

# SmartLevel<sup>®</sup> Quick Start Guide



**Reliance**<sup>®</sup>

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The Eye-Hye® SmartLevel® system is a microprocessor based industrial level control system that allows for the direct measurement of water level in a high temperature and pressurized boiler drum. Its modular design allows it to be configured to measure level over a User determined range and resolution and indicate it in a variety of methods, visually and/or electronically to plant control systems.

The Eye-Hye SmartLevel system consists of (3) basic parts. The first part is a water column that is custom manufactured for any boiler drum. It can be supplied with up to (24) separate water level sensing probes about the level of interest, linearly or un-linearly along the column. Each probe is then connected by high temperature insulated wire to a junction box that serves to connect the individual probe electrode circuits and the column ground to the main control unit. A separate conductor is required for each probe.

The second part of the system is the main control unit, and it is typically mounted locally near the boiler drum in its own metallic enclosure. The enclosure mounts the main 12/24 channel backplane that serves as the base for all the system modules and to make the connections. One cable entry should be used for probe wires from the column's junction box and another dedicated for the AC mains input. Additional cable entries are added for electrical signal outputs that connect to other plant control or indication instrumentation.

The third part of the system is the LED level indicators. Two sizes are available to fit the Users available mounting space and visual requirements. One Small LED level indicator can be mounted locally in the enclosure door or multiple indicators separately in their own enclosure nearby or up to several thousands of feet away, in a control room. Multiple LED level indicators only require a 4 wire cable connection as they daisy chain from indicator to indicator.

### **Unpacking and Inspection**

Always use caution when lifting or moving SmartLevel components. Some components may require special equipment to safely move or install.

Upon receipt of the Eye-Hye SmartLevel system, examine all products for any damage. Report any suspicious conditions as soon as possible to your carrier to avoid acceptance of damaged goods. Clark-Reliance will not be responsible for goods damaged in shipping, storage, or subsequent loss or damage due to improper storage and exposure.

Verify all materials are present as recorded on the packing list provided with each shipment. Report any discrepancies to Clark-Reliance immediately. Please have the Clark-Reliance order number and shipping waybill available at time of reporting.

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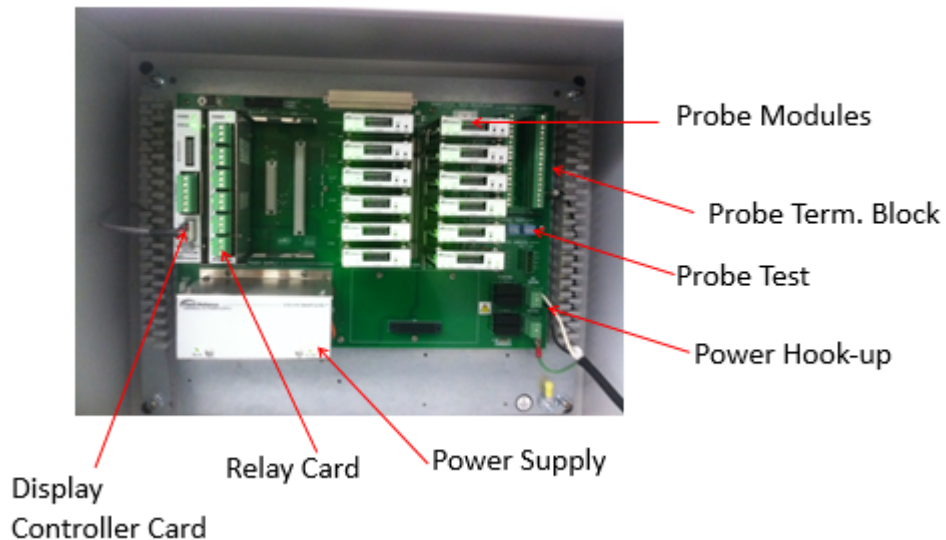
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**Caution:** Before proceeding, follow any and all plant lock-out/tag-out procedures required. Any trips/alarms should be bypassed to prevent any false trips/alarms when servicing the equipment. Verify that all power is turned off to any applicable equipment. If under pressure, the equipment should be isolated, or the boiler should be shut down before proceeding with the installation. Open drain valve to eliminate any trapped pressure. All inspection and installation steps should be performed by a qualified technician and should be executed in accordance with all applicable national and local codes and plant procedures.



**Do NOT remove any components while the unit is powered!**

### Parts of the SmartLevel Controller (interior):



### Wiring and Basic Setup

Field Wiring from the Electrolev is terminated in the Junction Box with the probe wire per Figure 2, (NOTE: that Figure 1 is for a 10 probe column and that systems that have more or less probe channels are wired similarly). A separate wire from the Electrolev column's ground is terminated as the GND (signal ground) conductor.

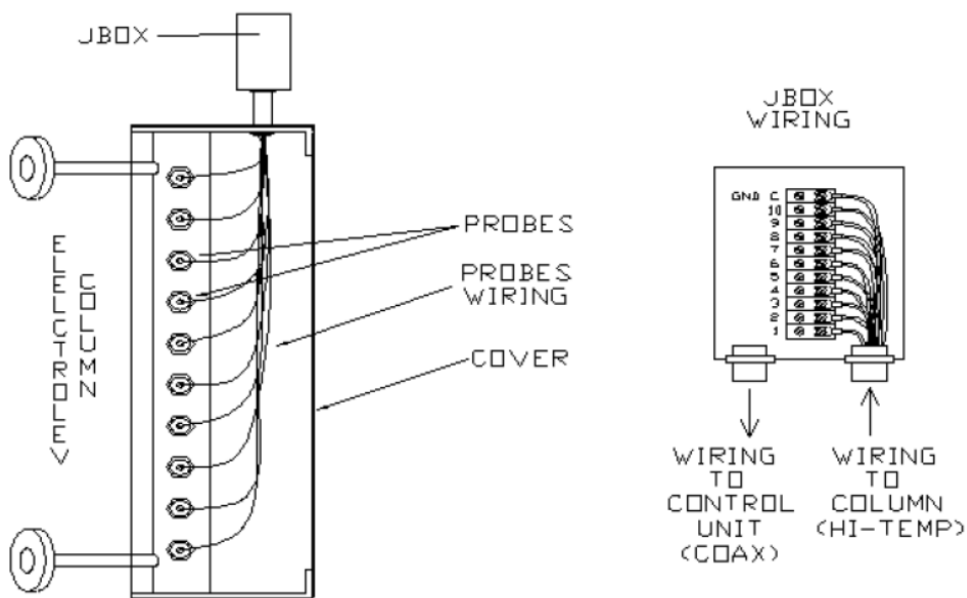
Electrolev columns rated up to 1000 psi (66 Bar) use 18 GA stranded conductor with Teflon insulation that is rated at 300 VAC and 200°C / 392°F. Columns rated 1000 to 3000 (66 to 200 Bar) psi use 18 GA. stranded Nickel coated Copper conductor with

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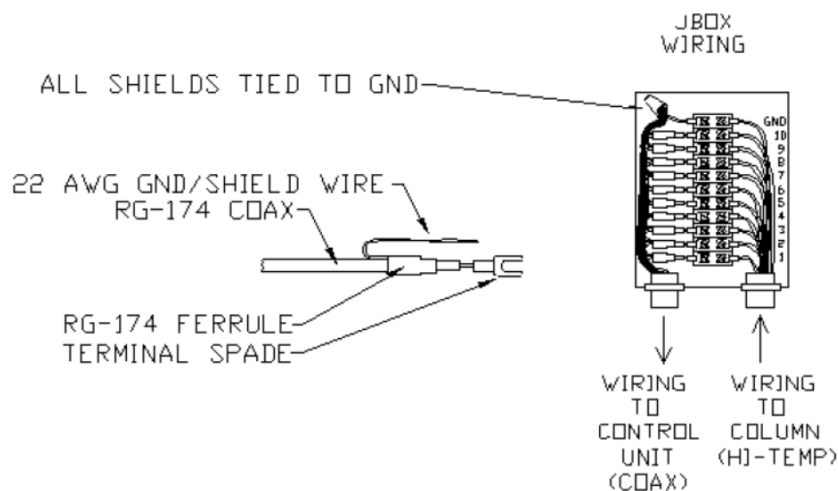
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Teflon-treated glass braid insulation rated at 600 VAC and 450°C / 842°F - UL #5107.  
Both are available from Clark-Reliance.



**Figure 1**

Wiring from the Junction Box to the control units should be made with RG-174 coax. A separate cable is used for each probe, i.e., the column in Figure 1 would use 10 separate lengths of coax. It is suggested that each cable be prepared as shown in Figure 2 with a coax ferrule, spade lug, and ground wire before terminating it at the Junction Box. All are available from Clark-Reliance.



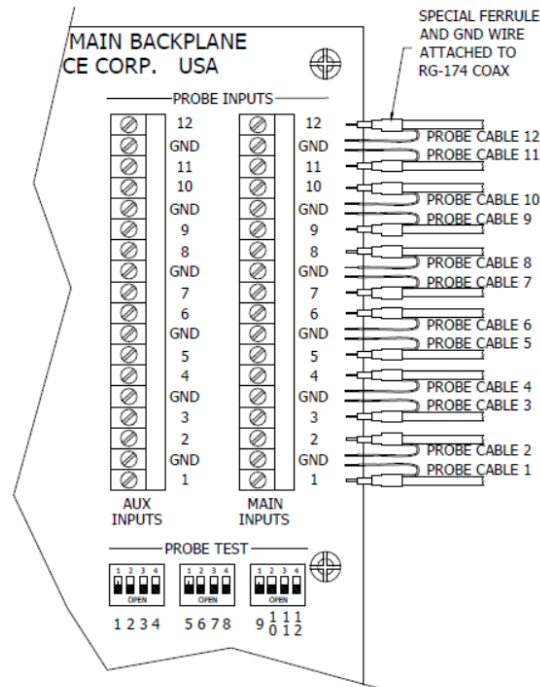
**Figure 2**

The probe connections from the Electroleve are made to the probe modules through the motherboard and are connected to TB3. Prepare the RG-174 coax in the same manner. Solder tin center core wire before installing into header plug. Note that a pair of probe channel connections shares a ground connection, and that the connector is removable to allow ease of wiring. See Figure 3. **NOTE:** *The ferrule crimp is not a requirement for all connections, but is highly recommended by Clark-Reliance to ensure the quality and integrity of the signal.*

Connections to J16, TB5, TB6, and J20 are not supported at this time. Connector J19 allows for electrical connections to the Expansion PCB that adds an additional 12 probe module channels, for a 24 channel system, and 4 more I/O peripheral slots, which is described in Options, section 6.0, in IOM.

A row of 12 DIP switches on the right middle side of the motherboard allow the User to test each probe module channel and the rest of the system for operation by simulating a water condition on each channel. Simply switch the channel to be tested to the ON/UP position to test.

**NOTE:** All the switches must be OFF/DOWN after testing is completed for normal water level.



**Figure 3**

**Note:** If the SmartLevel control unit is mounted within a 15 ft. wire run from the probe column, please consult Clark-Reliance for other wiring options.

The Universal AC Power Supply provides power from an AC Main supply source to power the system. A single supply is typically installed in slot J17. The supply is installed and secured by (3) 6-32 x 1/2 machine screws. An additional supply can be installed in slot J18 to be either used as a backup supply from a separate power source or a redundant, backup supply from a single AC source. See Figure 4.

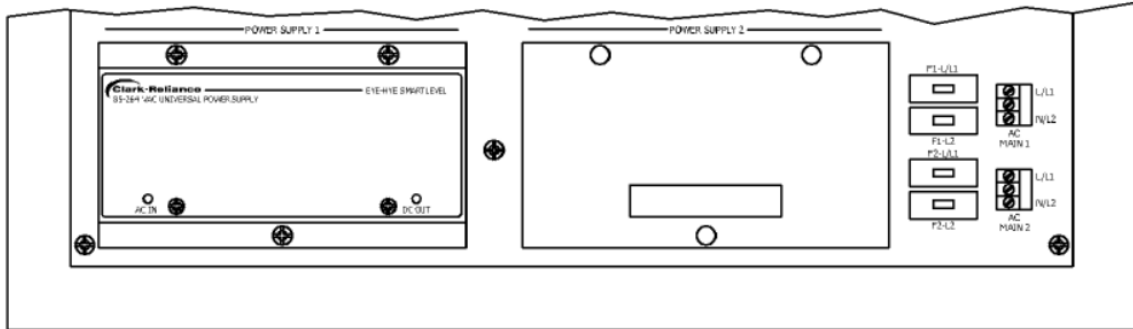


Figure 4

Each supply can accept 115/230VAC at 50/60Hz and is self-switching. The power supplies are also power factor corrected and incorporate active load sharing. Each is fused for safety as an entity and fused additionally on the motherboard for servicing. The AC Mains inputs are easily connected at AC Main 1 and AC Main 2 on removable connectors that accept wire sizes from 12 to 20 AWG. See Figure 5.

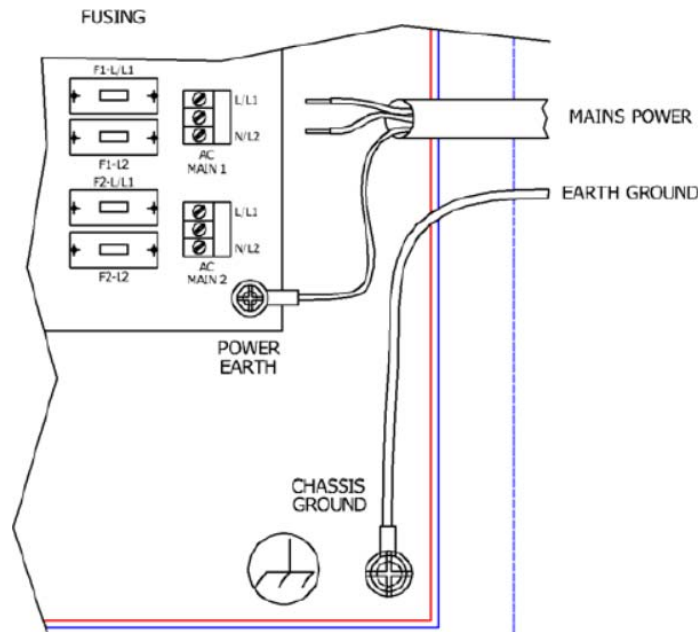


Figure 5

The fuse blocks, F1/F2 and F3/F4 allow for easy fuse servicing. Note that fuses F2 and F4 allow for fusing of the line on 115 VAC Americas and 230 VAC European single phase systems and that F1 and F3 allows for dual line fusing on 230 VAC Americas dual phase systems. Note that a shunt should be used for any single phase neutral, in F1 and/or F3.

AMERICAS ONLY: Fuses are included for both 115VAC and 230VAC operation and are in labeled bags. Locate the correct fuses for the power input, install and discard the other fuses.

#### Replacement Fuses:

- 1.) T3.15A 5x20 mm Fuse, (for 120 VAC use),  
Clark-Reliance P/N: E-F-DIN-0315-T
- 2.) T1.25A 5x20 mm Fuse, (for 240 VAC use),  
Clark-Reliance P/N: E-F-DIN-0125-T
- 3.) 5x20 mm Shunt, (for neutral fusing only),  
Clark-Reliance P/N: E-F-DIN-SHUNT

*Replacement fuses can be purchased at: [PARTS.CLARK-RELIANCE.COM](http://PARTS.CLARK-RELIANCE.COM)*

NOTE: The protective earth ground from the Power Mains should be connected to the enclosure via the bottom right mounting screw securing the motherboard. A separate earth ground MUST be connected to the terminal lug on the metal mounting plate and secured with the provided lock washer. See Figure 5.

Individual LED indicators are provided to indicate the supply's operational status. An AC IN LED is used to indicate a connection to an AC main and a DC OUT LED is used to indicate a "good" DC voltage output. Each supply powers a single 12 VDC power buss that is used to power the entire system. Each supply is rated for 150 watts and is protected by its own internal safety fuse.

Local and national electrical codes may require a disconnect device (switch, circuit breaker, etc.). This must be appropriately marked in a suitable location near the equipment and easily accessible. Do not position the equipment so that it is difficult to operate the disconnecting device.

The LED Display Controller is a peripheral assembly shown in Figure 9. Communications to all the LED indicators, small or large, are wired to it. An industry standard RS-485 interface is incorporated for reliable operation and effective immunity to environmental electrical noise. The display controller updates the indicators every second. Connections are easily made from the controller to one or more indicators by daisy chaining their signal connections as shown in Figure 7.

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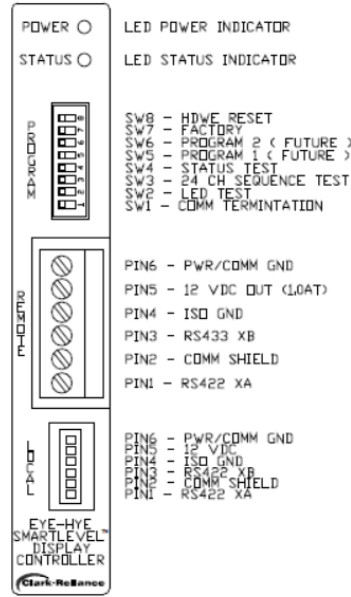


Figure 6

Both LED Indicator connectors (for the SIM and SIS indicators) pin outs are as follows. Two twisted pairs or 4 conductor-shielded 18-22 AWG wire is recommended for use. Note the pin numbering above in Figure 7. Pins are not always numbered in the same direction.

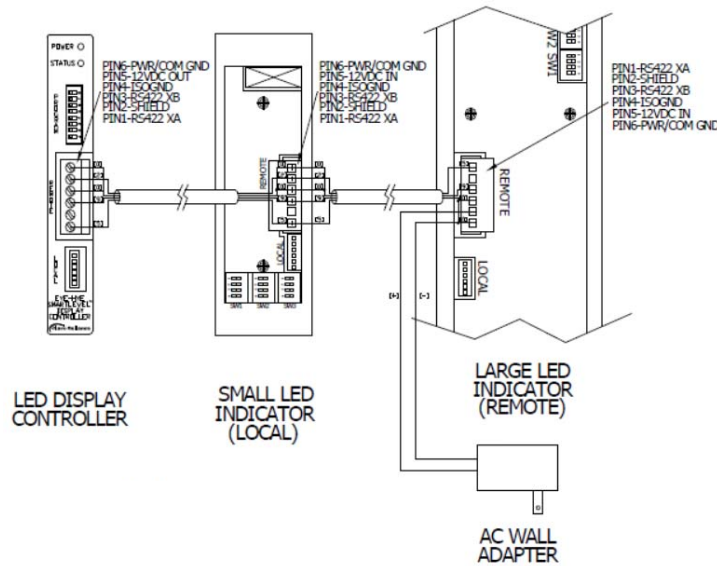
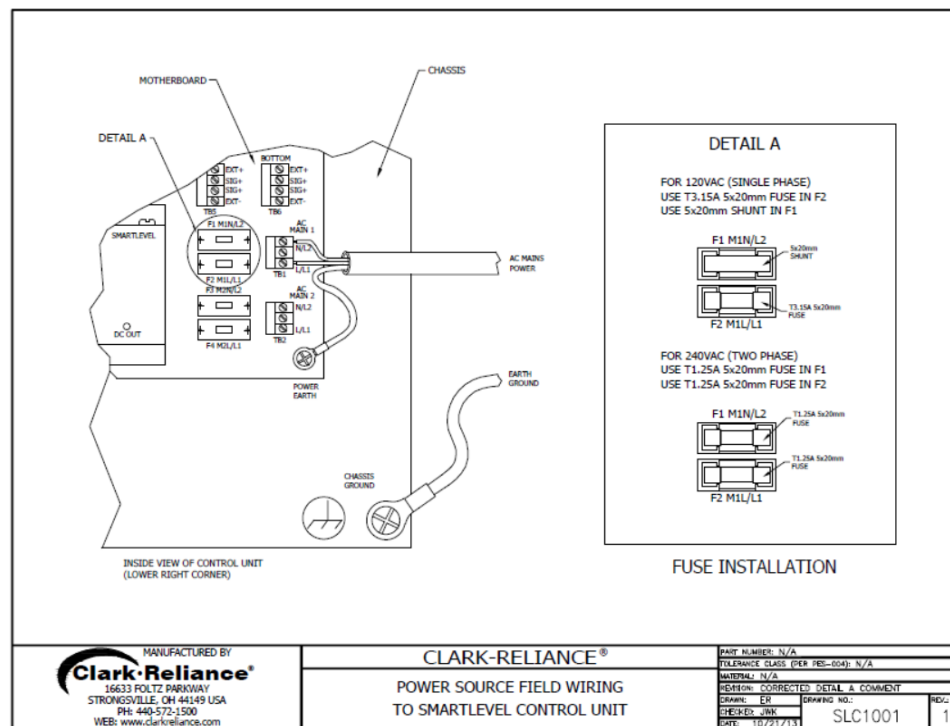
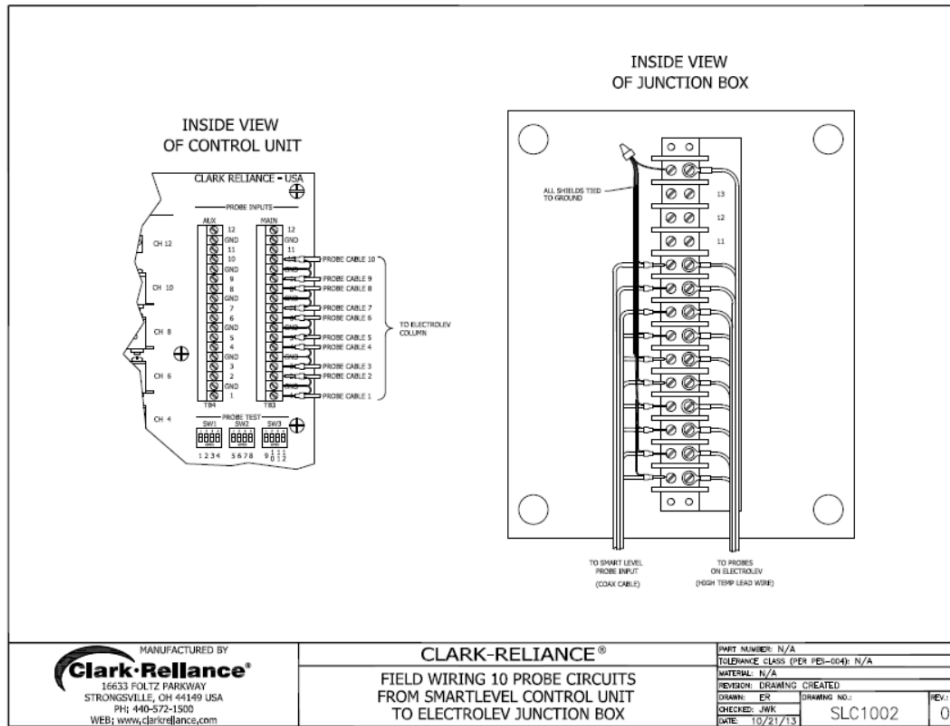


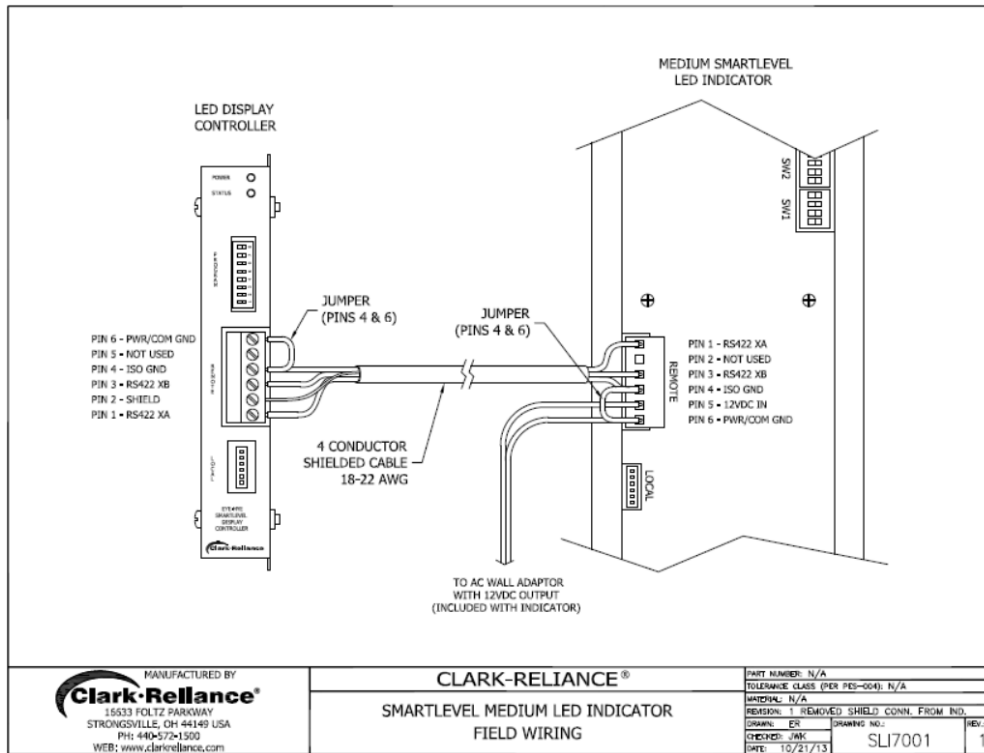
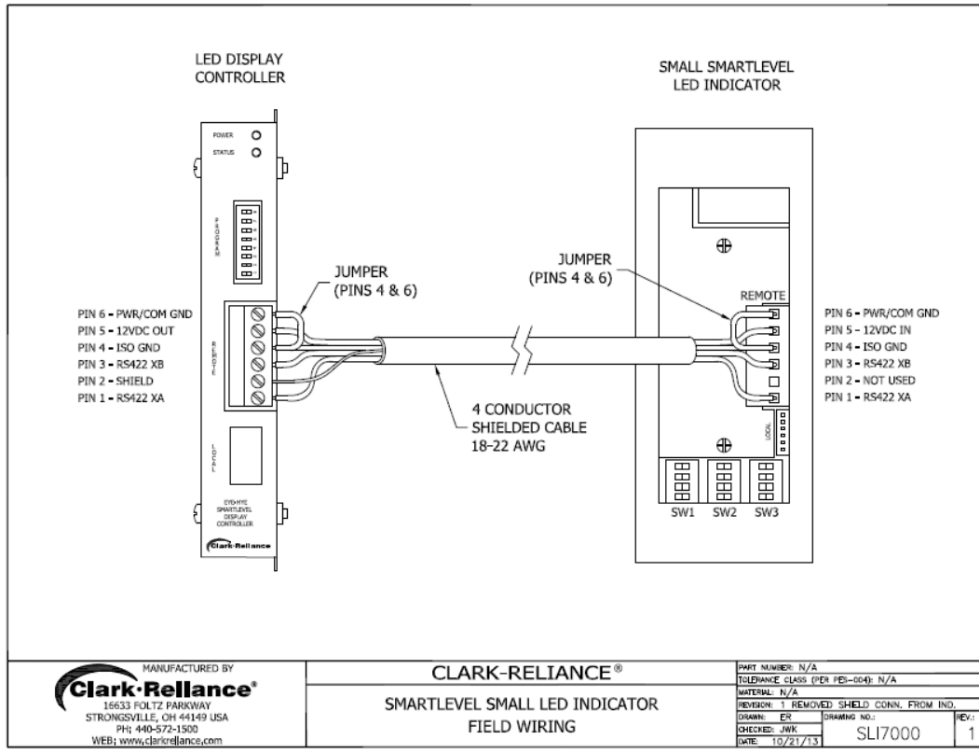
Figure 7

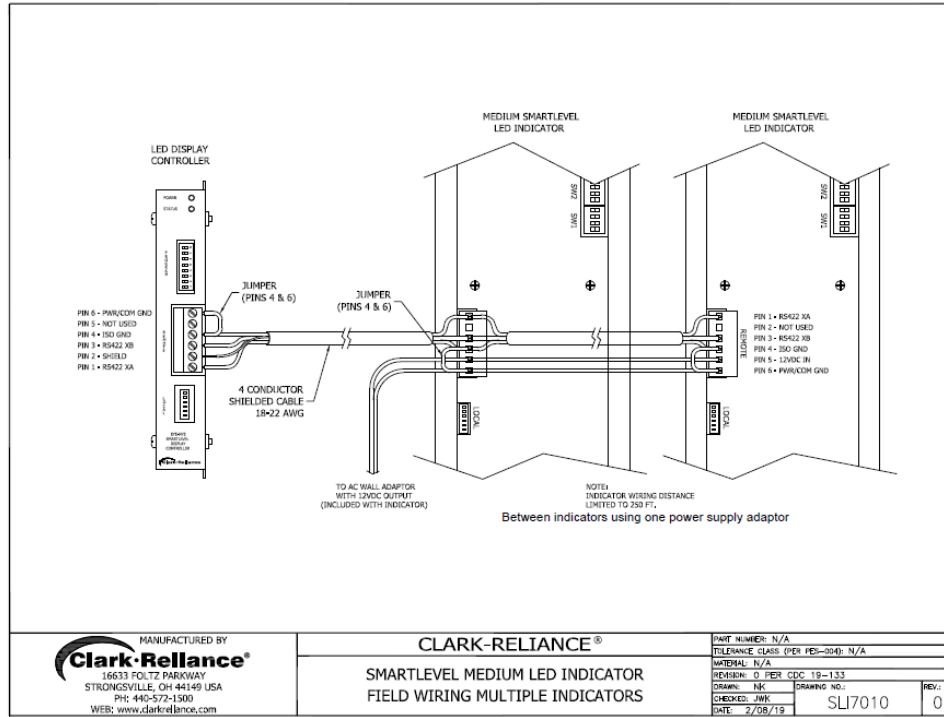
**Note:** The recommended method of powering the indicator is with the AC adaptor. If a power outlet is not readily available, the indicator can be powered from the control unit if it is within 1000 feet. Consult factory with any questions.



**Typical Reference Drawings**







**Instruction Manual References:**

- R500.E249 Detailed Instruction Manual, includes
  - Start-up and commissioning – page 23
  - Relay Card Setup – page 24
  - 4-20Ma Card Setup – page 26
- R500.E137 Probe Maintenance
- R500.E156 Blowdown Manual
- R500.E249-SLC85 Intrinsically Safe Barriers
- R500.E239 Hot Torque Procedure for the Probes

**Video References:**

Visit the Resouce Tab at [www.RelianceBoilerTrim.com](http://www.RelianceBoilerTrim.com) for:

- Terminating RG-174 Coax Cable Video
- Blowdown Animation Video
- Hot Torque Procedure
- Introduction to the Eye-Hye SmartLevel



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**REPLACEMENT PARTS WARNING**

THE USE OF NON-ORIGINAL EQUIPMENT MANUFACTURER PARTS (SUCH AS GLASS, GASKETS, PROBES, MODULES, ETC.) WILL VOID THE AGENCY APPROVAL (FM, UL, CAS, CRN, ABS, ETC.) PRESSURE/TEMPERATURE RATING, AND WARRANTY OF THE EQUIPMENT. CLARK-RELIANCE REQUIRES THE USE OF OEM PARTS FOR ALL REPAIRS IN ON THIS PRODUCT IN ORDER TO MAINTAIN PLANT AND PERSONNEL SAFETY, AND RELIABLE OPERATION.

Consult the factory or your local Clark-Reliance Representative with any questions. Please have the model numbers and/or reference drawing numbers available when calling. You can also contact us at our website [www.relianceboilertrim.com](http://www.relianceboilertrim.com) or [RelianceAppEng@clark-reliance.com](mailto:RelianceAppEng@clark-reliance.com).

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