)
	70 mA (6 LEDs lit) nominal
	One power supply module has 2000 mA
Wiring	To supply module - two 16 gauge
	To CCU - two 24 gauge per switch

Manual Override Keypad (Continued)	
Ambient operating temperatures	Minimum 32° F (0° C)
	Maximum 100° F (38° C)
Framed and sculpted internal dimensions	3" H x 2" W x 1¾" D
Framed external dimensions	4⅝" H x 2 13⁄16" W x ⅛" D
Sculpted external dimensions	4⅝" H x 2 13⁄16" W x ⅛" D
Slim-Line Keypad	
Supply voltage	16 - 20 VDC
Supply current	60 mA (5 LEDs lit)
	One power supply module has 2000 mA
Wiring	Three 16 gauge
Address combinations	256 - 5000LC CCU
	256 - Standard and Compact CCUs
Ambient operating temperatures	Minimum 32° F (0° C)
	Maximum 100° F (38° C)
Internal (backbox) dimensions	4" H x 1" W x 3½" D
External dimensions	4⅜" H x 1⅜" W x 3⅛" D
Buttons	3⁄16" x 11⁄16", protrude 1⁄16" from faceplate
Custom Punched Faceplate	
Internal dimensions (framed and sculpted)	3" H x 2" W x 3¾" D
External dimensions	4⅝" H x 2 13⁄16" W x ⅛" D
Receptacle dimensions	4⅝" H x 2 13⁄16" W x ⅛" D

Metropolitan Series Keypad

The Metropolitan Series keypad is available in a wide variety of button configurations, engraving options, and faceplate finishes. The Metropolitan Series features include the following:

- The LED is in the center, top edge of the square button.
- The square button has soft corners and edges.

- The keypad is available with a unique back-lit option. The backlighting illuminates the engraving text for easier reading both day and night. The backlighting is also adjustable so it can be as bright or dim as desired. This keypad may require additional power supply resources.
- The address wheels are on the front of the keypad. This allows for easier keypad identification and on-the spot address changes.
- A backbox covers and protects the electronics from dust and damage that can occur during installation in the midst of construction.
- The optional IR (infrared) window is in the eighth button position. Using the LiteTouch IR Remote, you can program up to 450 buttons anywhere in the house from any IR window.
- A polymer capture plate allows for easy button configuration changes in the field.

Engineering Data

Supply voltage	16 - 20 VDC
Supply current	10 mA (no LEDs lit)
	Non-backlit keypad: 100 mA (9 LEDs lit) nominal
	Backlit keypad: 200 mA (18 LEDs lit) nominal
Wiring to CCU	Two 18-gauge and one 16-gauge (or three 16-gauge)
Address combinations	256
Ambient operating temperatures	Minimum 32° F (0° C)
	Maximum 100° F (38° C)
Keypad dimensions	3" H x 2" W x ¾" D
Button dimensions	7⁄16" H x 7⁄16" W, protrudes 1⁄16" from faceplate

NOTE ☞ The LED is inset in the top-center of the button.

INSTALLATION NOTE ☞ Use square-cornered, standard size backboxes to accommodate the inside dimensions of the keypads. Do not use plaster rings.

Programmable Switch Functions

Metropolitan Series keypad switches can be programmed at the CCU to perform any of the following functions.

All CCUs	All CCUs	All CCUs	5000LC ONLY
Toggle	Scene Presets	Timed Toggle	Conditional
Dimming	Scene Toggle	Timed Flashing Interval	Operation Sequential
On Master	Raise	Momentary On	Combination Locks
Off Master	Lower	Dimming Master	Sequence Pause
Toggle Master	Timed Interval	Open/Close	
Switch Pointer	Motion Control	Keypads	

Coastal Keypad

The Coastal keypad is available in a wide variety of button configurations, engraving options, and faceplate finishes. The Coastal features include the following:

- Up to 5 buttons in a single gang.
- Large, angled buttons for easy reading from any height.
- LED status indicators are available in green or blue.
- Available with a backlit button option. The Coastal keypad has unique backlighting that illuminates the engraving text (black or white buttons) for easier reading in both day and night hours. The traditional green or tranquil blue backlighting is adjustable so it can be as bright or dim as you want it to be.
- Custom engraved buttons with up to ten characters per button.
- Keypad identification and on-the-spot address changes can be made easily from address wheels located on the front of the keypad.
- Button caps require no tools to remove to make engraving changes.
- Back-box cover allows for the protection of electronic components from dust and damage that can occur during installation in the midst of construction.

NOTE ☞ Coastal keypads may require additional power supply resources due to the backlighting option.

Engineering Data

Supply voltage	16 - 20 VDC
Supply current	10 mA (no LEDs lit)
	Non-backlit keypad: 50 mA (5 LEDs lit) nominal
	Backlit keypad: 100 mA (5 LEDs lit) nominal
Wiring to CCU	Two 18-gauge and one 16-gauge (or three 16-gauge)
Address combinations	256
Ambient operating temperatures	Minimum 32° F (0° C)
	Maximum 100° F (38° C)
Keypad dimensions	$4\frac{11}{16}$" H x $2\frac{7}{8}$" W x $1\frac{5}{8}$" D
Button dimensions	$\frac{1}{4}$" W x 1" H, protrudes $\frac{1}{16}$" from faceplate

INSTALLATION NOTE ☞ Use square-cornered, standard size backboxes to accommodate the inside dimensions of the keypads. Do not use plaster rings.

Programmable Switch Functions

Coastal keypad switches can be programmed at the CCU to perform any of the following functions.

All CCUs	All CCUs	All CCUs	5000LC ONLY
Toggle	Scene Presets	Timed Toggle	Conditional
Dimming	Scene Toggle	Timed Flashing Interval	Operation Sequential
On Master	Raise	Momentary On	Combination Locks
Off Master	Lower	Dimming Master	Switch Pointer
Toggle Master	Timed Interval	Open/Close	Motion Control

Euro Keypad

The Euro keypad offers a small square look, widely used throughout Europe. The Euro keypad is available in a wide variety of button configurations, engraving options, and faceplate finishes. The Euro features include the following:

- Up to 6 buttons in a single gang.
- Small square buttons with soft rounded corners and edges.
- Embedded LED status indicators located in the center, top edge of the button.
- Custom engraved buttons with up to two lines of characters, eight characters per line.
- Keypad identification and on-the-spot address changes can be made easily from address wheels located on the front of the keypad.
- Optional IR window (located in the fifth button position) allows for use of a LiteTouch IR remote. With a LiteTouch IR remote and an IR window you can access the programming of other buttons located anywhere on the property.

NOTE ☞ Because Euro Keypads have a smaller footprint than standard U.S. J-Boxes, a LiteTouch Euro Installation Adapter is required. See Product Catalog for details.

Engineering Data

Supply voltage	16 - 20 VDC
Supply current	10 mA (no LEDs lit)
	Keypad: 50 mA (6 LEDs lit) nominal
Wiring to CCU	Two 18-gauge and one 16-gauge (or three 16-gauge)
Address combinations	256
Ambient operating temperatures	Minimum 32° F (0° C)
	Maximum 100° F (38° C)
Keypad dimensions	3" H x 3" W x 1⅛" D
Button dimensions	7⁄16" H x 7⁄16" W, protrudes 1⁄16" from faceplate

INSTALLATION NOTE ☞ To allow for the use of standard size U.S. J-boxes, use a LiteTouch Installation Adapter. (For double-gang keypad installation a three-gang J-box is required.)

Programmable Switch Functions

Euro keypad switches can be programmed at the CCU to perform any of the following functions.

All CCUs	All CCUs	All CCUs	5000LC ONLY
Toggle	Scene Presets	Timed Toggle	Conditional
Dimming	Scene Toggle	Timed Flashing Interval	Operation Sequential
On Master	Raise	Momentary On	Combination Locks
Off Master	Lower	Dimming Master	Switch Pointer
Toggle Master	Timed Interval	Open/Close	Motion Control

Scenario

The LiteTouch Scenario is a stand-alone, wall-mounted, scene preset system capable of controlling up to four independent dimming or switching loads. Each load can be controlled by any of the following methods:

1. It can be turned on, turned off, and dimmed with its own independent switch.

2. It may be brought to a preset level (including off) by pressing a local scene switch.

3. It may be brought to a preset level (including off) by pressing a scene switch on another Scenario.

4. It may be turned off by using the local master.

5. It may be turned off using the master off of another Scenario.

Each Scenario has four independent load control switches, four scene switches, a master off switch, and an infrared receiver. Up to two remote switch keypads may be connected to each Scenario without the need for additional power supplies. These keypads can be configured with four, five, or nine switches (available in H-series only). The 4-button configuration offers control of the Scenario's four scenes. The 5-switch keypad acts as a switch between the four scenes and as a master off. The 9-switch keypad mirrors the Scenario. Infrared remote capability is available on the 5- and 9-button remote switch keypads.

Up to sixteen Scenarios may be connected together using LiteTouch keypad wire forming an integrated system. In such a system, any scene switch or master off switch can control any or all loads on any or all Scenarios.

Special features and capabilities include user-programmable fade rates that can be independently set for each scene and the master off. The Scenario also provides manual override capability and integrated LEDs to indicate load and system status. Custom engraving is an option that LiteTouch recommends for easy switch identification.

Two different Scenario models are available: 120 volt and 240 volt. The 120 volt Scenario can control a total of 2400 watts derated to 1920 watts. Any single dimming channel can control up to 800 watts as long as the unit total of 2400 watts is not exceeded. A DC power supply is built into each Scenario. The 120 volt Scenario requires only one main 120 volt power connection from a 20 amp breaker.

The 240 volt Scenario can control a total of 4000 watts derated to 3520 watts. Any single dimming channel can control up to 1500 watts while operating below the 4000 watt unit total. The 240 volt Scenario requires only one main 240 volt power connection from a 20 amp breaker.

The built-in power supply is capable of powering the Scenario plus up to two remote 9-switch keypads. Power supplies may be added to power additional keypads. The Scenario must be connected to the Scenario control module interface and then to a LiteTouch control module for loads larger than 800 watts for a 120 volt or 1500 watts for a 240 volt Scenario (contact LiteTouch for details). Dimming is done using standard phase control methods. To assure system ruggedness, conservatively rated triacs are used on all four dimming outputs. The triac firing method is optimized for use with incandescent, low voltage magnetic transformers, cold cathode, neon, and motor loads. The Scenario can switch fluorescent loads.

Each Scenario may operate: (1) on its own and/or (2) as a system with a total of sixteen Scenarios tied together.

The Scenario mounts in a standard 4-gang metal wall box. Make sure that the installed box will accommodate the Scenario's internal-to-wall dimensions.

Engineering Data

120 V Scenario	
Operating power (required)	3 watts per Scenario, 2 watts per keypad
Supply Voltage	120 VAC (50/60 Hz)
Supply current	20 amps @ 120 VAC max.
Input wiring	2 wire w/ground 12 gauge
Output wiring	2 wire w/ground 12 gauge
Unit rating	20 amps (2400 watts derated to 1920 watts)
Output ratings	800 watts; not to exceed unit capability of 2400 watts
Number of outputs	4
Maximum module thermal dissipation	40 watts (135 BTU/hr)
Ambient operating temperatures	Minimum 32° F (0° C)
	Maximum 100° F (38° C) non-condensing
Efficiency	Greater than 98% at full rated load
Data bus	Proprietary
Internal fuse	250 mA/250 V
Dimensions (Mounts in a standard 4-gang backbox)	External to wall: 4 7/16" H x 8" W x 7/32" D
	Internal to wall: 2 3/4" H x 7 1/4" W x 1 3/4" D
Output ratings	Tungsten: 800 watts
	Resistive: 800 watts
Standard faceplate finishes	Primecoat, White, Ivory
Custom faceplate finishes	Satin gold, Satin stainless
Switch button covers	Ivory, White, Gray, Black, Brown
240 V Scenario	
Operating power (required)	3 watts per Scenario, 2 watts per keypad
Supply voltage	240 VAC (50/60 Hz)
Supply current	20 amps @ 240 VAC max.
Input wiring	2 wire w/ground 12 gauge
Output wiring	2 wire w/ground 12 gauge
Unit rating	20 amps (4000 watts derated to 3520 watts)
Output ratings	1500 watts; not to exceed unit capability of 3520 watts
Number of outputs	4
Maximum module thermal dissipation	40 watts (135 BTU/hr)
Ambient operating temperatures	Minimum 32° F (0° C)
	Maximum 100° F (38° C) non-condensing

240 V Scenario (Continued)	
Efficiency	Greater than 98% at full rated load
Data bus	Proprietary
Internal fuse	250 mA/250 V
Dimensions (Mounts in a standard 4-gang backbox)	External to wall: 4 7/16" H x 8" W x 7/32" D
	Internal to wall: 2 3/4" H x 7 1/4" W x 3 1/4" D
Output ratings	Tungsten: 1500 watts
	Resistive: 1500 watts
Standard faceplate finishes	Primecoat, White, Ivory
Custom faceplate finishes	Satin gold, Satin stainless
Button colors	Ivory, White, Gray, Black, Brown

LTZ Keypad

The LTZ keypad can be used as an extension of the data input keypad or module. Each button provides contact closure to one of the six terminals on the Data input keypad (or eight terminals on the data input module). Multiple keypads can be connected to one data input keypad, providing significant savings over the cost of normal keypads.

The LTZ keypad provides up to three momentary controls per keypad. The keypad consists of a sculpted faceplate with one to three square or horizontal buttons (no LEDs), a standard capture plate, and a PCB with one to three dual terminal blocks mounted on the back. Two terminals are provided for each switch. All inputs should be wired from the data input keypad's +V terminal and desired input terminal. The LTZ keypad can be used to control any device that allows a dry contact closure up to 12mA @ 24 VDC.

Engineering Data

Switch rating	12mA @ 24VDC
Wiring to data input keypad	18 - 24 gauge wires per switch
Ambient operating temperatures	Minimum 32° F (0° C)
	Maximum 100° F (38° C)
Sculpted internal dimensions	3" H x 2" W x 1/2" D

Sculpted external dimensions	4 5/8" H x 2 13/16" W x 1/8" D
H-series buttons	3/16" H x 11/16" W (protrudes 1/16" from faceplate)
S-series buttons	7/16" H x 7/16" W (protrudes 1/16" from faceplate)

Data Input Keypad

The data input keypad is a combination of a normal LiteTouch keypad and six data input terminals. It can be used for connecting motion sensors, garage door openers, door jam sensors, toggle switches, security systems, and other devices that require dry contact closure to complete a message circuit to the LiteTouch system.

The data input keypad takes two keypad addresses. The physical buttons on the keypad will respond as the selected address and the input functions will respond as the next higher address. Three of the data inputs are "momentary." This means that the switch press will be sent when the input is closed, and a release will be sent when the input is opened (e.g., door jam switches, select motion sensors, touch switches (press and hold dimmers) or anything that cannot produce a maintained "press and release"). The other three inputs are "maintained." A maintained input sends a press and release of a switch when the input is active or closed and a press and release of a different switch when the input is inactivated or opened (e.g., photo cells, security systems, pressure pads, weather sensors, temperature sensors, and toggle switches. Infrared is not available on the data input keypad.

The data input keypad has two positive voltage (+V) terminals and all inputs should be dry contact closures between the +V and the desired input. The wiring inputs have a limit of 500 feet from the actuator (motion sensor, etc.).

Engineering Data

Supply voltage	15 - 20 VDC
Supply current	10 mA (no LEDs lit)100 mA (9 LEDs lit) nominal (one power supply module has 2000 mA and can power 35 5-button keypads)
Wiring to CCU	Three 16-gauge conductors
Address combinations	256

Ambient operating temperatures	Minimum 32° F (0° C)
	Maximum 100° F (38° C)
Internal dimensions	3" H x 2" W x 1 3/8" D
External dimensions	4 5/8" H x 2 13/16" W x 1/8" D
H-series buttons	3/16" H x 11/16" W, protrudes 1/16" from faceplate
S-series buttons	7/16" H x 7/16" W, protrudes 1/16" from faceplate
E-series buttons	23/32" H x 23/32" W, protrudes 1/16" from faceplate

Master Control Keypad

The master control keypad allows the user to display a maximum of 32 S-, H-, or E-series keypads through a backlit LCD display. The keypads displayed on the master control keypad can be programmed to duplicate existing keypads throughout the home or they can be unique to the master control keypad. The master control keypad is ideal for master bedrooms or other rooms in which complete control of the entire home is desired.

The master control keypad is compatible with Standard, Compact, and 5000LC CCUs. Keypad selection and switch control is achieved by four E-series buttons. Keypads can be identified by name or location through the master menu, and any LiteTouch switch type can be activated from the master control keypad.

To program the master control keypad, first select keypads from an existing job's programming for use in the master control keypad. Then, upload the configuration data for these keypads to the master control keypad's memory via the RS-232 port. The Master Control Keypad Development Utility is required to upload software to the master control keypad.

One power supply will drive five master control keypads. One master control keypad equals seven keypads when calculating power supply requirements.

The master control keypad mounts in a backbox provided by LiteTouch.

Engineering Data

LCD display	340 x 240 pixels
Control buttons	4
Voltage input	16 to 20 VDC
Maximum current	300 mA
Power consumption	5 watts
Ambient operating temperatures	Minimum 32° F (0° C)
	Maximum 95° F (35° C)
Backbox dimensions	8.7" W x 3" D x 4" H (slightly larger than a 4-gang backbox)
Faceplate dimensions	9.65" W x .72" D x 4.93" H

SatiLite Wall-Box Dimmer

The SatiLite wall-box dimmer functions like a traditional wall-box dimmer but with added features. It becomes an extension of the LiteTouch System and can be controlled by other button presses on keypads. For example, a “Master On/Off” or “Vacation” button could be programmed to control a load connected to a SatiLite. It can control inductive, neon, cold cathode, low-voltage magnetic transformer, and incandescent loads. It cannot be used to control electronic transformer low voltage incandescent lighting.

The SatiLite three-way switch is for use with the SatiLite wall-box dimmer when additional points of control are required. It is used to replace the toggle switch in a three-way lighting installation and allow load control from a remote location.

The SatiLite wall-box dimmer and the three-way switch come in a 1-button configuration. The SatiLite wall-box dimmer also comes in a 2-button configuration. Both units are similar in style to the Metropolitan Series, which has rounded button corners plus an LED inset into the top of each button. On the SatiLite wall-box dimmer, the top button acts as a module and controls the load to which it is connected (local load control). The second button functions as a traditional LiteTouch button and can be preset as a scene or to control other loads in the house. The button on the SatiLite three-way switch controls the local load of the SatiLite to which it is connected.

The non-backlit keypad also has illuminated LEDs inset at the top of the button, but does not have the backlit engraving in the face of the button. The "night light" function, or the level of intensity at which the LEDs glow with no load activation, can be adjusted. This level is controlled by the same dial switch. The SatiLite three-way switch is not available in a backlit version.

A dam switch on the unit is used to mechanically turn the switch off when repairing fixtures or changing bulbs.

Engineering Data

Power supply ratings	Input: 120 V/60 Hz
Supply current	300 mA
	One power supply module has 2000 mA
Communication	Module bus: RS-485 communication medium, both lines transmit and receive
Output rating	750 watts
Wiring to CCU	Four 16-gauge
Ambient operating temperatures	Minimum 32° F (0° C)
	Maximum 95° F (35° C)

INSTALLATION NOTE ☞ Use square-cornered, U.S. standard size backboxes to accommodate the inside dimensions of the keypads. Do not use plaster rings.

Programmable Switch Functions

SatiLite wall-box dimmers can be programmed at the CCU to perform one of many possible functions. Available switch modes include the following:

All CCUs	All CCUs	All CCUs	5000LC ONLY
Toggle	Scene Presets	Timed Toggle	User Programmable
Dimming	Scene Toggle	Timed Flashing Interval	Start up
On Master	Raise	Momentary On	Combination Locks
Off Master	Lower	Dimming Master	Switch Pointer
Toggle Master	Timed Interval	Open/Close	Motion Control

The SatiLite wall-box dimmer also has a three-way switch that is used to replace the toggle switch in a three-way lighting installation and allow control on a SatiLite wall-box dimmer from a remote location. Contact LiteTouch for more information.

Power Supply Modules

Power supply modules provide DC power to DC motor control modules, low voltage relay modules, data input modules, keypads, data input keypads, and Standard and Compact CCUs. Power supplies come in single or dual. Both types fit in a module can that mounts in module enclosures. Every system requires at least one power supply.

A power supply can power five (5) DC motor control or low voltage relay modules. If more than one power supply is required at the CCU, they may be homerun and connected in parallel at the CCU without regard to the AC input phase. Do not parallel more than two power supplies into any single port on the back of a CCU. Power supplies are wired to the CCU using 2-conductor, 16-gauge wire.

A single power supply occupies one-half of a LiteTouch module can. It may be combined in the same can with other modules that only take up one-half of a module can (i.e., momentary contact data input, maintained contact data input, and low voltage relay modules).

LiteTouch components requiring power supplies	Requirements
Keypad (average 9 LEDs per keypad)	100 mA
Metropolitan Series keypad (average 9 LEDs per keypad)	100 mA (non-backlit)
	200 mA (backlit)
Data input keypad	150 mA
Master control keypad	300 mA
Momentary contact data input module	100 mA
Maintained contact data input module	100 mA
Low voltage relay module	330 mA
DC motor control module	350 mA
Compact and Standard CCUs	200 mA

Engineering Data

All information is for a single power supply; double the ratings for a dual power supply.

Voltage output	20 VDC (unregulated) at capacity
Output current capacity	2000 mA
AC line voltage	115 VAC + 10% @ 30 watts

External fuse	5 A/250 V
Ambient operating temperatures	Minimum 32° F (0° C)
	Maximum 95° F (35° C)
Efficiency	Over 98% at full rated load
Dimensions	One-half of a standard LiteTouch module (10¼" W x 7⅝" H x 3" D)

Inverse Phase Dimmer Module

The inverse phase dimmer module is designed specifically for solid state electronic-transformer low-voltage lighting applications where triac dimmers would result in excessive filament noise and shortened electronic transformer life. Phase control dimming is accomplished using power MOSFETs instead of triacs, which results in smoother switching since they turn on at zero-crossing, allowing the load current to rise slowly at the normal 60 Hz range. Triac dimmers switch mid-halfcycle, generating steep waveforms.

The inverse phase dimmer module is rated at 20 amps or 2400 watts (derated to 1920) but with a single load capacity of 4 amps (480 watts). This requires a more balanced load distribution.

NOTE ☞ The inverse phase dimmer is not suitable for inductive loads such as a conventional 60 Hz magnetic core transformer or motor.

Engineering Data

120 V Inverse Phase Dimmer Module	
Supply voltage	120 VAC (50/60 Hz)
Operating power (no load)	120 VAC 7 watts (no load)
Internal fuse	250 mA/250V
Module rating	20 amps
Output rating	480 watts
Number of outputs	6
Contact	Form A
Maximum module thermal dissipation	41 watts (138 BTU/hour)

120 V Inverse Phase Dimmer Module (Continued)	
Ambient operating temperatures	Minimum 32° F (0° C)
	Maximum 95° F (35° C)
Efficiency	Over 98% at full rated load
Dimensions	Standard LiteTouch module size
	10¼" W x 7⅝" H x 3" D
240 V Inverse Phase Dimmer Module	
Supply voltage	240 VAC (50/60 Hz)
Operating power (no load)	240 VAC 7 watts (no load)
Internal fuse	500 mA/250V
Module rating	20 amps
Output rating	960 watts
Number of outputs	6
Contact	Form A
Maximum module thermal dissipation	41 watts (138 BTU/hour)
Ambient operating temperatures	Minimum 32° F (0° C)
	Maximum 95° F (35° C)
Efficiency	Over 98% at full rated load
Dimensions	Standard LiteTouch module size
	10¼" W x 7⅝" H x 3" D

Momentary and Maintained Contact Data Input Modules

The momentary contact data input module and maintained contact data input module allow external signals to control LiteTouch loads. Typical signal sources include RF remotes, security systems, photo cells, and motion sensors. Both modules have 8 (6 to 32 volt) DC inputs available. Both modules connect to a keypad line from the CCU for power and communication. Internal voltage regulation is provided. Both modules require only one-half of a module can space.

Engineering Data

Momentary Contact Data Input Module	
Operating power:	
Non-backlit keypads:	16 - 20 VDC (keypad line)
	@ 10 mA nominal (no LEDs lit)
	@ 100 mA nominal (all LEDs lit)
Backlit keypads:	16 - 20 VDC (keypad line)
	@ 10 mA nominal (no LEDs lit)
	@ 200 mA nominal (all LEDs lit)
Supply voltage	16 - 20 VDC
Number of inputs	8
Voltage out	15 VDC for relay contact interfacing
Input	6 to 32 VDC
Analog input drive requirements	5 VDC/0.2 mA
	12 VDC/3 mA
	24 VDC/9 mA
Ambient operating temperatures	Minimum 32° F (0° C)
	Maximum 95° F (35° C)
Dimensions	Half the space of a standard LiteTouch module
	10¼" W x 7⅝" H x 3" D

Maintained Contact Data Input Module	
Operating power:	
Non-backlit keypads:	16 - 20 VDC (keypad line)
	@ 10 mA nominal (no LEDs lit)
	@ 100 mA nominal (all LEDs lit)
Backlit keypads:	16 - 20 VDC (keypad line)
	@ 10 mA nominal (no LEDs lit)
	@ 200 mA nominal (all LEDs lit)
Supply voltage	16 - 20 VDC
Number of inputs	8
Voltage out	15 VDC for relay contact interfacing
Input	6 to 32 VDC

Maintained Contact Data Input Module (Continued)	
Analog input drive requirements	5 VDC/0.2 mA
	12 VDC/3 mA
	24 VDC/9 mA
Ambient operating temperatures	Minimum 32° F (0° C)
	Maximum 95° F (35° C)
Dimensions	Half the space of a standard LiteTouch module
	10¼" W x 7⅝" H x 3" D

8-Channel Relay Module

The 8-channel relay module is designed for dry contact power switching of fluorescent, low voltage incandescent, outlets, motors, and other undimmed loads. The module is rated at 96 amps (11,520 watts at 120 VAC and 23,040 watts at 240 VAC). Each output is rated at 12 amps (1440 watts at 120 VAC, and 2880 watts at 240 VAC). For maximum relay life, incandescent loads and low voltage loads switched on the primary side of the transformer should be limited to 8.3 amps (1000 watts). Motor loads should not exceed ½ hp at 120 VAC and 1 hp at 240 VAC. Fluorescent ballast and general purpose loads are limited only by the output's full capacity. If a load exceeds these limitations, an auxiliary relay may be used. Each output has an individual manual override switch. To minimize the wiring to the module, the internal power supply is fed from the LINE 1 and NEUTRAL 1 connections of the terminal block. Therefore, OUTPUT 1 is reserved for a load requiring line voltage.

Each output of the module can be supplied AC power by a separate feed or can be jumped together to permit loads to share a feed and allow full use of the circuit. The module features a four position interlock switch. This allows the module to operate with eight independent relays, four pairs of interlocked relays, or a combination of these two relay types. A pair of relays are interlocked together by placing their corresponding interlock switch to the “on” position and jumping the line-side of the relays together. This configuration is specifically designed for two-way motion control applications such as drapery, skylights, projection screens, and other applications where opposite direction signals should not be active simultaneously. When activated by an “Open” or “Close” switch, this module provides the ability not only to open or close (raise or lower) a device but also to stop the motion at any desired location.

Engineering Data

120 V 8-Channel Relay Module	
Supply voltage	120 VAC (50/60 Hz)
Operating power (no load)	120 VAC 6 watts
Field serviceable fuse	250 mA/250V
Module rating	96 A/250 VAC maximum
Output rating	General purpose: 12 A/250 VAC maximum
	Motor: ½ hp at 120 VAC
Number of outputs	8 independent or 4 interlocked
Contact	Form A
Maximum module thermal dissipation	7 watts (24 BTU/hour)
Ambient operating temperatures	Minimum 32° F (0° C)
	Maximum 95° F (35° C)
Efficiency	Over 99% at full rated load
Dimensions	11" W x 7⅝" H x 3" D
240 V 8-Channel Relay Module	
Supply voltage	240 VAC (60 Hz)
Operating power (no load)	240 VAC 6 watts
Field serviceable fuse	250 mA/250 V
Module rating	96 A/250 VAC maximum
Output rating	General purpose: 12 A/250 VAC maximum
	Motor: 1 hp at 240 VAC
Number of outputs	8 independent or 4 interlocked
Contact	Form A
Maximum module thermal dissipation	7 watts (24 BTU/hour)
Ambient operating temperatures	Minimum 32° F (0° C)
	Maximum 95° F (35° C)
Efficiency	Over 99% at full rated load
Dimensions	11" W x 7⅝" H x 3" D

Low Voltage Relay Module

The low voltage relay module is an 8-channel control module with dry contact relays for low voltage switching. Each channel of the low voltage relay module is an independent, single pole, single throw contact. The low voltage relay module is intended for switching low voltage controls such as HVAC, audio/video, alarms, and some window treatment controls. For maximum relay life, loads should be limited to 2 amps at 24 VDC.

The 8-channel low voltage relay module is powered from a power supply module. Each low voltage relay module uses 330 mA of a power supply module's current capacity. Relay outputs are on the low voltage side of the module and are intended for switching of low voltage only. This module requires one-half of a module can space.

Engineering Data

Operating power required	16 - 20 VDC @ 330 mA
Supply voltage	60 - 20 VDC
Output rating	2A @ 24 VDC
Number of outputs	8
Contact	Form A
Maximum module thermal dissipation	6 watts (20 BTU/hour)
Ambient operating temperatures	Minimum 32° F (0° C)
	Maximum 95° F (35° C)
Dimensions	One-half of a standard LiteTouch Module can ($10\frac{1}{4}$" W x $7\frac{5}{8}$" H x 3" D)

DC Motor Control Relay Module

The DC motor control relay module is designed to operate two-way motion control devices such as skylights, drapery, and so on. The module controls both the on/off and polarity reversal required for two-way control of DC motors. The DC motor control relay module contains six channels with three independently operated dry contact outputs. Each of the three channels provides connections for the positive and negative to a non-switched DC source and connections for the two motor wires.

Engineering Data

Supply voltage	16 - 20 VDC
Operating current	350 mA maximum
Operating power	7 watts maximum
Internal fuse	1 A/250 V
Output rating	General purpose: 5 A @ 30 VAC or 30 VDC
	Motor: 1/6 hp @ 24 VDC
	2A @ 24 VAC
Number of outputs	3
Contact	Form A and Dual Form C (dedicated to DC motor control)
Ambient operating temperatures	Minimum 32° F (0° C)
	Maximum 95° F (35° C)
Efficiency	Over 99% at full rated load
Dimensions	Standard LiteTouch module
	10 1/4" W x 7 5/8" H x 3" D

Fan Speed Control Module

The LiteTouch fan speed control module is designed for multiple speed ceiling fan loads. The module is capable of providing three specific speeds, high, medium, and low, using circuit tuning and capacitive circuitry for each output.

The module is rated for 8 amps at 120 VAC. Each output is rated for up to 2 amps, and has a manual override switch. Each output is also protected from short circuits by a field-serviceable 2 amp fuse. Note that although most multiple-speed fans do not require 2 amps of current to operate at any speed, it is not advisable to place more than one fan on any one output.

NOTE ☞ Due to the way multiple fans react to each other, combining multiple fans in a single output could cause damage to the fans, the module, or both. This module is for use with ceiling fans rated at 2 amps or less. This module is not for use with shaded-pole or non-reversible motors. Medium and low speeds may vary slightly from the ceiling fan's factory set speed due to motor variations.

Engineering Data

Operating power (no load)	120 VAC, 6 watts
Supply voltage	120 VAC (60 Hz)
Field Serviceable fuses	2 A/250 V
	250mA/250 V
Module rating	8 amps
Output rating	2 amps (1/4 hp)
Number of outputs	4
Ambient operating temperatures	Minimum 32° F (0° C)
	Maximum 95° F (35° C)
Efficiency	Over 99% at full rated load
Dimensions	Standard LiteTouch module
	10 3/4" W x 7 5/8" H x 3" D

Quad Dimmer Module

The quad dimmer module provides two 20-amp dimmers in a standard size module. Each of the four outputs has a separate RFI filter based on the toroidal inductor for low noise operation. This module has a single set of rotary dial switches that are used to designate the address of the module. The total module is rated at 4800 watts with a maximum capacity of any single output of 1800 watts. Note that this dimmer is not recommended for dimming solid state electronic transformer low voltage (unless the transformer is so rated) or fluorescent loads. An air gap relay is connected to each main feed line of the module.

NOTE ☞ When using three-phase power, both dimmers must be connected to the same phase. If 550 MS rise times are required, 10 amp, 15 amp, or 20 amp peripheral chokes may be purchased. Special instructions are required for use with GFI breakers. Contact LiteTouch for more information.

Engineering Data

Operating power required	120 VAC, 3 watts
Supply voltage	120 VAC (60 Hz)
Internal fuse	250 mA/250 V

Module rating	40 amps (4800 watts)
Output rating	1800 watts
Number of outputs	4
Maximum module thermal dissipation	40 watts (135 BTU/hour)
Ambient operating temperatures	Minimum 32° F (0° C)
	Maximum 95° F (35° C)
Efficiency	Over 99% at full rated load
Dimensions	Standard LiteTouch module
	10¼" W x 7⅝" H x 3" D

Dual 20-Amp Dimmer Module

The dual 20-amp dimmer module provides two 20 amp dimmers in a standard size module. Each of the two outputs has a separate RFI filter based on the toroidal inductor for low noise operation. This module has a set of two rotary dial switches that are used to designate the address of the module with each 20 amp dimmer being designated as a different output. The total module is rated at 4800 watts with a maximum capacity of 2400 watts (derated to 1920 watts) on a single output. Note that this dimmer is not recommended for dimming solid state electronic transformer low voltage (unless the transformer is so rated) or fluorescent loads. If only one output is being used, the load must be connected to output number 1.

NOTE ☞ When using three-phase power, both outputs of the dual 20-amp dimmer module must be connected to the same phase. Auxiliary chokes are available for commercial grade rise times. Special instructions are required for use with GFI breakers. Contact LiteTouch for more information.

Engineering Data

Operating power required	120 VAC, 3 watts
Supply voltage	120 VAC (60 Hz)
Internal fuse	250 mA/250 V
Module rating	40 amps (4800 watts)
Output rating	20 amps (2400 watts derated to 1920 watts)
Number of outputs	2
Maximum module thermal dissipation	40 watts (135 BTU/hour)

Ambient operating temperatures	Minimum 32° F (0° C)
	Maximum 95° F (35° C)
Efficiency	Over 99% at full rated load
Dimensions	Standard LiteTouch module
	10¼" W x 7⅝" H x 3" D

Fluorescent Dimmer Module

The fluorescent dimmer module is designed specifically for fluorescent loads fitted with magnetic dimming ballasts. With four independent outputs (one dimming and one constant per output), the fluorescent dimmer module is capable of powering 2400 total watts (with a maximum derated capacity of 1920 watts) at 120 VAC, 4800 total watts (with a maximum derated capacity of 3840 watts) at 240 VAC, and 5540 watts (with a derated capacity of 4432 watts) at 277 VAC, of fluorescent loads. The dimming is performed by conservatively rated triac devices using phase control technology. Each of the four channels has a separate RFI filter based on a toroidal inductor for low noise operation. The total module is rated to 20 amps, which may be divided among the channels in any proportions desired but with a maximum of 15 amps on a single channel. Each output has an individual manual override switch and is protected from short circuits by a field-serviceable, 15 amp, slow-blow fuse.

The fluorescent dimmer module is designed to handle 10 or more ballasts. If fewer than 10 ballasts are connected to the module, a 25 watt, 1500 ohm load resistor may be necessary for proper dimming of the ballasts. Refer to the drawing on page 169 for proper placement of the resistor.

Engineering Data

120 V Fluorescent Dimmer Module	
Operating power (no load)	120 VAC, 3 watts
Supply voltage	120 VAC (50/60 Hz)
Field serviceable fuse	250 mA/250 V
Module rating	20 amps (2400 watts derated to 1920 watts)
Output rating	15 amps (1800 watts)
Number of outputs	4 (each with accompanying filament channel)
Maximum module thermal dissipation	25 watts (84 BTU/hour)

120 V Fluorescent Dimmer Module (Continued)	
Ambient operating temperatures	Minimum 32° F (0° C)
	Maximum 95° F (35° C)
Efficiency	Over 98% at full rated load
Dimensions	Standard LiteTouch module
	10¼" W x 7⅝" H x 3" D
240 V Fluorescent Dimmer Module	
Operating power (no load)	240 VAC, 3 watts
Supply voltage	240 VAC (50/60 Hz)
Field serviceable fuse	250 mA/250 V
Module rating	20 amps (4800 watts derated to 3840 watts)
Output rating	15 amps (3600 watts)
Number of outputs	4 (each with accompanying filament)
Maximum module thermal dissipation	40 watts (135 BTU/hour)
Ambient operating temperatures	Minimum 32° F (0° C)
	Maximum 95° F (35° C)
Efficiency	Over 98% at full rated load
Dimensions	Standard LiteTouch module
	10¼" W x 7⅝" H x 3" D
277 V Fluorescent Dimmer Module	
Operating power (no load)	277 VAC, 3 watts
Supply Voltage	277 VAC (50/60 Hz)
Field serviceable fuse	250 mA/500 V
Module rating	20 amps (5540 watts derated to 4432 watts)
Output rating	15 amps (4155 watts)
Number of outputs	4 (each with accompanying filament)
Maximum module thermal dissipation	40 watts (135 BTU/hour)
Ambient operating temperatures	Minimum 32° F (0° C)
	Maximum 95° F (35° C)
Efficiency	Over 98% at full rated load
Dimensions	Standard LiteTouch module
	10¼" W x 7⅝" H x 3" D

8-Channel Dimmer Module

The 8-channel dimmer module is designed for dimming incandescent, neon, cold cathode, and magnetic transformer low voltage loads. The dimming is performed by conservatively rated triac devices using phase control technology. Each of the eight outputs has a separate RFI filter based on a toroidal inductor for low noise operation.

This module is rated at 20 amps or 2400 watts (derated to 1920 watts) at 120 VAC, 4400 watts (derated to 3520 watts) at 240 VAC, and 5540 watts (derated to 4432 watts) at 277 VAC. The total amps may be divided among the eight outputs in any proportion as long as no single output exceeds 15 amps (1800 watts at 120 VAC, 3300 watts at 240 VAC, or 4155 watts at 277 VAC). Each output has a manual override switch and is protected from short circuits by a field-serviceable, 15 amp, slow-blow fuse.

NOTE ☞ This dimmer is not recommended for dimming solid state electronic transformer low-voltage loads unless the transformer is so rated. An air gap relay is connected to the main feed line of the module. The relay will be open (off) when all loads on the module are off and will be closed (on) when one or more loads on the module are on. This feature eliminates any voltage potential going to the loads when all loads on the module are off.

Engineering Data

120 V 8-Channel Dimmer Module	
Operating power (no load)	120 VAC, 3 watts
Supply voltage	120 VAC (50/60 Hz)
Field serviceable fuse	250 mA/250 V
Module rating	20 amps (2400 watts derated to 1920 watts)
Output rating	15 amps (1800 watts)
Number of outputs	8
Maximum module thermal dissipation	25 watts (84 BTU/hour)
Ambient operating temperatures	Minimum 32° F (0° C)
	Maximum 95° F (35° C)
Efficiency	Over 99% at full rated load
Dimensions	Standard LiteTouch Module
	10¼" W x 7⅝" H x 3" D

240 V 8-Channel Dimmer Module	
Operating power (no load)	240 VAC, 3 watts
Supply voltage	240 VAC (50/60 Hz)
Field serviceable fuse	250 mA/250 V
Module rating	20 amps (4800 watts derated to 3840 watts)
Output rating	15 amps (3600 watts)
Number of outputs	8
Maximum module thermal dissipation	40 watts (135 BTU/hour)
Ambient operating temperatures	Minimum 32° F (0° C)
	Maximum 95° F (35° C)
Efficiency	Over 99% at full rated load
Dimensions	Standard LiteTouch module
	10¼" W x 7⅝" H x 3" D
277 V 8 Channel Dimmer Module	
Operating power (no load)	277 VAC, 3 watts
Supply voltage	277 VAC (50/60 Hz)
Field serviceable fuse	250 mA/500 V
Module rating	20 amps (5540 watts derated to 4432 watts)
Output rating	15 amps (4155 watts)
Number of outputs	8
Maximum module thermal dissipation	40 watts (135 BTU/hour)
Ambient operating temperatures	Minimum 32° F (0° C)
	Maximum 95° F (35° C)
Efficiency	Over 98% at full rated load
Dimensions	Standard LiteTouch module
	10¼" W x 7⅝" H x 3" D

High Power Relay Module

The high power relay module is designed for larger switch loads. Available in 120V, 240V, and 277V versions, the high power relay accepts line feeds from up to eight individual breakers. The inputs may also be looped together where the loads do not exceed the power ratings on the module. It has manual override DIP switches, allowing the user to control loads with-

out using the standard keypads or CCU. The loads may also be controlled from manual override keypads using standard toggle switches mounted in a remote location.

Like the 8-channel relay, the high power relay module is designed for dry contact power switching of cold cathode, neon, fluorescent, low voltage magnetic transformer, incandescent, outlets, motors, and other non-dimmed loads. The control circuit is protected from short circuits via an external accessible fuse mounted to the circuit board.The replacement fuse should be rated at 250mA/500VAC and be fast acting. Over-current protection is provided via the breakers at the breaker panel feeding each input. Each output is rated for 20 amps (2400 watts at 120 VAC, 4800 watts at 240 VAC, and 5540 watts at 277 VAC). Each module input is supplied from a 20 amp, 120/240/277 volt breaker. Consecutive outputs cannot exceed 30 amps. Each load must be derated.

The high power relay module operates with eight independent relays or four pairs of interlocked relays. A combination of interlocked and independent relays can also be used. Interlock relays are mutually exclusive on states for the following paired outputs:

1-2 paired
3-4 paired
5-6 paired
7-8 paired

Engineering Data

120 V High Power Relay Module	
Supply voltage	120 VAC (50/60 Hz)
Operating power (no load)	120 VAC 6 watts
Field serviceable fuse	250 mA/250 VAC
Module rating	120 amps total
Output rating	General purpose: 20 amps
	Motor: ½ hp
Number of outputs	8 independent or 4 interlocked
	Total of all outputs not to exceed 160 x 20 watts
Contact	Form A
Maximum module thermal dissipation	7 watts (24 BTU/hour)
Ambient operating temperatures	Minimum 32° F (0° C)
	Maximum 95° F (35° C)

120 V High Power Relay Module (Continued)	
Efficiency	Over 98% at full rated load
Dimensions	11" W x 7⅝" H x 3" D
240 V High Power Relay Module	
Supply voltage	240 VAC (50/60 Hz)
Operating power (no load)	240 VAC 6 watts
Field serviceable fuse	250 mA/250 VAC
Module rating	120 amps total
Output rating	General purpose: 20 amps
	Motor: 1 hp
Number of outputs	8 independent or 4 interlocked
	Total of all outputs not to exceed 160 x 240 watts
Contact	Form A
Maximum module thermal dissipation	7 watts (24 BTU/hour)
Ambient operating temperatures	Minimum 32° F (0° C)
	Maximum 95° F (35° C)
Efficiency	Over 98% at full rated load
Dimensions	11" W x 7⅝" H x 3" D
277 V High Power Relay Module	
Supply voltage	277 VAC (50/60 Hz)
Operating power (no load)	277 VAC 6 watts
Field serviceable fuse	250 mA/500 VAC
Module rating	120 amps total
Output rating	General purpose: 20 amps
	Motor: 2 hp
Number of Outputs	8 independent or 4 interlocked
	Total of all outputs not to exceed 160 x 277 watts
Contact	Form A
Maximum module thermal dissipation	7 watts (24 BTU/hour)
Ambient operating temperatures	Minimum 32° F (0° C)
	Maximum 95° F (35° C)
Efficiency	Over 98% at full rated load
Dimensions	11" W x 7⅝" H x 3" D

Electronic Ballast Dimmer Module (0-10 VDC)

The electronic ballast dimmer module (0-10 VDC) is a six-channel controller providing a 0 to 10 VDC output directly proportional to the selected lighting level. It also provides six dry contact relays for power switching. These dry contacts are closed whenever the corresponding analog output is above 0 VDC. The module is designed to interface to electronic fluorescent ballasts that require an analog input along with switched 120 VAC. Each analog output of the electronic ballast dimmer module (0-10 VDC) can typically drive eight ballasts. For maximum module life, ballasted loads should be limited to 15 amps at 250 VAC.

Engineering Data

120 V Electronic Ballast Dimmer (0 - 10 VDC)	
Operating power	14 - 20 VDC @ 350 mA (no load)
Supply Voltage	120 VAC
External fuse	250 mA/250 V
Number of outputs	6
Analog output rating	D/A resolution 250 steps
Analog output drive	0 - 10 volts proportional
Analog output drive rating per channel	4.5 mA (typically 8 ballasts)
Relay output contact ratings	Tungsten: 8A @ 250 VAC
	Inductive: 15A @ 250 VAC
	Resistive: 15A @ 24 VDC
Maximum module thermal dissipation	0 watts (34 BTU/hr)
Ambient operating temperatures	Minimum 32° F (0° C)
	Maximum 95° F (35° C)
Efficiency	Over 98% at full rated load
Dimensions	Standard LiteTouch module
	10¼" W x 7⅝" H x 3" D
240 V Electronic Ballast Dimmer (0 - 10 VDC)	
Operating power	14 - 20 VDC @ 350 mA (no load)
Supply voltage	240 VAC
External fuse	250 mA/250 V
Number of outputs	6

240 V Electronic Ballast Dimmer (0 - 10 VDC) (Continued)	
Analog output rating	D/A resolution 250 steps
Analog output drive	0 - 10 volts proportional
Analog output drive rating per channel	4.5 mA (typically 8 ballasts)
Relay output contact ratings	Tungsten: 8A @ 250 VAC
	Inductive: 15A @ 250 VAC
	Resistive: 15A @ 24 VDC
Maximum module thermal dissipation	10 watts (34 BTU/hr)
Ambient operating temperatures	Minimum 32° F (0° C)
	Maximum 95° F (35° C)
Efficiency	Over 98% at full rated load
Dimensions	Standard LiteTouch module
	10¼" W x 7⅝" H x 3" D
277 V Electronic Ballast Dimmer (0 - 10 VDC)	
Operating power	14 - 20 VDC @ 350 mA (no load)
Supply voltage	277 VAC
External fuse	250 mA/500 V
Number of outputs	6
Analog output rating	D/A resolution 250 steps
Analog output drive	0 - 10 volts proportional
Analog output drive rating per channel	4.5 mA (typically 8 ballasts)
Relay output contact ratings	Tungsten: 8A @ 250 VAC
	Inductive: 15A @ 250 VAC
	Resistive: 15A @ 24 VDC
Maximum module thermal dissipation	10 watts (34 BTU/hr)
Ambient operating temperatures	Minimum 32° F (0° C)
	Maximum 95° F (35° C)
Efficiency	Over 98% at full rated load
Dimensions	Standard LiteTouch module (10¼" W x 7⅝" H x 3" D)

NOTE ☞ All analog outputs are protected against short circuit and short term miswiring to 120 VAC. If additional output drive is required (up to 20mA) the miswiring protection can be removed.

Module Enclosures

LiteTouch rough-in enclosures will accommodate two or four LiteTouch modules. In accordance with UL and CSA requirements, the interior space is barriered to isolate line and low voltage sections. The most suitable locations for enclosures are near the breaker panel feeding the modules or wherever the load runs can be minimized. LiteTouch enclosures should be located in an environment where ambient temperatures do not exceed 95° F (35° C). Modules may create some audible noise and should not be located where this would be objectionable.

Two enclosure types are available: surface and recess mount. The surface mount's metal door is mounted flush with the edges of the enclosure. The recessed mount's metal door overlaps the enclosure by 1" on all four sides (to cover up the rough-in work). Both doors are hinged on the left side.

NOTE ☞ 277 V modules must be housed in a separate enclosure.

Engineering Data

Transorb board	Transient protection provided for the module data line
Four-module enclosure dimensions	37" H x 20" W x 4" D
Four-module lid dimensions	Surface mount: 37" H x 20" W
	Recess mount: 39" H x 22" W
Two-module enclosure dimensions	20" H x 20" W x 4" D
Two-module lid dimensions	Surface mount: 36.8" H x 19.8" W
	Recess mount: 38.5" H x 20.6" W
Knockouts	Line voltage side: 18 – 7/8" in top, 18 – 7/8" in bottom
	Low voltage side: 6 – 7/8" in top, 6 – 7/8" in bottom
Construction	16 gauge steel

CCU and Keypad Boxes

LiteTouch provides the following types of CCU backboxes for mounting Compact or Standard CCUs.

The surface mount CCU backbox is a simple rough-in box for smaller projects. This 4" deep box may be recessed leaving only the CCU protruding from the wall. If the box is recessed, a trimout lid is not available.

The surface or recess mount CCU backbox with wiring harness provides a termination point inside the box for the keypad and control module runs. This option should be used for larger projects with more than 60 keypads. A wiring harness is provided to connect the CCU to the termination board. In addition, removable transorb boards protect the CCU against power surges.

NOTE ☞ The 5000LC backbox is a surface mount box for the 5000LC card set. Refer to "5000LC CCU" on page 156 for information.

The waterproof keypad box is designed to protect the keypad from water damage for keypads mounted in an outdoor environment and in direct contact with the elements such as a boat dock or near a beach. The all-metal construction adds increased durability. The flange sinks flush with the wall leaving only a 4" door protruding from the wall. This must be installed before the drywall is hung.

The humid location keypad box is designed to protect the keypad from mild moisture conditions (not intended for direct water contact). The clear plastic lid lets you see the engraved buttons while the gray backing hides the wiring. The humid location backbox should be ordered with a keypad as a single unit.

Engineering Data

Surface Mount CCU Backbox	
Dimensions	8" H x 11" W x 4" D
Knockouts	8 – ¾" and 6 – 1" 16-gauge steel
CCU Backbox w/Wiring Harness	
Surface Mount	
Dimensions	14" H x 11¾" W x 4" D

CCU Backbox w/Wiring Harness	
Lid	14" H x 11¾" W
Knockouts	8 – ¾" and 6 – 1" 16-gauge steel
Recessed Mount	
Dimensions	14" H x 11 ¾" W x 4" D
Lid	16" H x 13 ¾" W
Knockouts	8 – ¾" and 6 – 1" 16-gauge steel
Waterproof Keypad Box	
Dimensions	5⅝" H x 8¼" W x 3⅛" D
Flange	6½" H x 5⅛" W x ⅛" D
Humid Location Keypad Box	
Dimensions	4¾" H x 2¾" W x 1⅛" D
Cover	Hinge mounted at top, transparent

CCUs

The LiteTouch system is based around a central control unit (CCU), which receives all switch information, processes the commands, and transmits control data to the control modules. One CCU is required per system. CCUs use non-volatile memory to retain programming information indefinitely and to retain the current load on/off status and clock status information for at least two days.

CCUs have no software limit on the number of masters and presets that may be assigned and are only limited by available memory. On Masters, Off Masters, and Scene Presets may overlap load assignments with no logical conflict. All switch-to-load assignments (including masters and presets) are fully user programmable in a menu-driven environment. Preset memory levels are programmable at the preset switch or at the CCU. Preset fades are smooth, continuous transitions from the preset levels in a time frame which is individually programmable for each scene preset.

CCUs employ an astronomical clock/calendar (based on sunrise and sunset times) that may be used to turn on or off system loads and activate presets. Events may be programmed to occur on specific dates, specific days of the week, or on a daily basis.

LiteTouch offers three central control units: Compact, Standard, and 5000LC (details in the following sections). All three CCUs include an RS-232 computer interface port and the 5000LC has an optional Ethernet network port that allows easy system backup, alternate system configurations, and system operation via an external computer.

5000LC CCU

The 5000LC CCU has a rack mount design that accommodates card upgrades. Seven card slots are available for future expansion of new modem, communication, and integration cards. The built-in terminal blocks simplify both keypad and module wiring by allowing you to keep "clean" wiring connections to the central control unit. A built-in redundant processor in the controller cabinet provides fail safe operation.

You can upgrade from previous LiteTouch systems without changing wiring or keypads. Generally, only the changing of the controller and some reprogramming are required.

The 5000LC comes with non-volatile flash memory to store all programs. It also offers extended power outage battery backup. The system is "live" during job uploading, which provides the ability for lights and switches to function without interruption during system changes. LiteWare software allows you to incorporate utilities to plan, design, and program any 5000LC project and runs on Windows 32-bit operating systems (Windows 95/98/NT/2000/XP).

The 5000LC CCU and keypads make up a LiteTouch 2000 system.

Engineering Data

Power supply ratings	Input: 100 - 240 VAC, 50/60 Hz
	Output: 5 VDC, 3 amp
Dimensions	14" H x 16" W x 5" D (Surface mount only)
Programming	Done through an RS-232 connection to an external computer or through an optional built-in modem
Connections [1]	4 keypad ports (CSP)
	4 control module ports (CMP)
ESD protection	All external line transient protected
Ambient operating temperatures	Minimum 45° F (7° C)
	Maximum 95° F (35° C)

1. The 5000LC is capable of controlling up to 256 keypads (2304 unique switches) and up to 256 control modules (2048 independent loads).

Standard CCU

The Standard CCU may include a telephone interface option that allows up to 900 system switches to be operated remotely from a touch-tone telephone anywhere in the world. The telephone interface option also includes a modem for remote programming and system troubleshooting. The telephone/modem interface has a user programmable security access code to prevent unauthorized entry.

Engineering Data

Case dimensions	8¾" H x 12½" W x 2½" D
Screen	LCD, 4 line x 40 character, monochrome, 3" x 6"
Keyboard	20-point keypad
Programming	Done through the keypad or through an S-232 connection to an external computer or through an optional built-in modem.
Connections[1]	4 keypad ports
	4 control module ports
Operating voltage requirements	16 - 20 VDC
ESD protection	All external lines transient protected
Current requirements	200 mA nominal
Ambient operating temperatures	Minimum 45° F (7° C)
	Maximum 95° F (35° C)
Options	Telephone interface and modem

1. The Standard CCU is capable of addressing up to 256 keypads (2300 unique switches) and up to 100 control modules (800 independent loads).

Compact CCU

Engineering Data

Case dimensions	8½" H x 12¼" W x 1" D
Screen	No
Keyboard	No
Programming	Done through the RS-232 connection
Connections[1]	2 keypad ports
	2 control module ports
Operating voltage requirements	16 - 20 VDC
ESD protection	All external lines transient protected

Current requirements	200 mA nominal
Ambient operating temperatures	Minimum 45° F (7° C)
	Maximum 95° F (35° C)

1. The Compact CCU is capable of addressing 40 keypads (320 unique switches) and up to 40 control modules (320 independent loads).

IR Remote

The LiteTouch IR Remote operates LiteTouch IR keypads and up to 11 other devices and allows you to create a device LCD screen for the most frequently used devices.

The IR Remote Control for A/V components is preprogrammed with three-digit code numbers.

Each of the twelve devices operated by the IR Remote can have up to four pages of LCD screens. There are also two customizable LCD pages reserved for the device buttons.

You can change the size and shape of the buttons on the LCD screen to meet your needs. You can also write the text directly on the buttons with or without a PC.

You can set the duration of LCD and backlight turn on time, beep sound level, low battery warning level, set the clock and date, and set the LCD contrast level.

All buttons and the LCD screen have bright “EL” illumination.

The following macro operations are available:

- M1, M2, and M3 buttons send out up to 28 commands each.
- 12 device buttons send out up to 14 commands each.
- 60 favorite channel buttons send out up to 14 commands each.

The program and data are downloaded from a PC or uploaded from a remote control.

You can program punch through operations to any of the 12 devices from any 12 devices for volume, channel, and transport (play, stop, rewind and fast forward) controls.

A built-in memory backup system prevents memory loss even after removal of the batteries for several months.

Engineering Data

PC interface	RS-232 serial adapter/cable (included) to connect to a PC to program the remote control and download updated versions of the operating system
Memory	4 MB non-volatile SRAM
Power supply	4 AA alkaline batteries (Duracells included)
Power saving	Configurable automatic shut-off
Dimensions	8.9” x 2.9” x 1.5” (L x W x H)
Weight	10.2 oz (with batteries)
Warranty	One year parts and labor

Remote Modem

The Remote Modem was designed to provide end users with an easy communication link between the programmer’s laptop and the LiteTouch 5000LC CCU. The Remote Modem has a serial connection, switch, indicator lights, high quality antenna, mounting plate, and optional power source inputs.

The Remote Modem transfers data at 19200 baud up to ¼ mile in a city environment or greater than 10 miles line-of-sight with a directional antenna.

The transceiver modules have built-in support for multi-drop networking protocols. Multiple independent networks can operate in the same vicinity by using distinct network identifiers. The radios integrate quickly and seamlessly into any new or existing design. Simply output serial data from any microcontroller or RS-232 port into the radio to send FCC approved, frequency hopping spread spectrum data through the air and capture it on all receivers within range on the same network. The system behaves as a virtual half-duplex parallel-wired network.

Engineering Data

General	
Radio frequency	902-928 MHz, unlicensed ISM band supply current
Type	Frequency hopping spread spectrum transceiver
Frequency control	Direct FM
Network topology	Point-multipoint and point-to-point multi-drop transparent networking
Channel capacity	65,000 network identifiers share 25 hop channels
Serial data interface	RS-232, DCE
I/O data rate	Software selectable 2400-57,600 bps

Performance	
RF baud rate	9,200 bps
Data throughput	19,200 bps
Transmit power output	100 mW nominal 100 mW nominal
Rx sensitivity	-107 dBm
Range[1]	Indoor: 600' to 1500'
	Outdoor: 7 miles with dipole, > 20 miles with gain antenna
Interference rejection	70 dB at pager and cellular phone frequencies

1. Range calculations are for 9600 baud radio, line-of-sight. Actual range will vary based upon specific board integration, antenna selection, environment and the OEM's device.

Power Requirements	
Supply voltage	7-18 VDC
Current consumption	Tx 210 mA, Rx 70 mA, sleep TBD

Physical Properties	
Enclosure size	2.75" x 5.50" x 2.1875" (7.90 x 13.90 x 3.80)cm
Weight	6.9 oz. (195.61 g)
Operating temperature	0° C to 70° C (- 40° C to 85° C available)
Operating humidity	10% to 90% (non-condensing)

Antenna	
Antenna connector	Reverse-polarity SMA
Antenna impedance	50 ohms unbalanced
Approved antenna	½ wave flexible whip (6"), SMA, 2.1 dBi gain

Serial Connector Pinout			
Pin	**Signal**	**Type**	**Description**
1	NC	-	No connection
2	RXD	Output	Data
3	TXD	Input	Data
4	DTR	Input	Sleep control
5	SGND	Ground	Common return
6	NC	-	No connect
7	RTS	Input	Binary program control
8	CTS	Output	Clear to send control
9	NC	-	No connect

NOTES

Drawings B

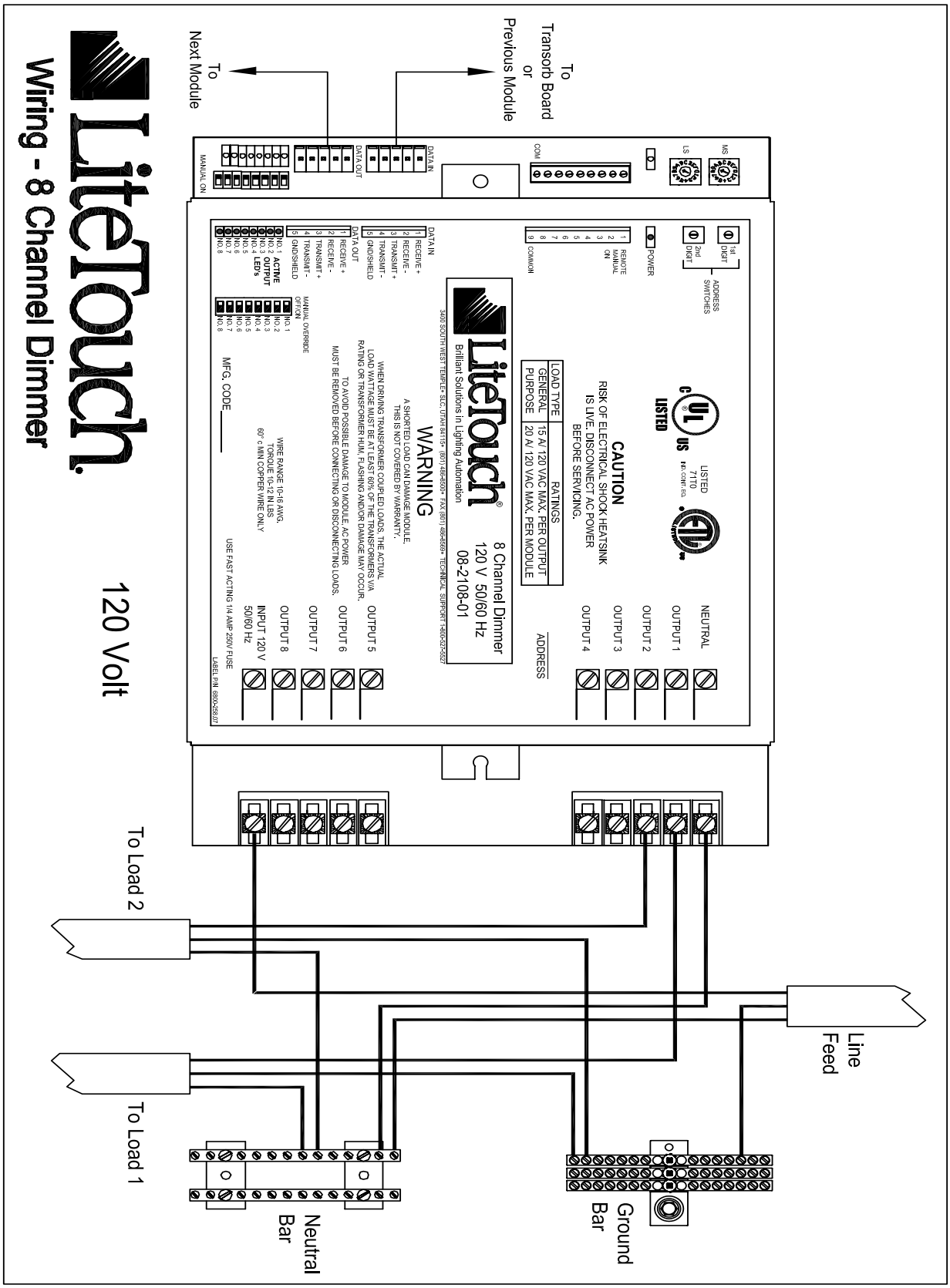
This appendix contains technical drawings for the following:

- Control module wiring
- Power supply module wiring
- Keypad and master control keypad wiring
- Serial cable wiring
- Legacy module wiring

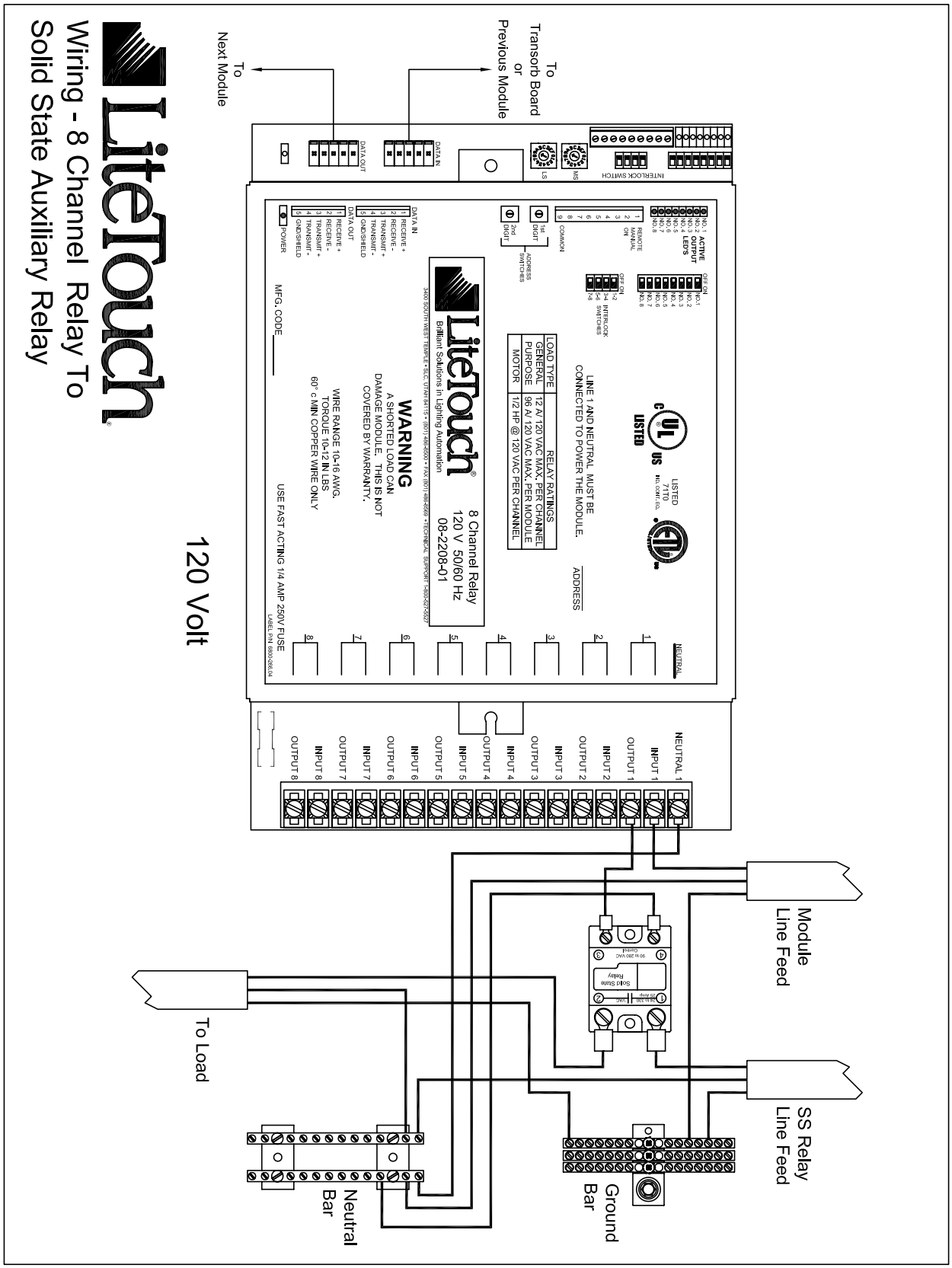
Control Module Wiring

The following images show the proper wiring for control module configurations.

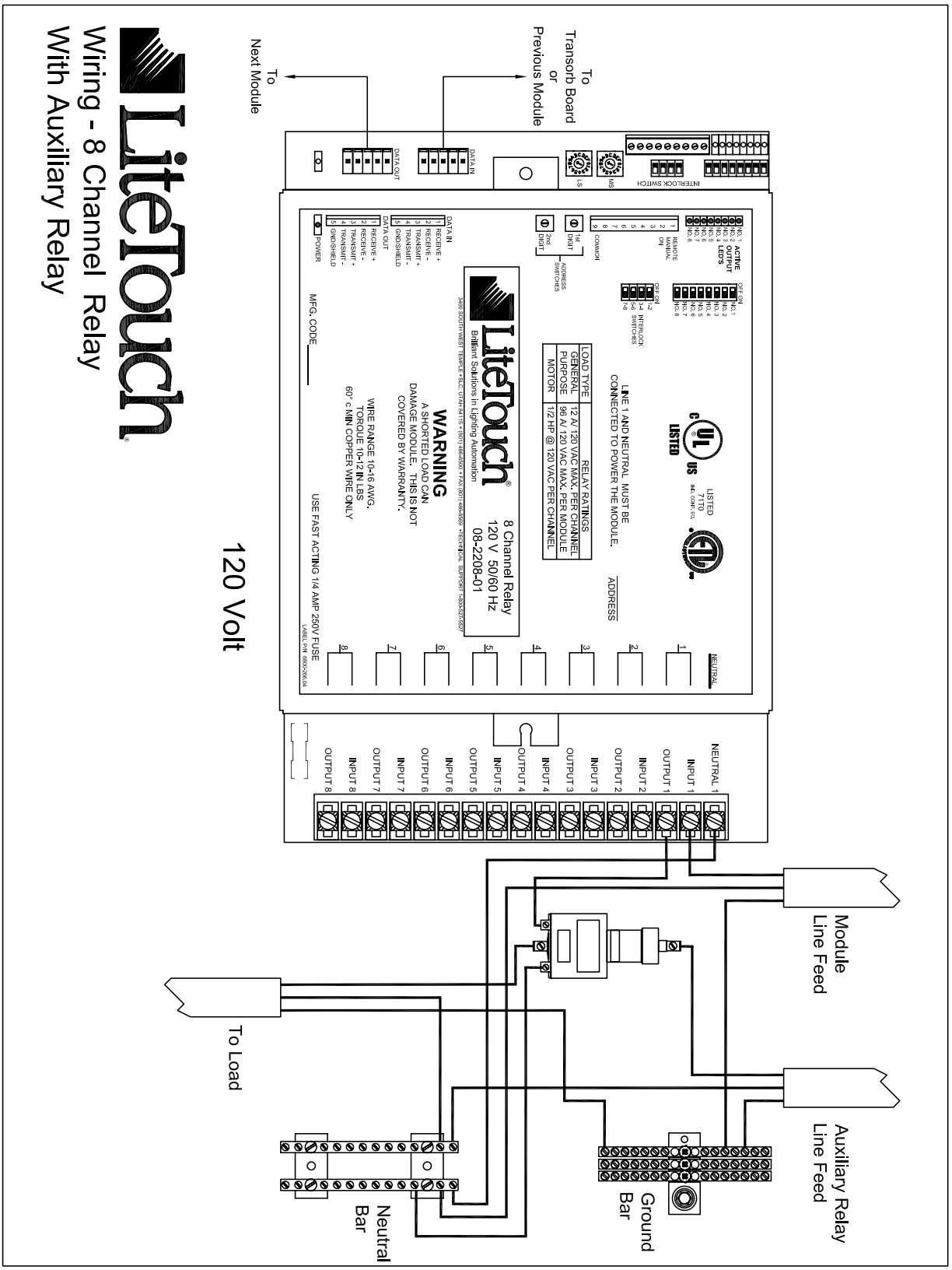
8-Channel Dimmer



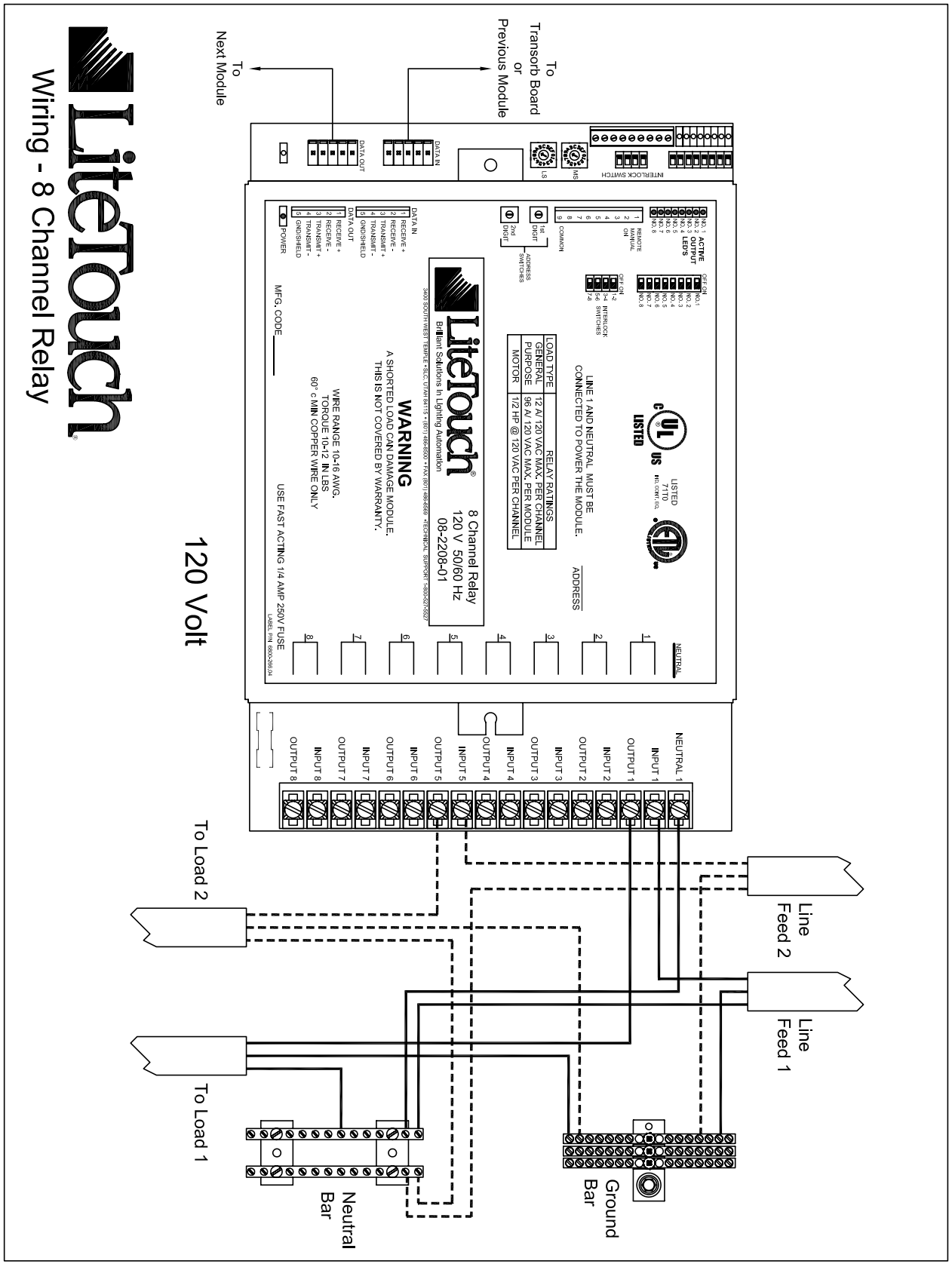
8-Channel Relay to Solid State Auxiliary Relay



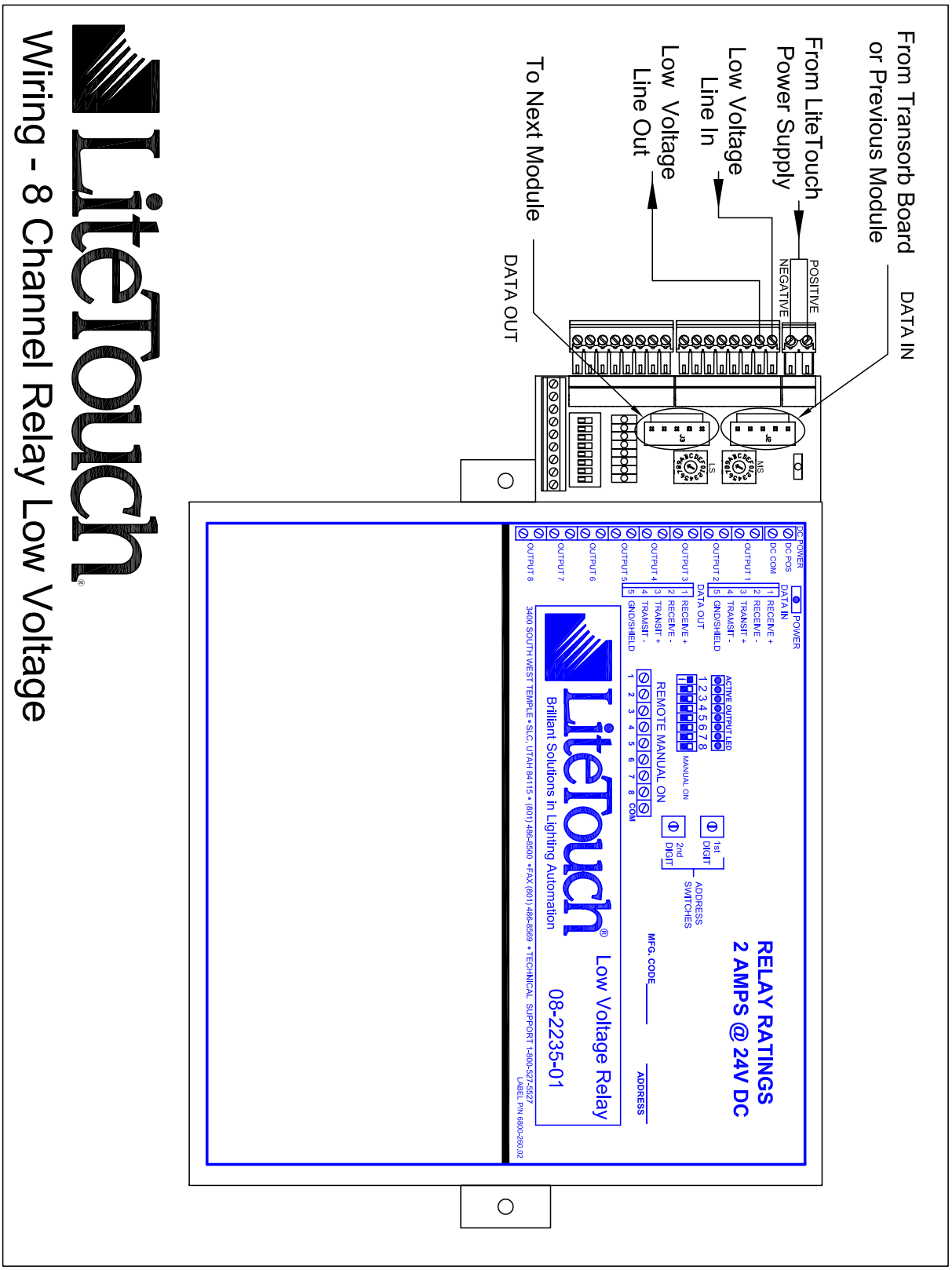
8-Channel Relay to Auxiliary Relay



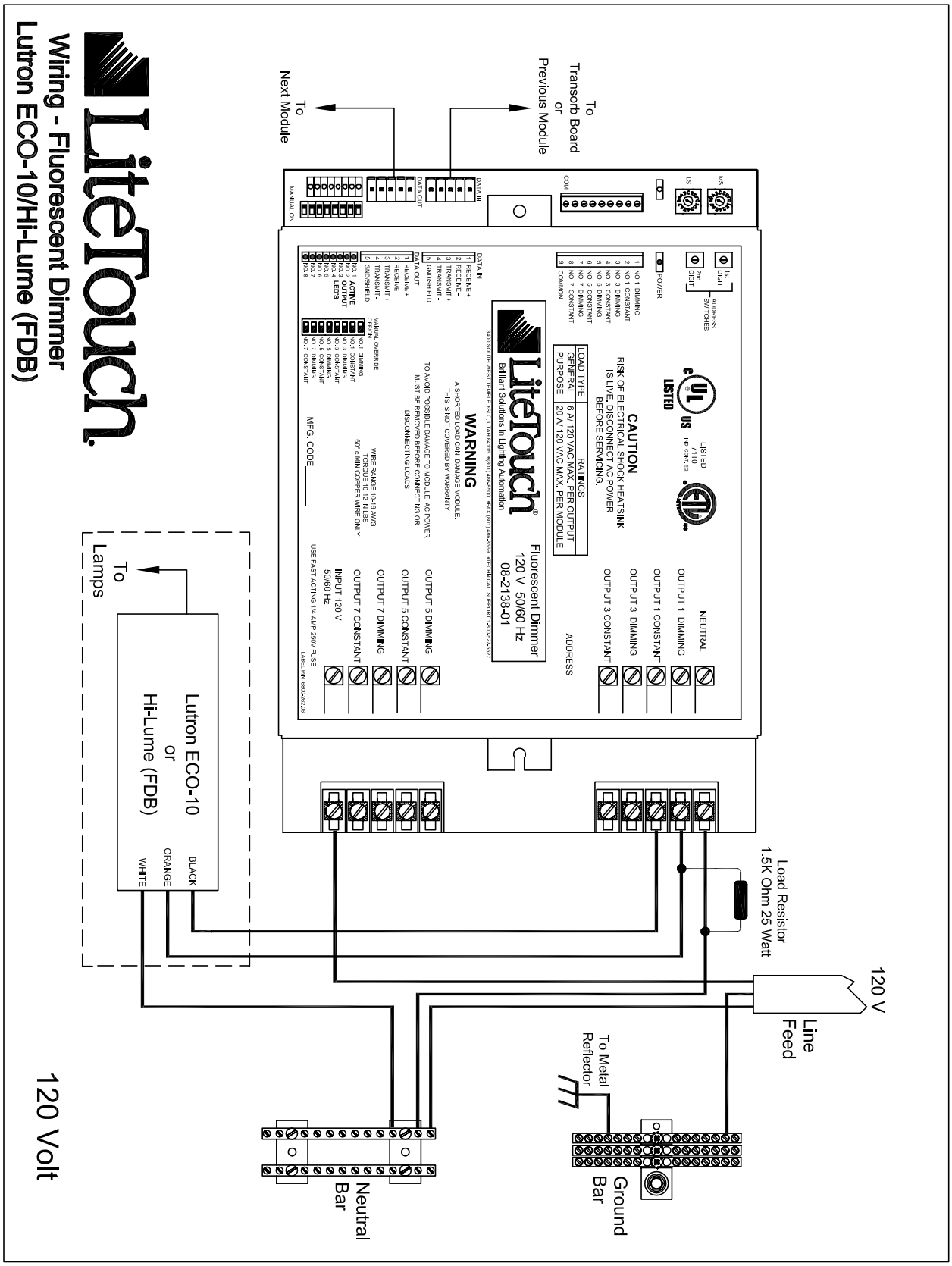
8-Channel Relay



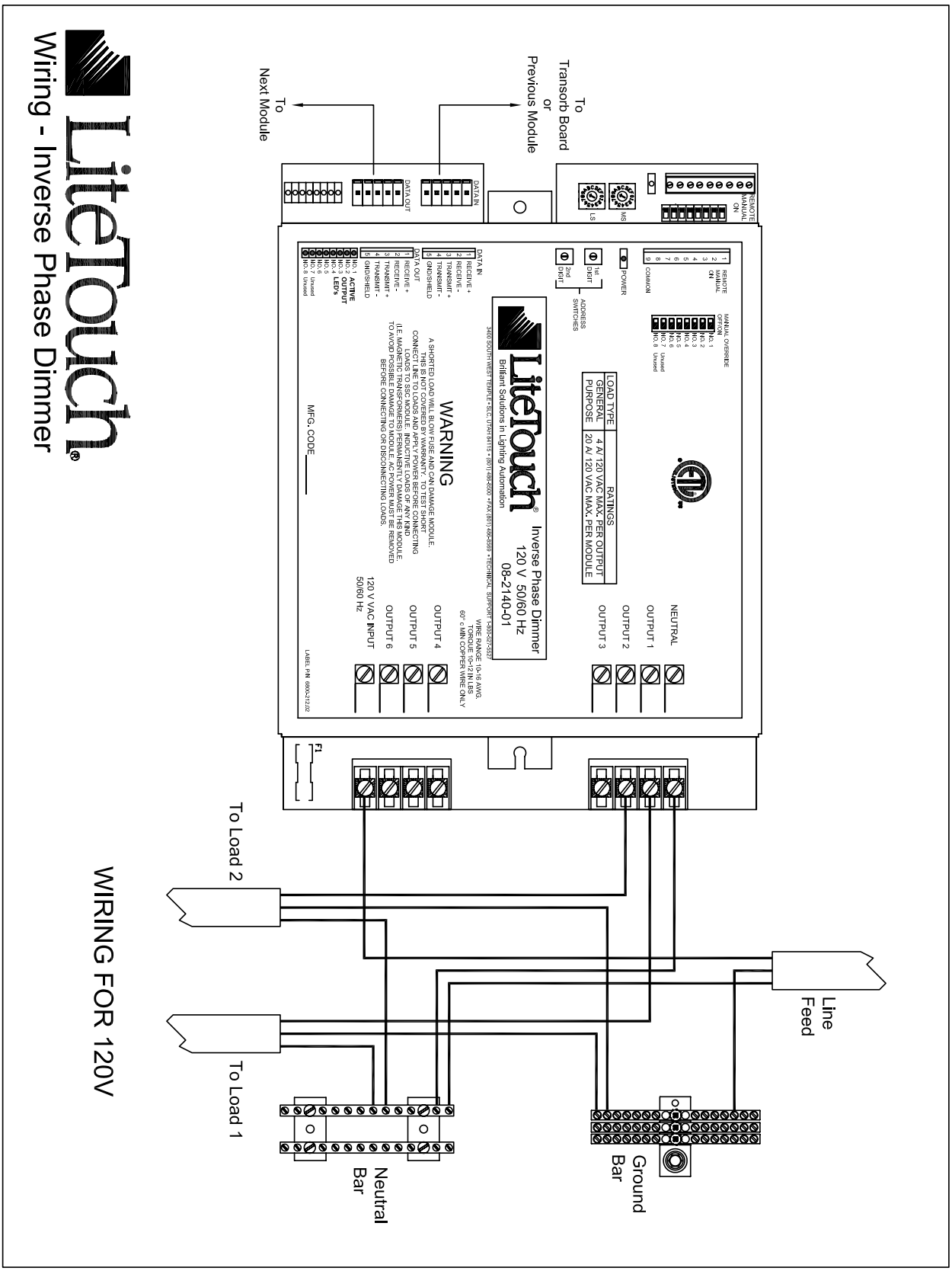
8-Channel Relay, Low Voltage



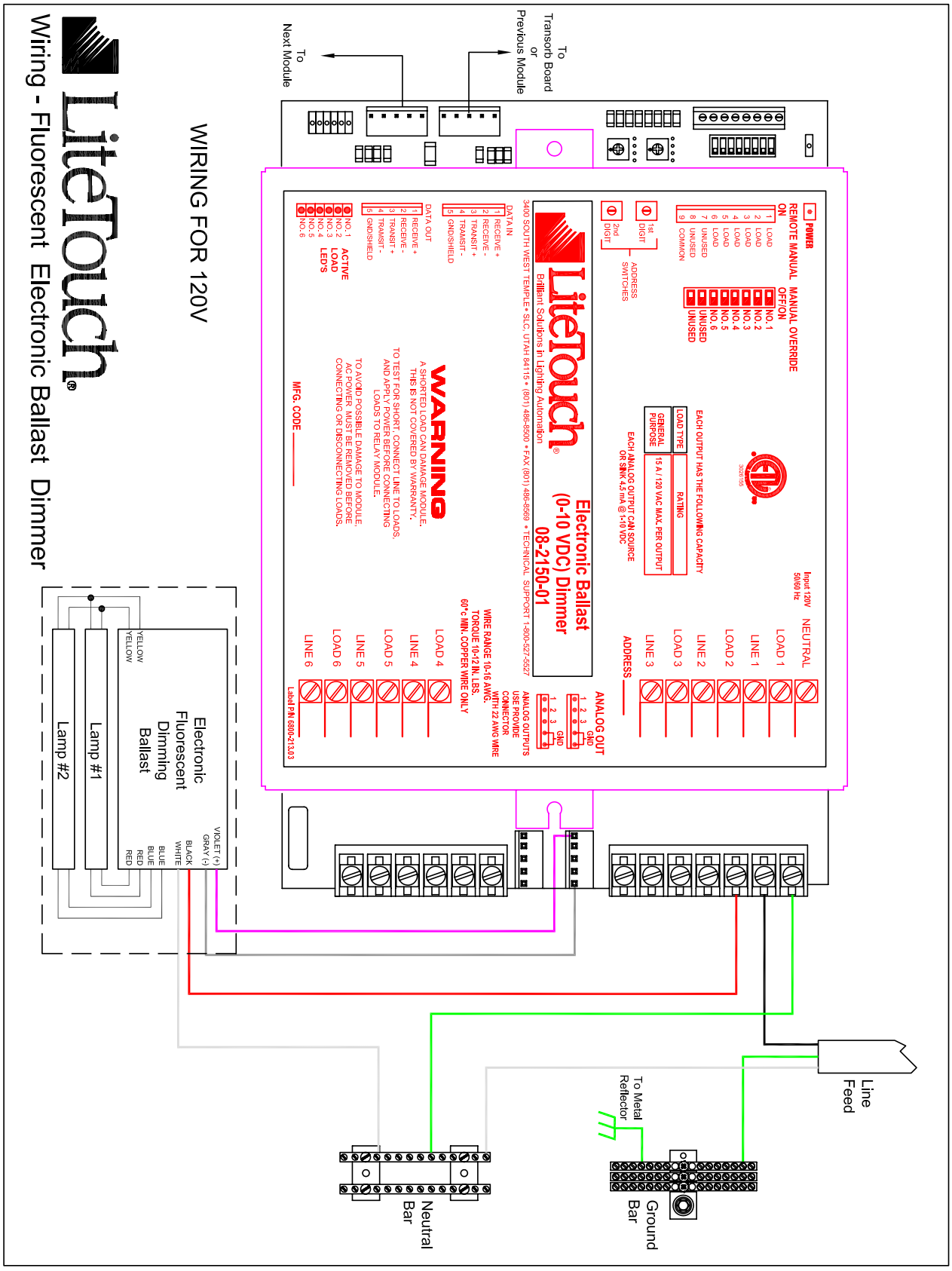
Fluorescent Dimmer



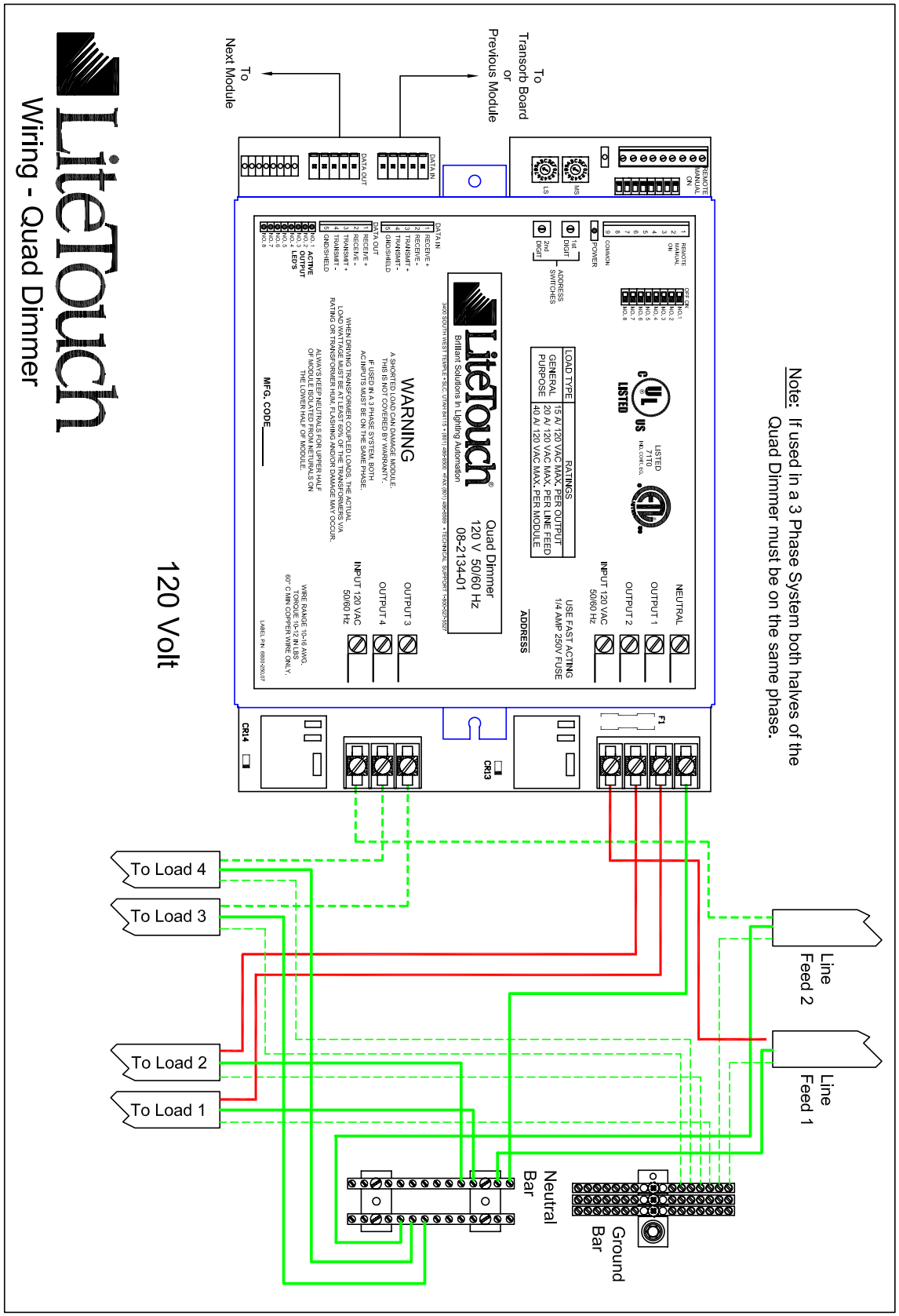
Inverse Phase Dimmer



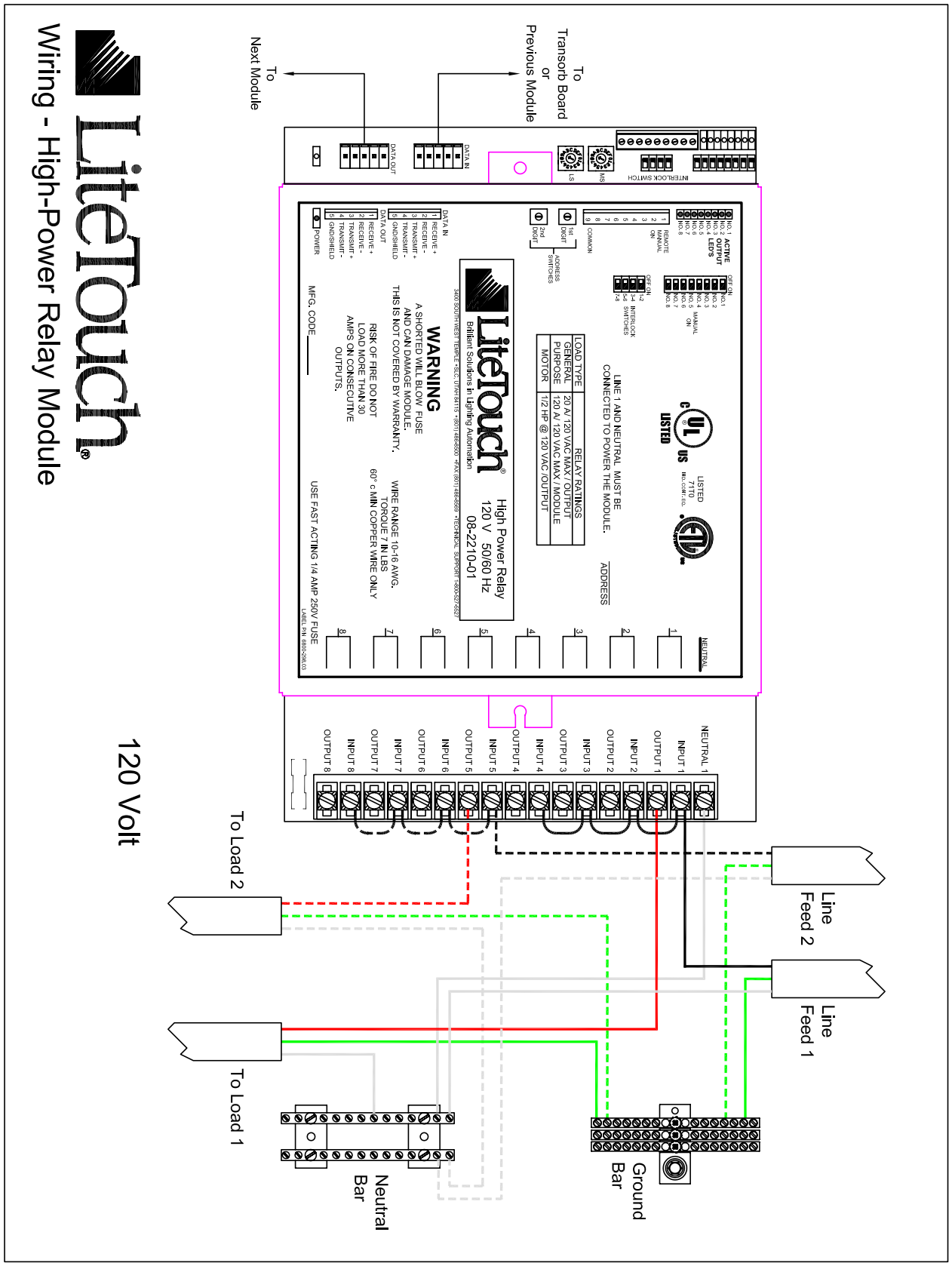
Fluorescent Ballast Dimmer



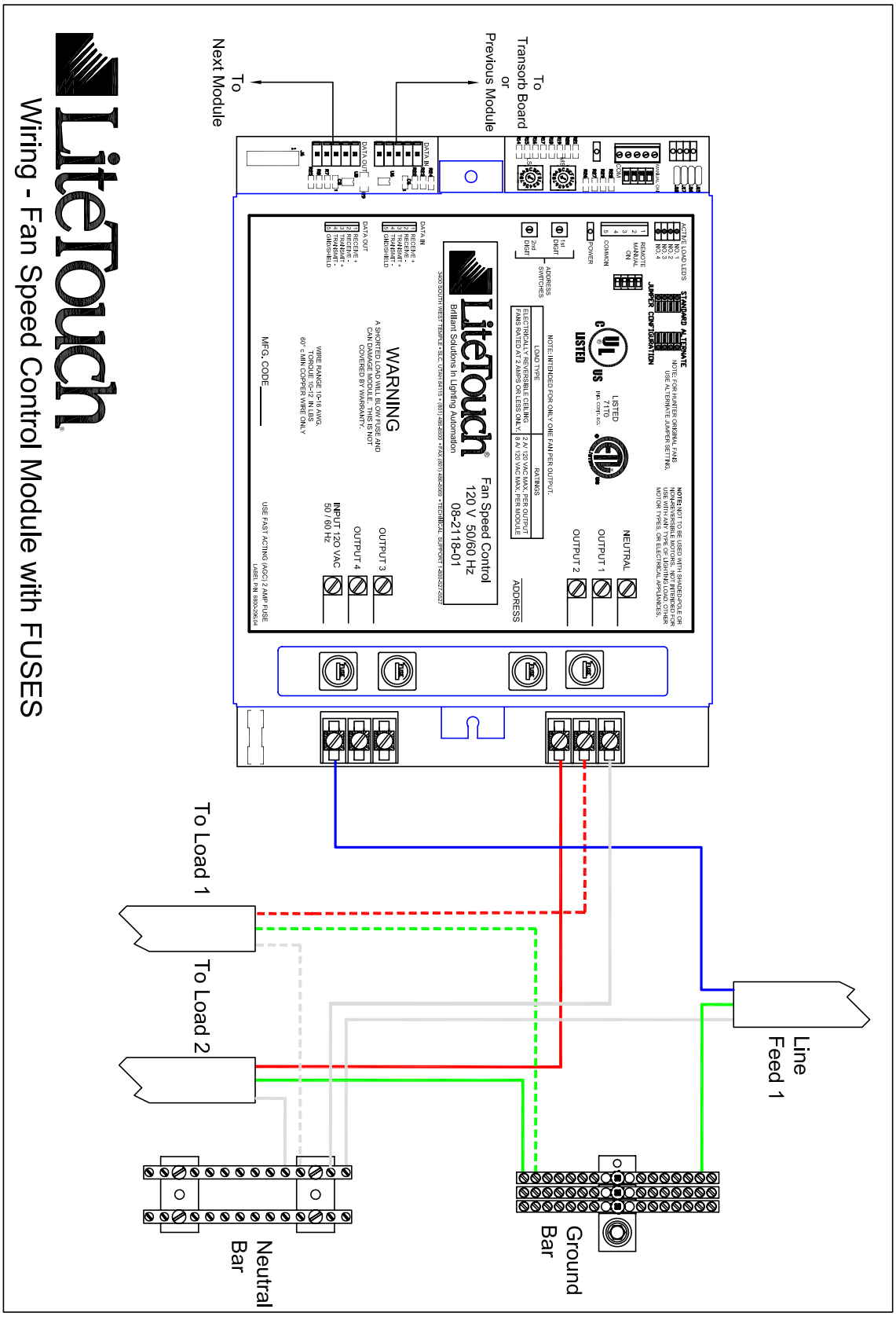
Quad Dimmer


LiteTouch
Wiring - Quad Dimmer
120 Volt
DRAWING 10018-001 REV. J
Note: If used in a 3 Phase System both halves of the Quad Dimmer must be on the same phase.
To Next Module
To Transorb Board or Previous Module
Quad Dimmer
120 V 50/60 Hz
08-2134-01
Brilliant Solutions in Lighting Automation
WARNING
LOAD TYPE
RATINGS
GENERAL PURPOSE
15 A/ 120 VAC MAX. PER OUTPUT
20 A/ 120 VAC MAX. PER LINE FEED
40 A/ 120 VAC MAX. PER MODULE
INPUT 120 VAC 50/60 Hz
NEUTRAL
OUTPUT 1
OUTPUT 2
OUTPUT 3
OUTPUT 4
ADDRESS
USE FAST ACTING 1/4 AMP 250V FUSE
To Load 4
To Load 3
To Load 2
To Load 1
Line Feed 2
Line Feed 1
Neutral Bar
Ground Bar

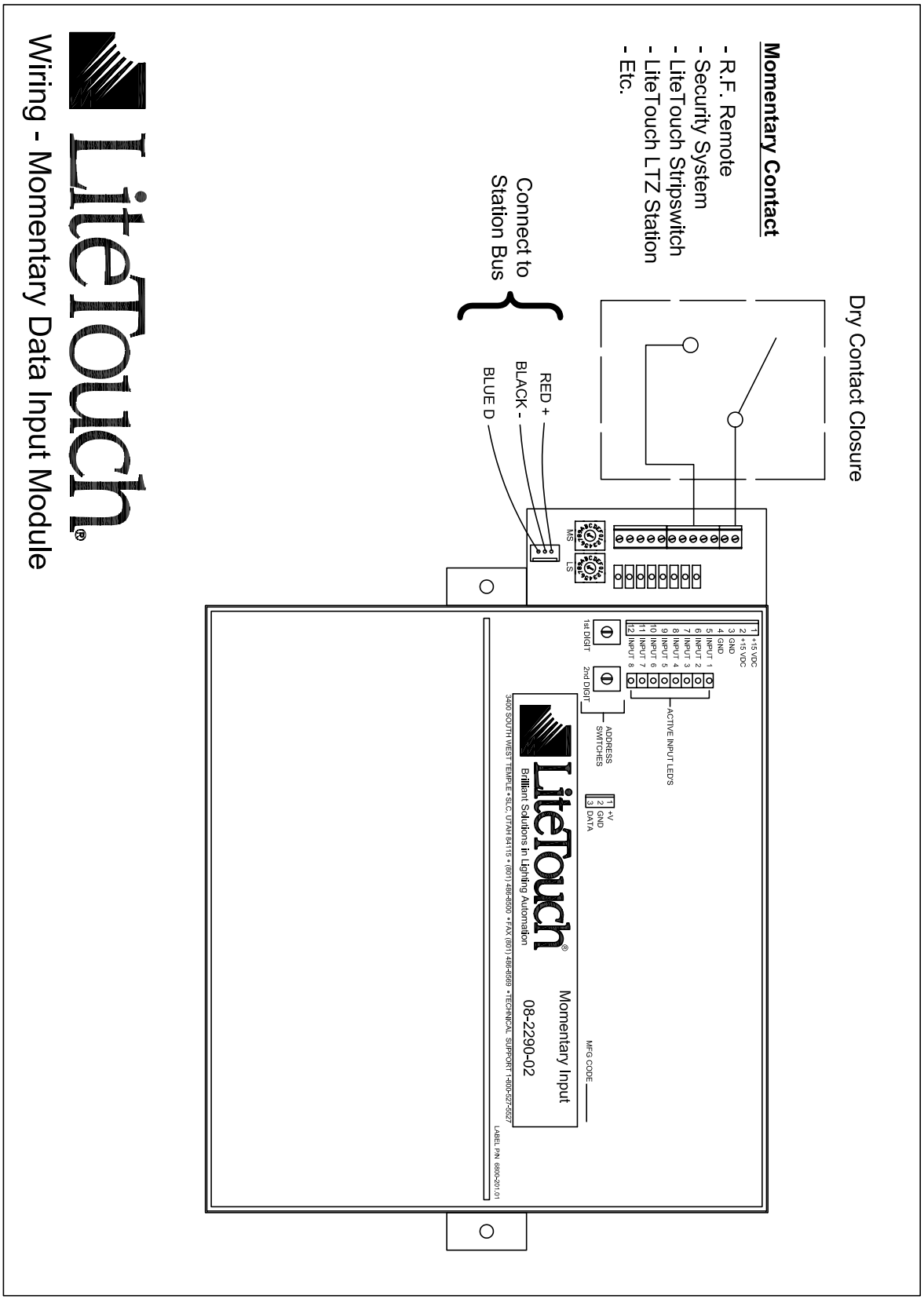
High Power Relay



Fan Speed


LiteTouch
Wiring - Fan Speed Control Module with FUSES
DRAWING 10016-001 REV. D
To Next Module
To Transorb Board or Previous Module
Fan Speed Control
120 V 50/60 Hz
08-2118-01
Brilliant Solutions in Lighting Automation
WARNING
A SHORTED LOAD WILL BLOW FUSE AND CAN DAMAGE MODULE. THIS IS NOT COVERED BY WARRANTY.
INPUT 120 VAC 50/60 HZ
OUTPUT 1
OUTPUT 2
OUTPUT 3
OUTPUT 4
NEUTRAL
ADDRESS
To Load 1
To Load 2
Line Feed 1
Ground Bar
Neutral Bar

Data Input, Momentary

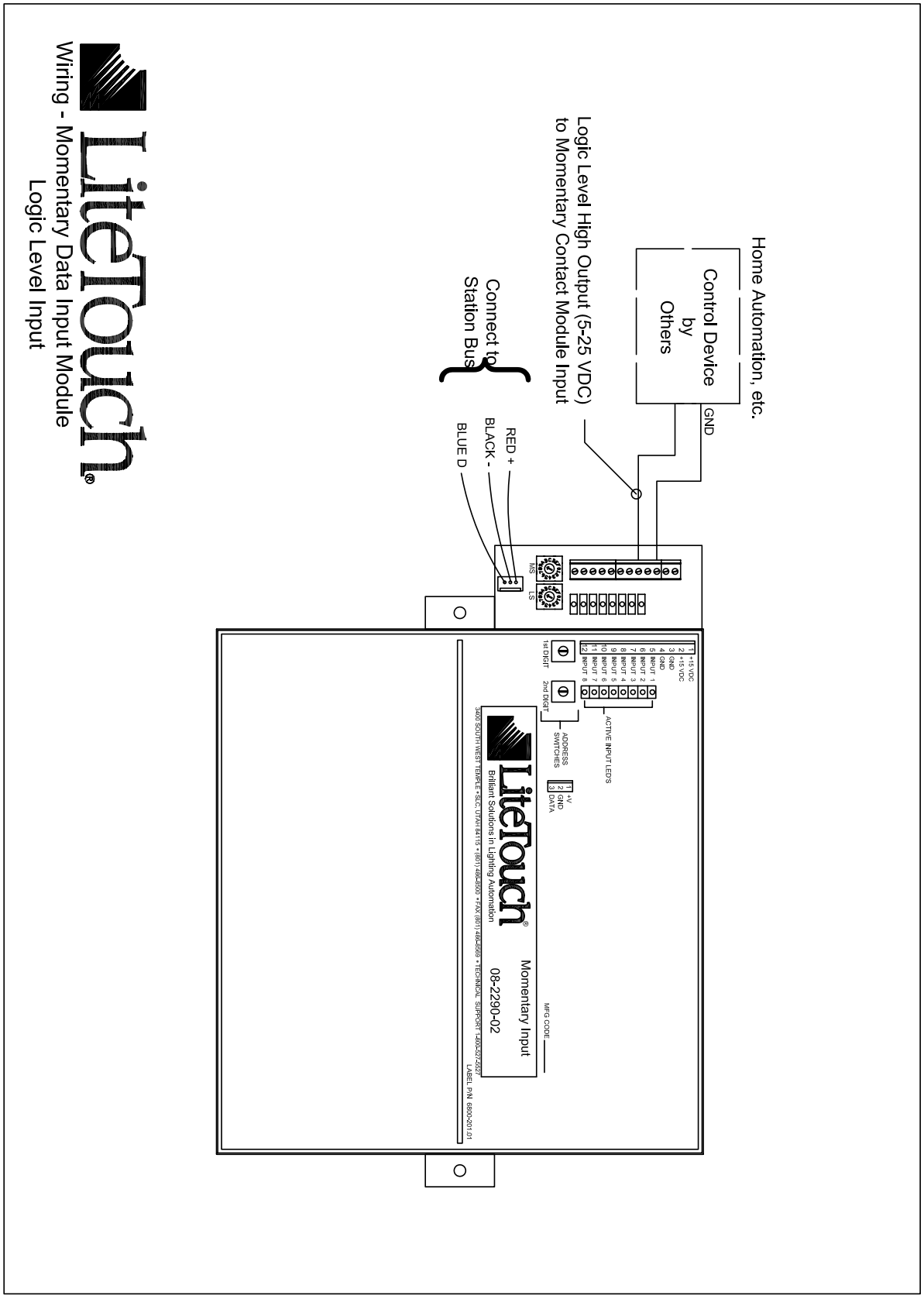


LiteTouch®

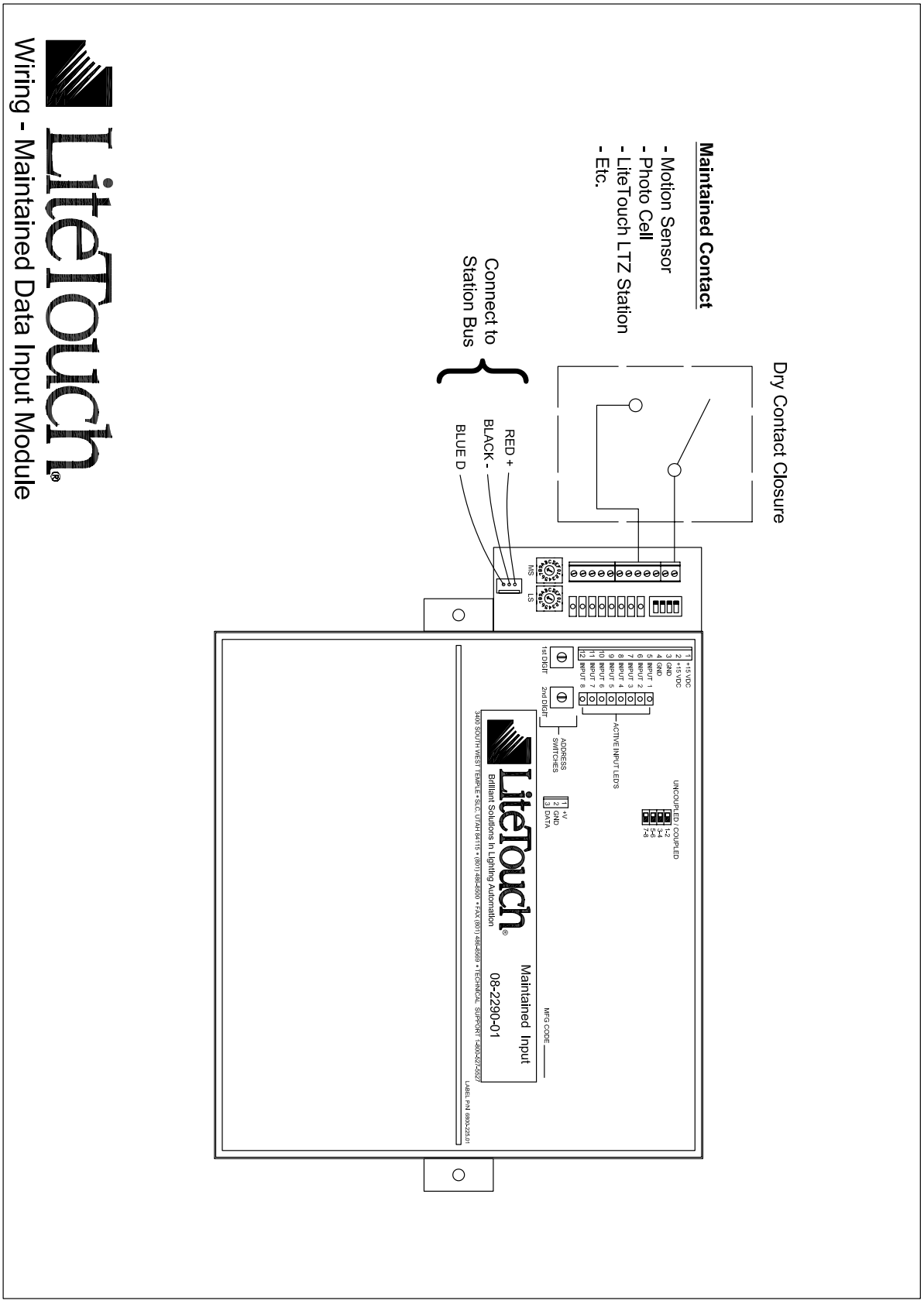
Wiring - Momentary Data Input Module

DRAWING 10082-001 REV. B

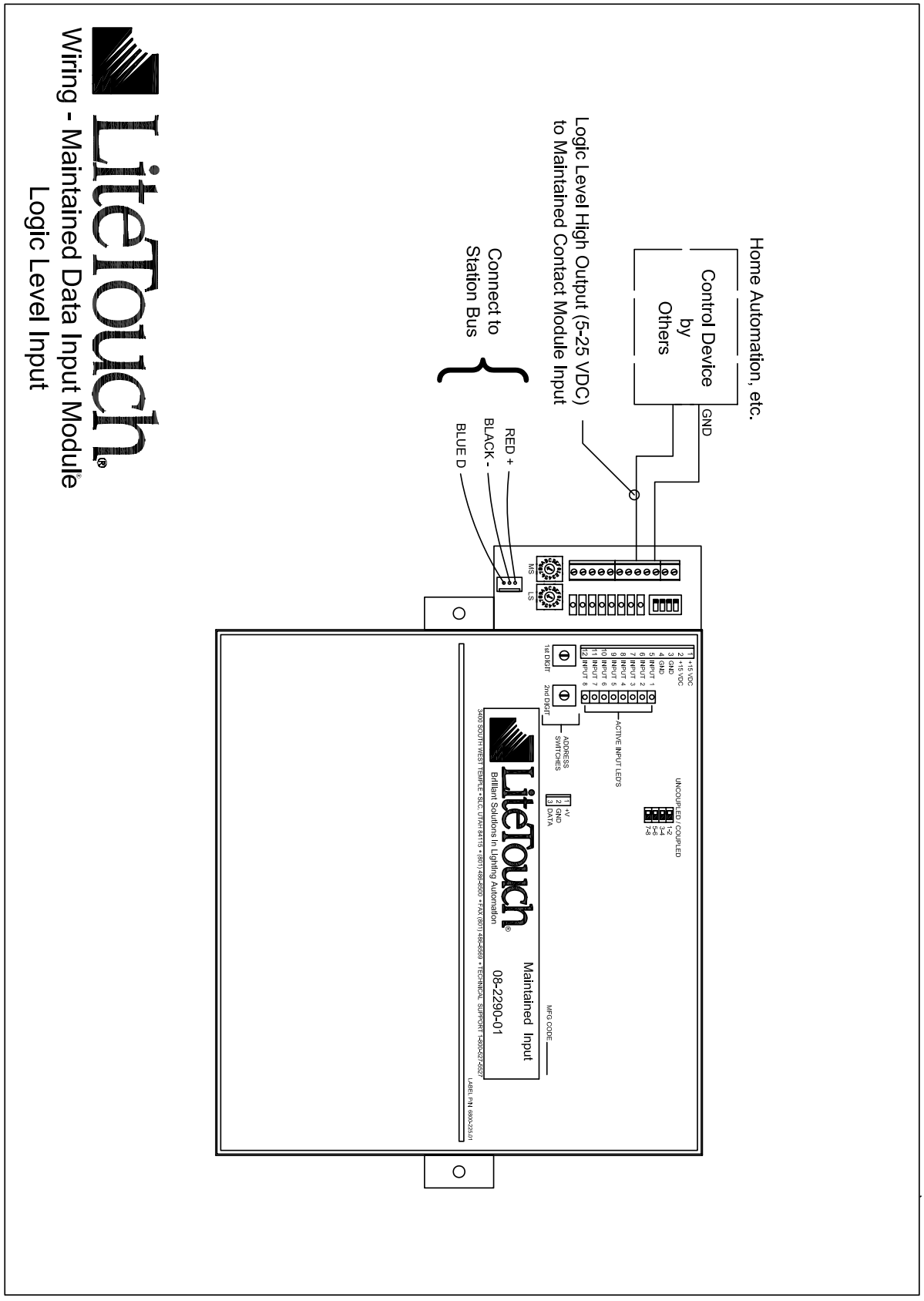
Data Input, Momentary, Logic Level Input



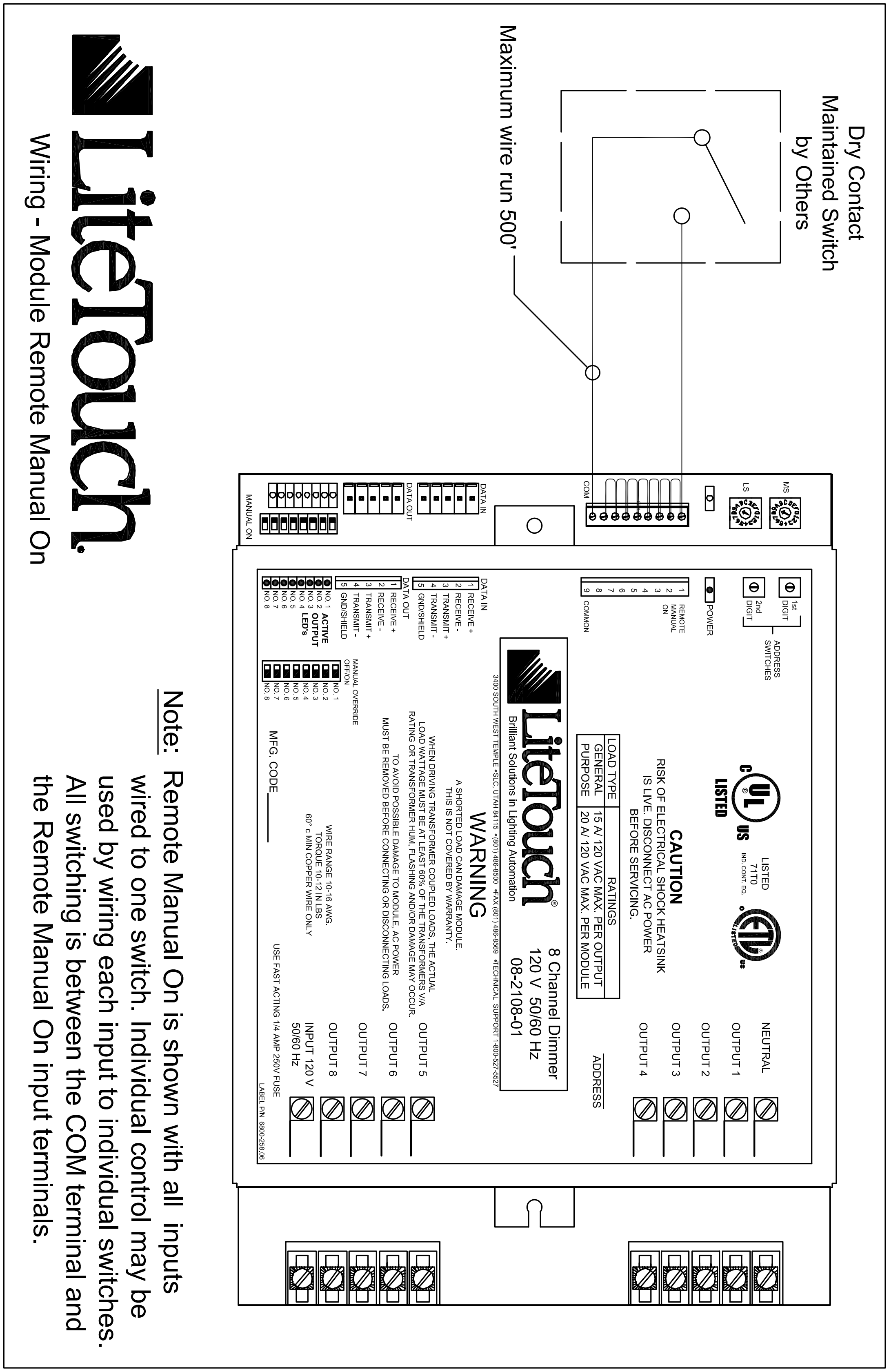
Data Input, Maintained



Data Input, Maintained, Logic Level Input



Remote Manual On

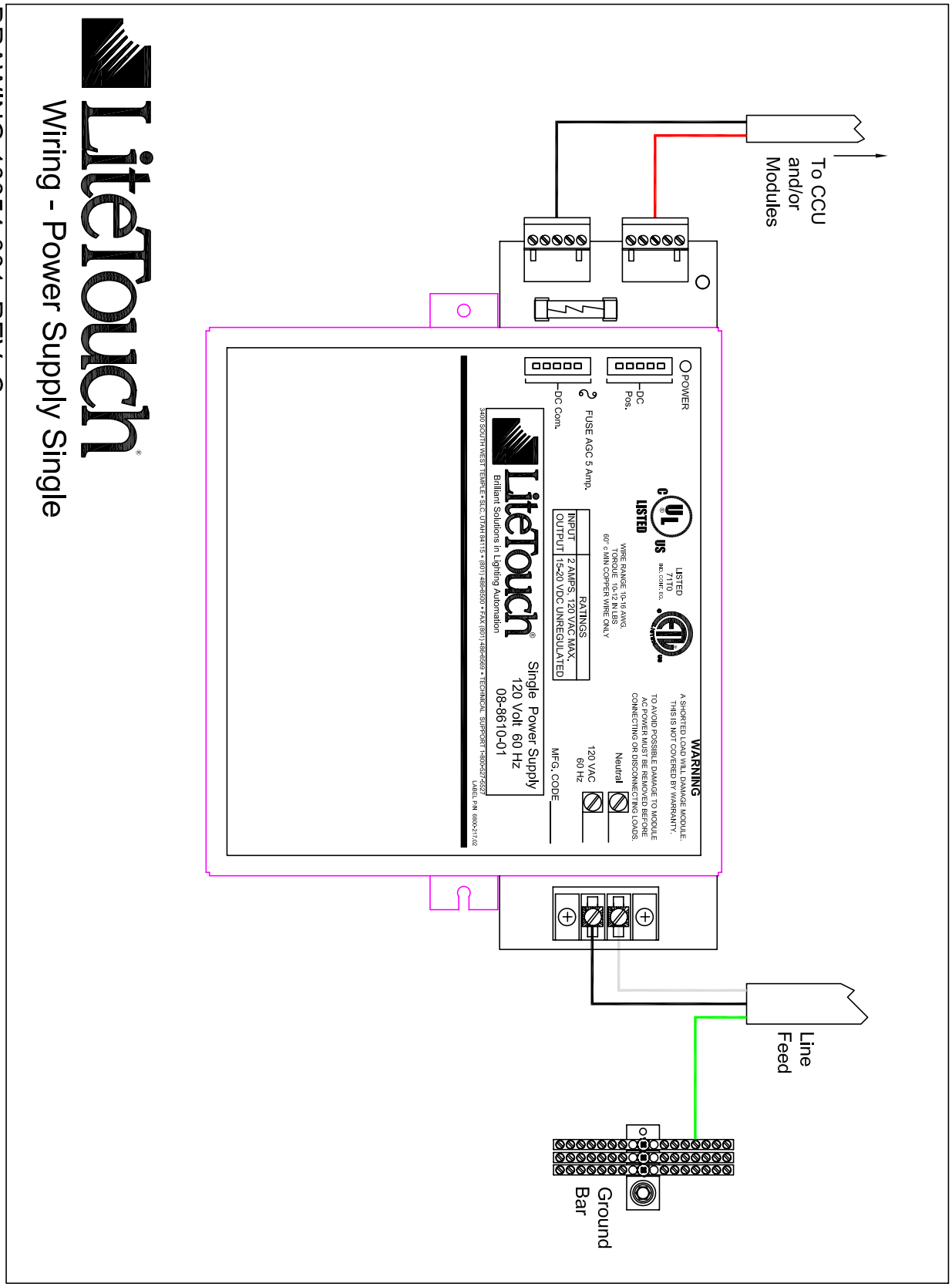


Drawing 10086-001 Rev. C

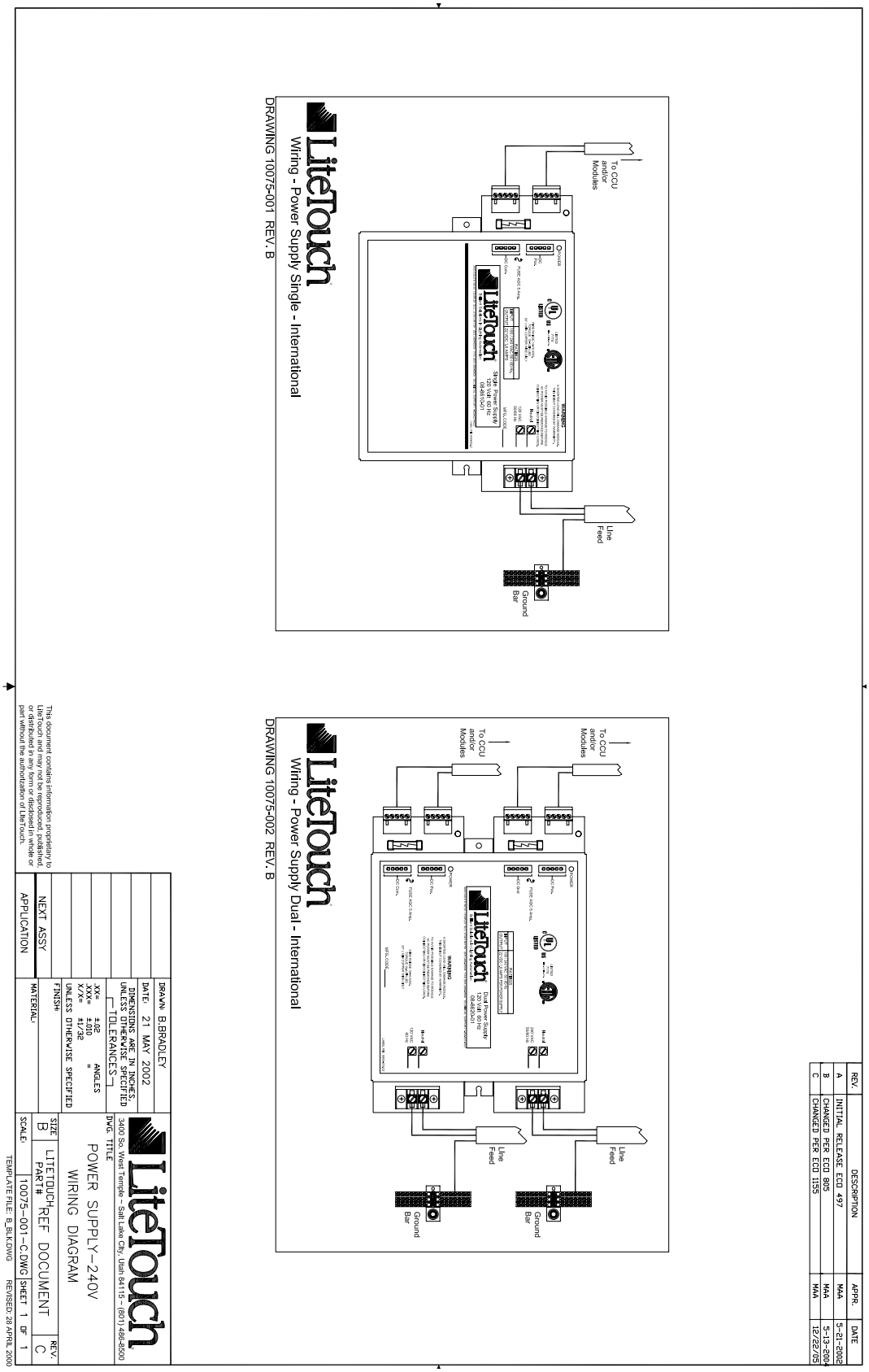
Power Supply Wiring

The following images show the proper wiring for power supply configurations.

Single Power Supply



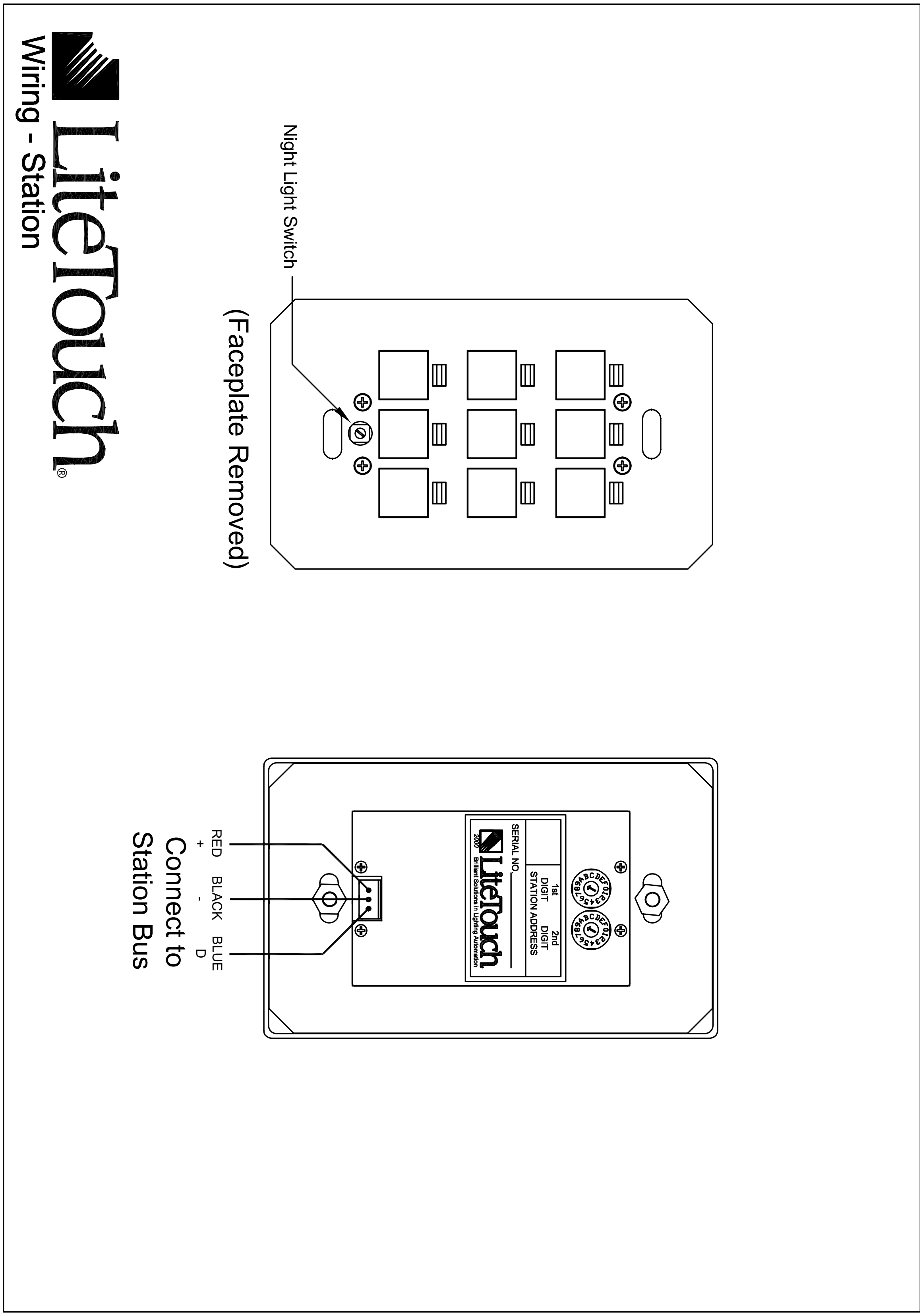
International Power Supply



Keypad Wiring

The following images show the proper wiring for keypad configurations.

Single Gang



DRAWING 10077-001 REV. A
Wiring - Station
LiteTouch
Night Light Switch
(Faceplate Removed)
1st DIGIT
2nd DIGIT
STATION ADDRESS
SERIAL NO.
RED +
BLACK -
BLUE D
Connect to Station Bus

Dimensions – Single Gang

Notes: 1. Minimum clearance is 1/8 inch on each side of circuit board and 1/2 inch behind heatsink.
2. Recommended box is a Carlon B116A or equivalent.
3. Data Input Station and previous station versions have a depth of 1 3/8" all other dimensions are equivalent.

LiteTouch®

Dimension - Station

DRAWING 10077-002 REV. A

Dimensions – Double Gang

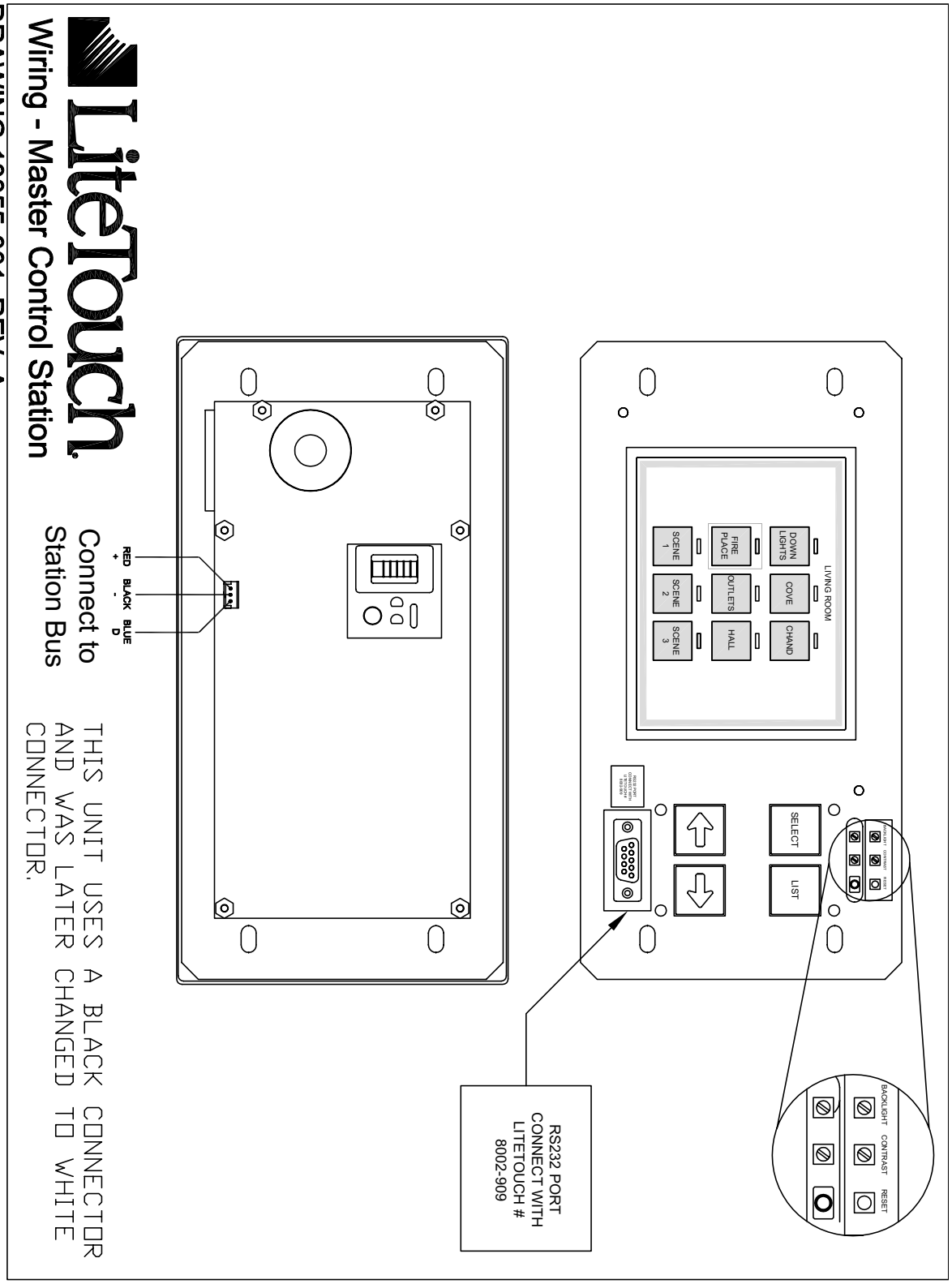
Notes:
1. Minimum clearance is 1/8 inch on each side of circuit board and 1/2 inch behind heatsink.
2. Recommended box is a Carlon B232A or equivalent.
3. Data Input Station and previous station versions have a depth of 1 3/8" all other dimensions are equivalent.

LiteTouch®

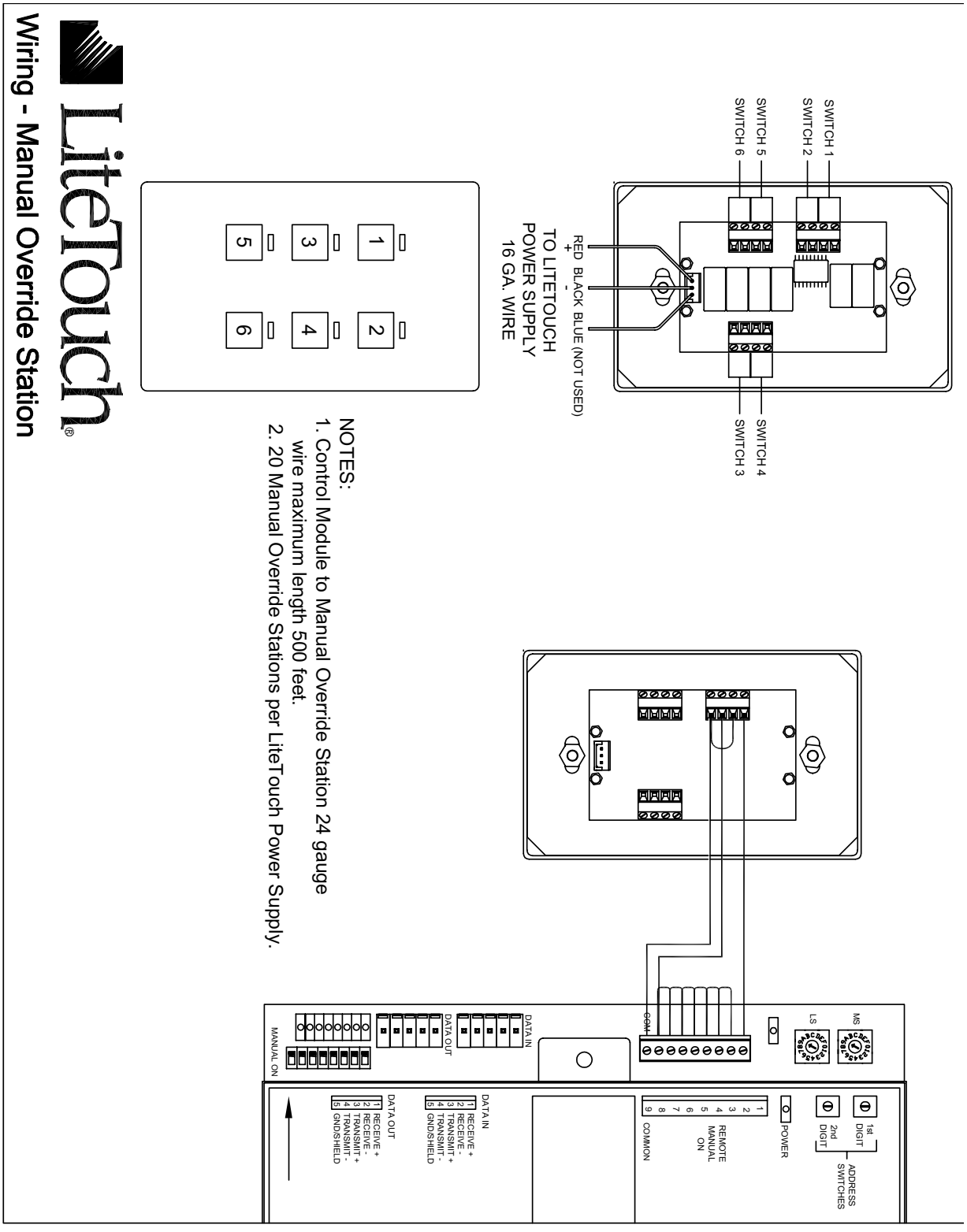
Dimensions - SMT Station Two Gang

DRAWING 10077-003 REV. A

Master Control Keypad



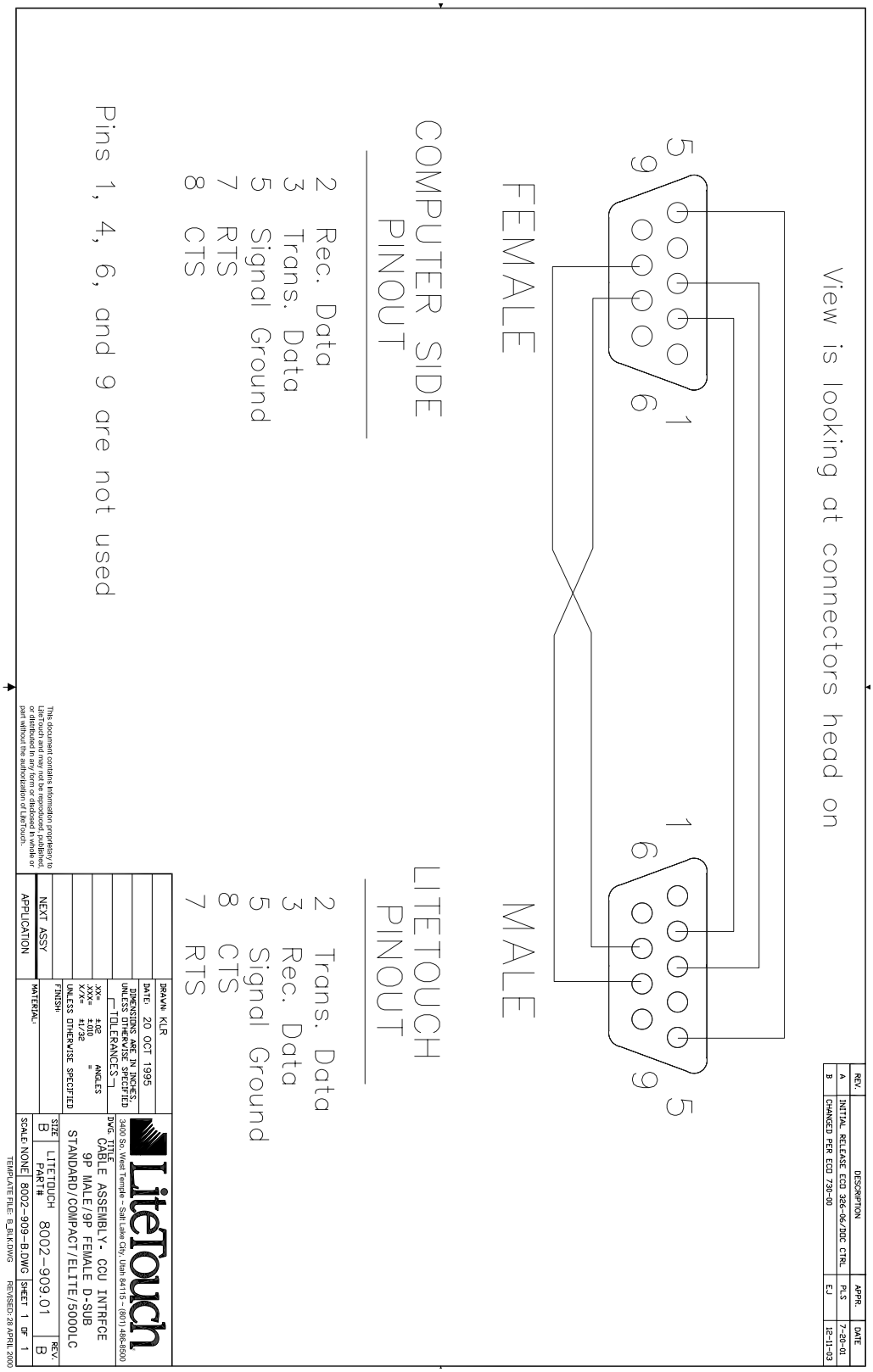
Manual Override



Serial Cable Wiring

The following images show the proper wiring for serial cable configurations.

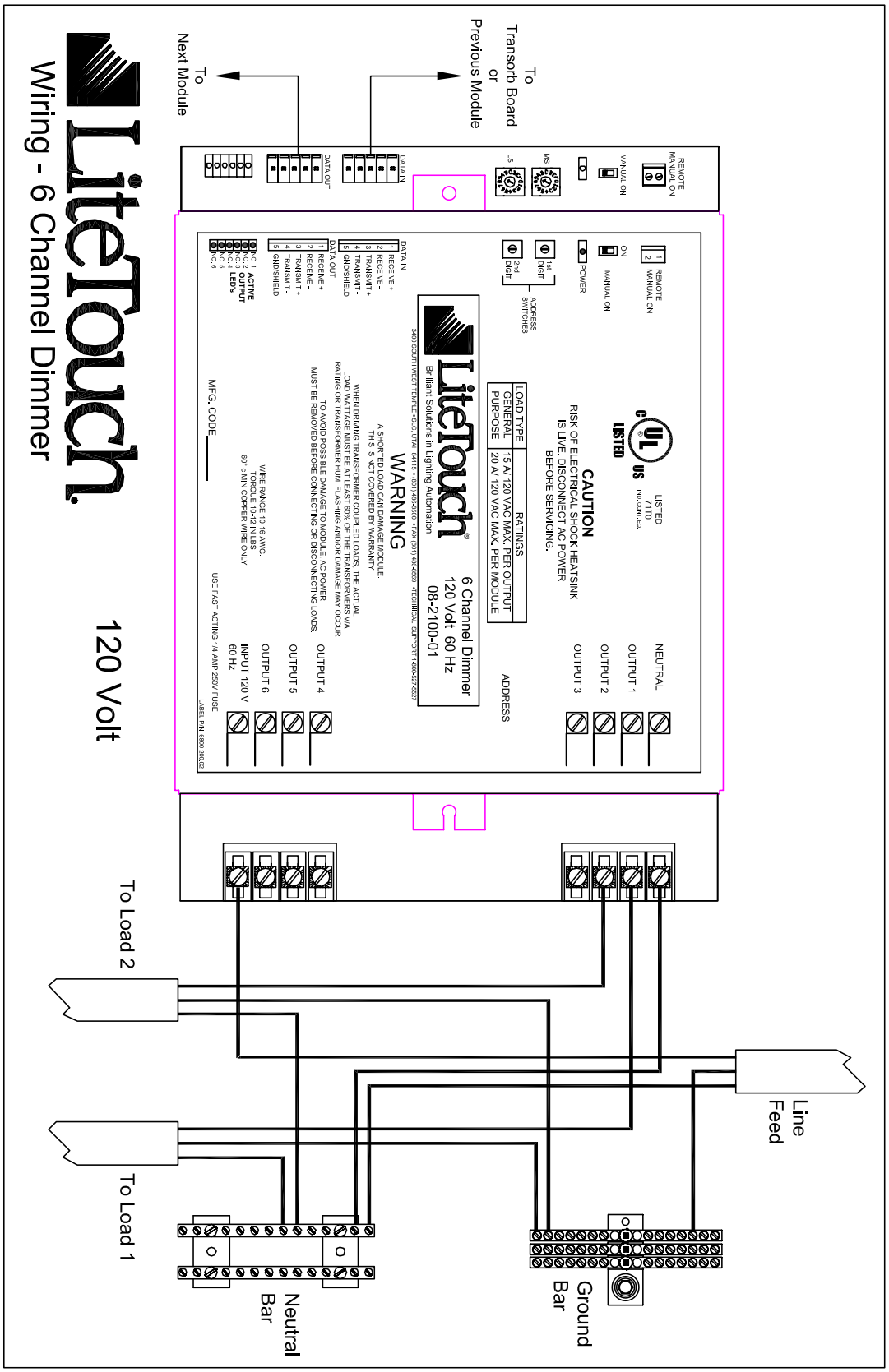
Communications Cable



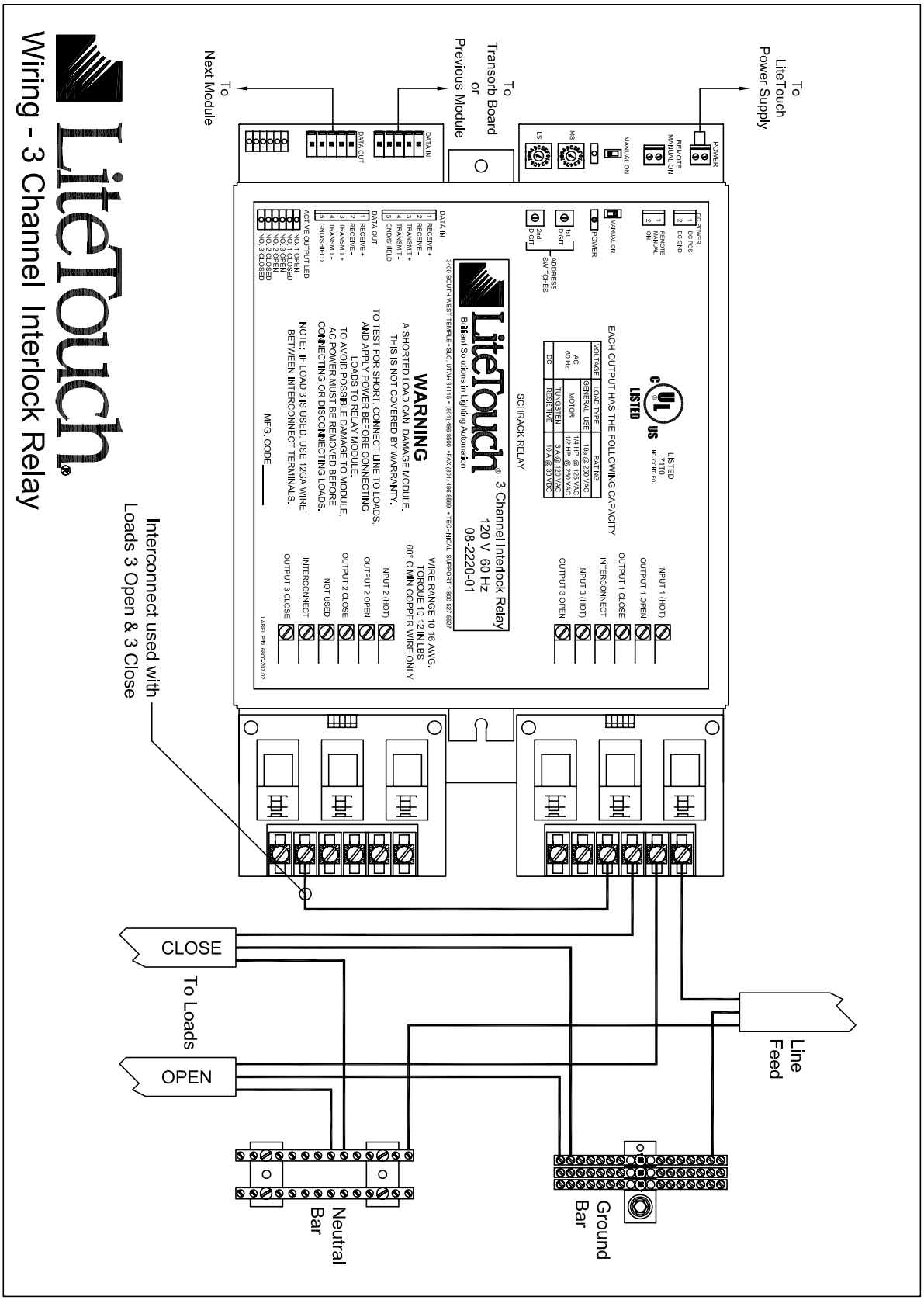
Legacy Module Wiring

The following images show the proper wiring for legacy module configurations.

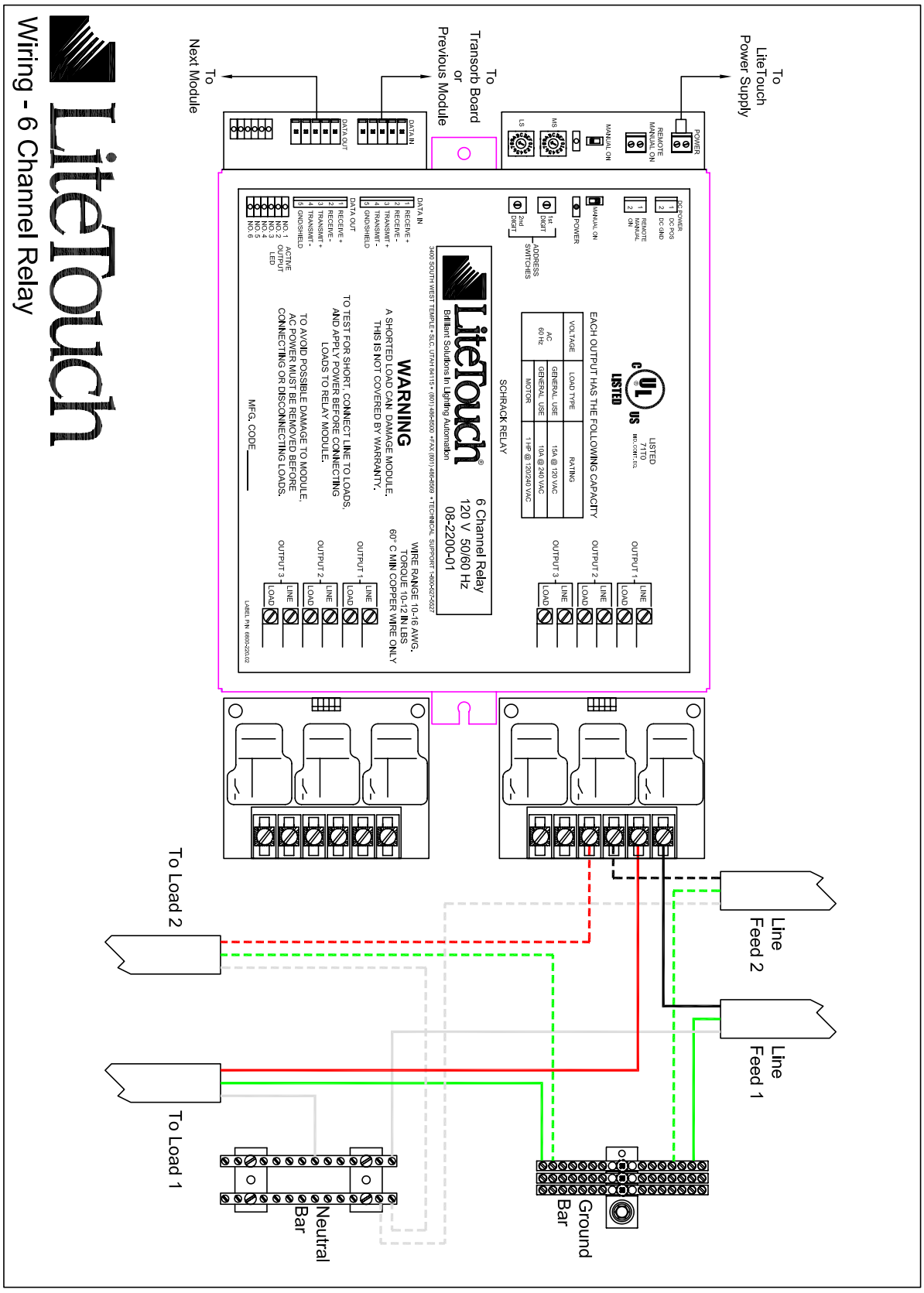
6-Channel Dimmer



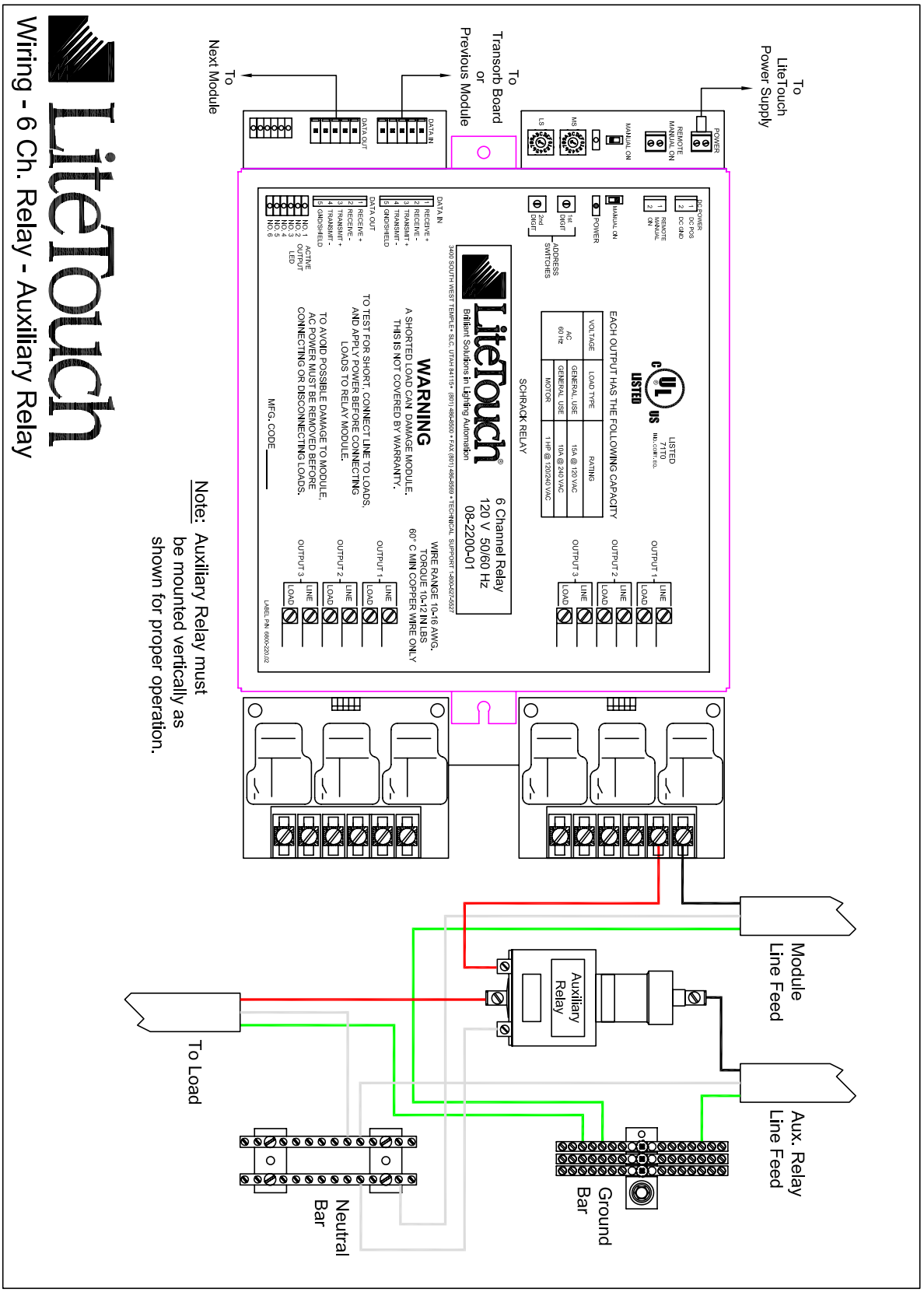
3-Channel Interlock Relay



6-Channel Relay

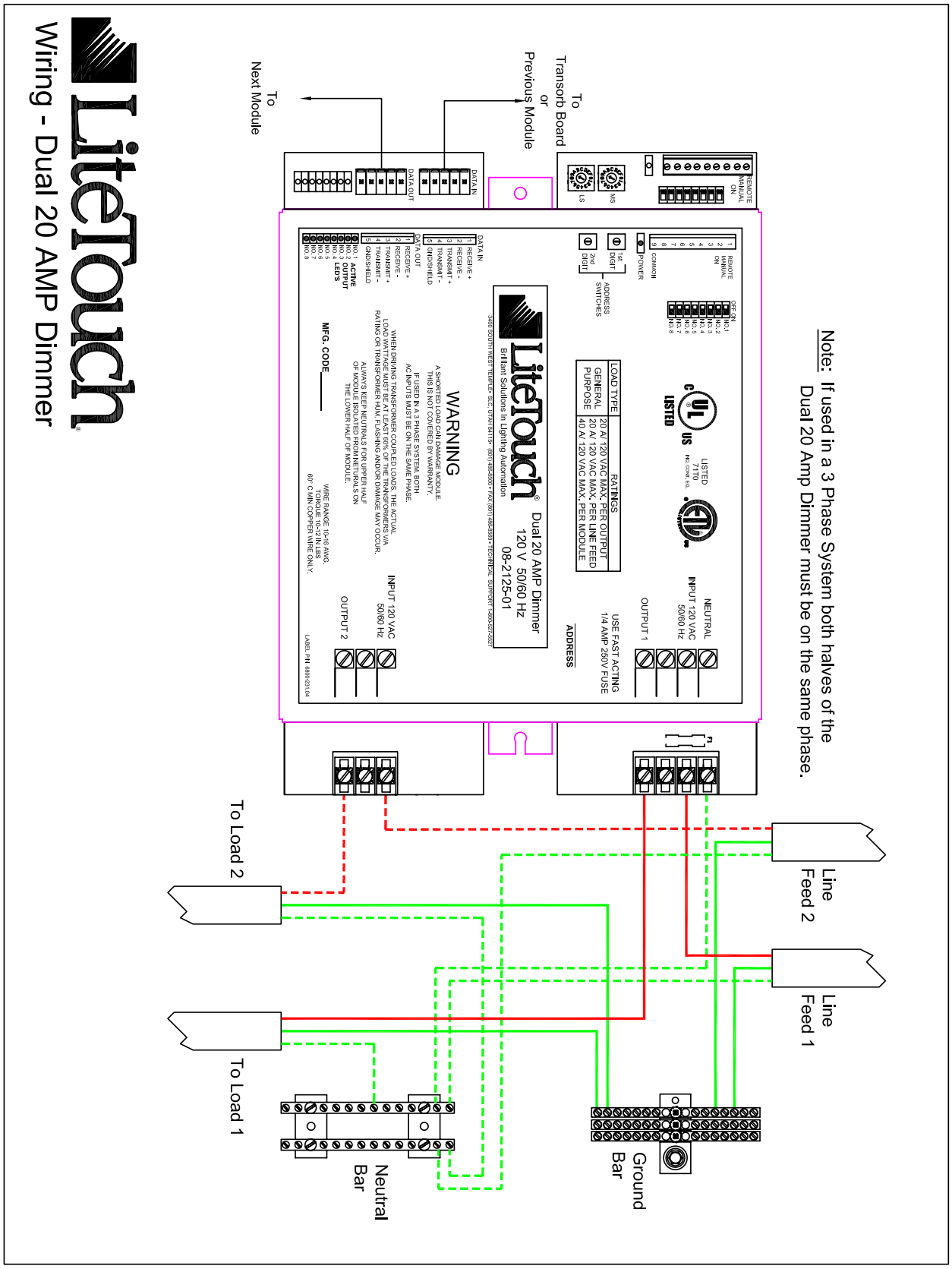


6-Channel Auxiliary Relay

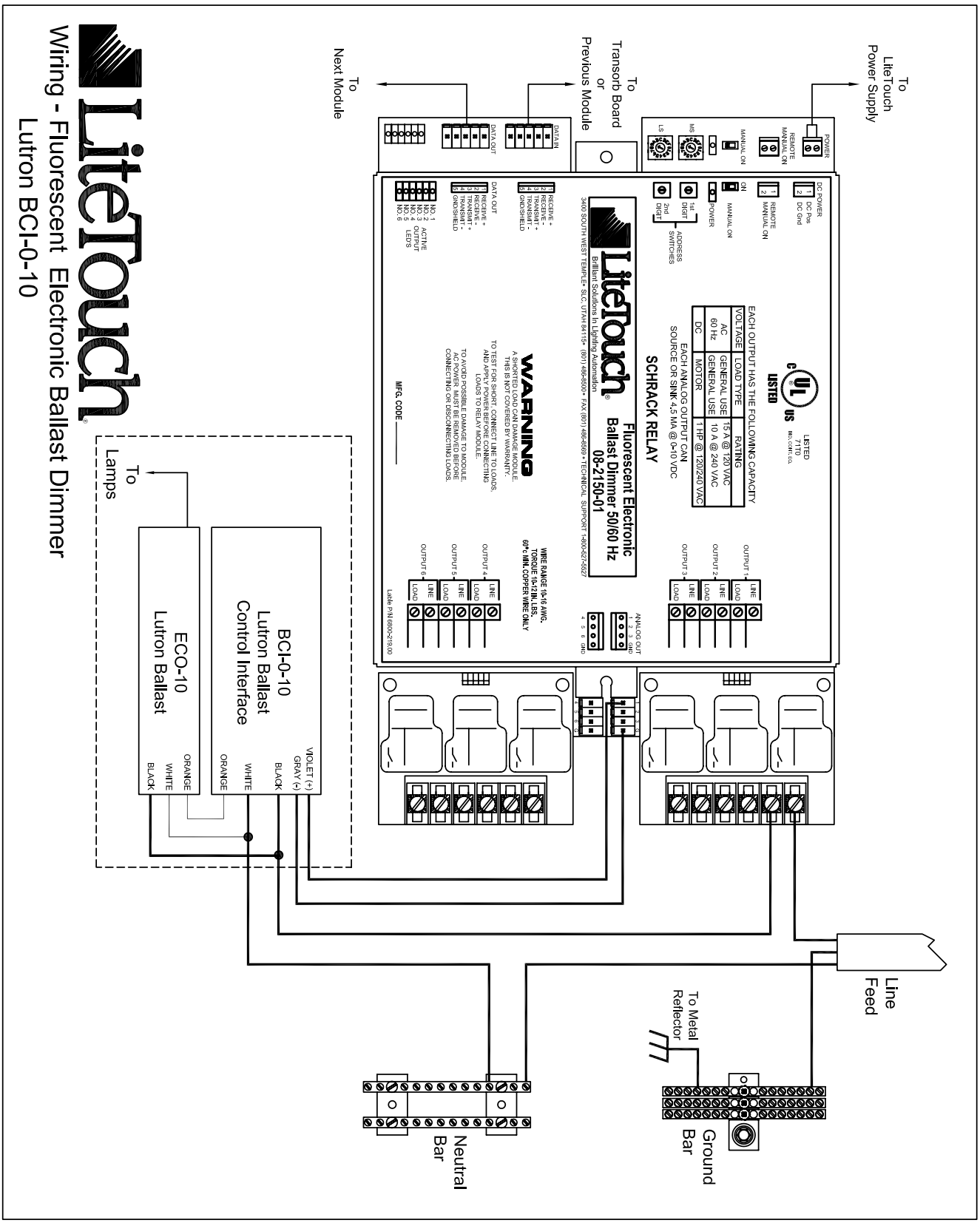


Note: Auxiliary Relay must be mounted vertically as shown for proper operation.

Dual 20-Amp Dimmer



Fluorescent Ballast Dimmer



DC Motor Control