



Network LTC™ Plus Satellite Series Controller Installation Instructions

Introduction

The Network LTC Plus satellite controller is designed for installation on a substantial concrete foundation with imbedded conduit of various diameters to enable power, field, ground and communication wiring to be routed into the cabinet for connection. A mounting bolt positioner and basic mounting hardware components are included with each controller. Additional materials required to complete the installation must be obtained separately. A material list can be compiled by reading through the instructions completely prior to starting the installation.

For your protection and the safety of the product user, comply with all Caution and Warning statements within this document. All installation practices must comply with all applicable national and/or local electrical and construction codes.

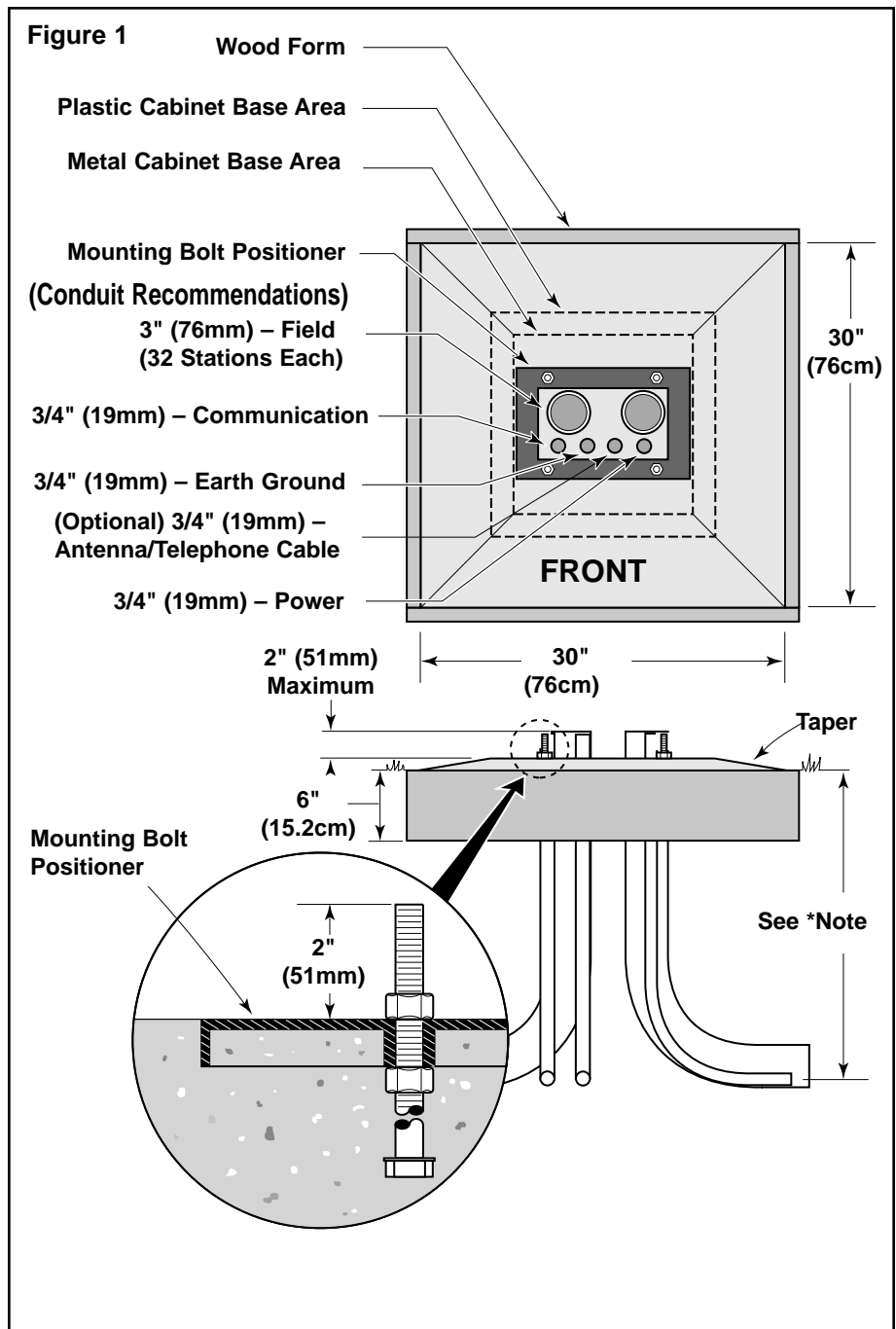
Foundation Construction

1. Prepare a hole for the foundation and wiring conduit using the minimum recommended dimensions shown in **Figure 1**.

***Note:** Refer to local electrical codes for required depth of buried wiring .

2. Trench to the foundation site as required for each wiring run.
3. Position straight and sweep elbow conduit sections in foundation hole as shown. Tape the conduit ends to seal out dirt. Backfill soil to form a 6" (15.2cm) foundation depth. Conduit should not extend more than 2" above the finished top surface of the foundation.
4. Prepare the sides of the foundation hole with wood forms.
5. Prepare the mounting bolt positioner with the 5/16 x 4-1/2" bolts and nuts (provided) as shown in **Figure 1**. The threads should extend 2" (51mm) from the top surface of the bolt positioner.
6. Pour concrete into the formed foundation hole. Press the mounting bolt positioner into the concrete until it is flush and level with the foundation surface and aligned with the conduit.
7. Finish the concrete with a level flat area for the pedestal base (13" x 13" [33cm x 33cm] for the metal cabinet or 16" x 16" [41cm x 41cm] for the plastic cabinet). To prevent pooling at the base of the pedestal, add a slight taper away from the cabinet base contact area. Allow concrete to sufficiently harden before continuing.

8. Remove the hex nuts from the mounting studs. Carefully position the controller onto the studs. Install a flat washer and a hex nut on each stud and tighten securely.



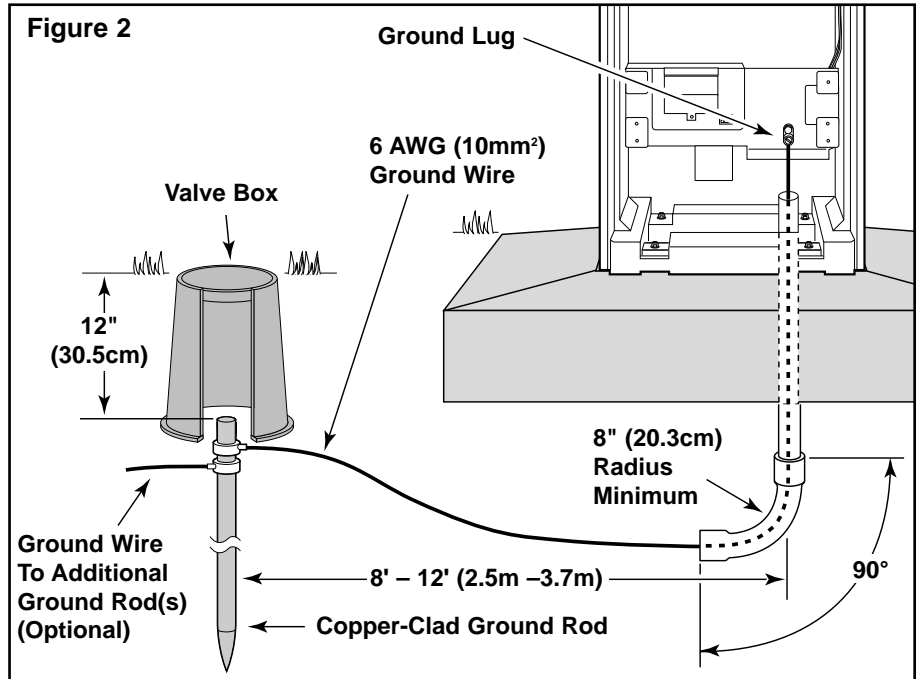
Earth Ground Installation

⚠ Important: The satellite surge protection components cannot properly function unless an efficient pathway to earth ground is provided. The ground path must be as direct as possible, without sharp bends and must not exceed 30 ohms resistance (when measured with an earth ground resistance test device). A resistance reading of 0–10 ohms is considered excellent, 11–20 ohms is acceptable and 21–30 is considered marginal. All electrical components throughout the irrigation system should be grounded in a manner which provides the same ground potential.

The following instructions depict one of several acceptable earth grounding methods. Due to variables in soil composition and terrain, the method shown may not be suitable for your installation site. Contact your local Toro distributor for assistance and availability of the required earth ground resistance test instrument. Recommended ground testers are: AEMC Instruments, model 3710 clamp-on tester, or Biddle Megger, model 250260 (or equivalent).

Procedure

1. Drive a 5/8" by 8' (16mm by 2.5m) copper-clad steel rod into well-moistened soil at a distance of 8' to 12' (2.5m to 3.7m) from the satellite. The top of the ground rod should be 12" (30.5cm) below grade level. See **Figure 2**.
2. Using a 5/8" (16mm) clamp or "Cad weld" fastener, attach a length of 6 AWG (10mm²) solid-core, bare copper wire near the top of the ground rod. Avoiding wire bends of less than 8" (20.3cm) radius, route the wire through the foundation into the controller cabinet. Secure the wire to the large copper ground lug provided on the power supply chassis. See **Figure 2**.



3. Ensure the soil surrounding the ground rod remains well moistened at all times. Measure the ground resistance per the instructions provided with the ground test instrument. A reading of 0 ohms is optimum, up to 10 ohms is good and 11–30 ohms is acceptable in most cases. If the resistance exceeds the acceptable limit, an additional ground rod can be installed at a distance equal to twice the buried depth of the first rod (i.e., 16' [4.9m]). Connect the ground rods using 6 AWG (10mm²) bare copper wire and test again. If the ground resistance remains high, contact your local Toro distributor for further assistance and recommendations.

Note: A valve box works well for locating the ground rod and providing access to the ground wire connection(s).

Input Power Installation

Caution: When installing multiple controllers, polarity of the Line and Neutral connections must be properly maintained throughout the irrigation system. Reversed polarity may cause damaging potentials to exist at one or more controller locations.

WARNING

AC POWER WIRING MUST BE INSTALLED AND CONNECTED BY QUALIFIED PERSONNEL ONLY.



ALL ELECTRICAL COMPONENTS AND INSTALLATION PROCEDURES MUST COMPLY WITH ALL APPLICABLE LOCAL AND NATIONAL ELECTRICAL CODES. SOME CODES MAY REQUIRE A MEANS OF DISCONNECTION FROM THE AC POWER SOURCE, INSTALLED IN THE FIXED WIRING, HAVING A CONTACT SEPARATION OF AT LEAST 0.120" (3MM) IN THE LINE AND NEUTRAL POLES.

ENSURE THE AC POWER SOURCE IS OFF PRIOR TO CONNECTING TO THE CONTROLLER.

Input Power Installation (continued)

Procedure

1. Place the controller's main power switch in the Off position. See **Figure 3**.
2. Position the input voltage select switch to the 115V or 230V position as required.
3. Remove the power wiring access cover located on the back of the power supply assembly. See **Figure 4**.

Note: The power and equipment ground wires are connected to a terminal block located on the back of the power supply assembly. The power wire access hole provided will accommodate a 3/4" (19mm) conduit fitting. If conduit is required, install a section of flexible 3/4" (19mm) electrical conduit from the foundation conduit to this access hole.

4. Route the appropriate size insulated copper wire from the power source location to the power supply terminal block.
5. Reference **Table 1** for the appropriate type of power connection. Secure the wires to the terminal block as indicated in **Figure 4**.
6. Reinstall the power wiring access cover.
7. Apply power to the controller.

Note: The Network LTC Plus satellite incorporates a 24 v a.c. Hot Post feature on each station output module which enables control valves to be identified through momentary activation. To utilize the Hot Post feature, the satellite power supply must be switched on. If you do not wish to use the Hot Post feature, leave the controller's main power switch off until the installation has been completed.

Field Wire Installation

Caution: The Network LTC Plus satellite is capable of operating up to eight stations and the pump/master valve circuit concurrently. To prevent possible controller damage, total current load for all field outputs operating concurrently must not to exceed 3.2A. If more than one valve per station is required, calculate the total in-rush current load which would be imposed in the maximum operating conditions and use this value as a guide during installation and operation of the controller.

Caution: Do not connect the pump starter directly to the controller's pump start circuit – damage to the controller will result.

Procedure

1. Attach the control and common wires to each valve and/or valve-in-head solenoid leads using an approved waterproof splicing method. Route the wires into the controller cabinet through the 3" (76mm) conduit.
2. If automatic pump start is required, refer to the applicable wiring diagram in **Figure 5** (page 4) and install accordingly.

Caution: Do not connect the pump starter directly to the controller's pump start circuit – damage to the controller will result.

Note: The pump circuit can also be utilized to control a master valve if required.

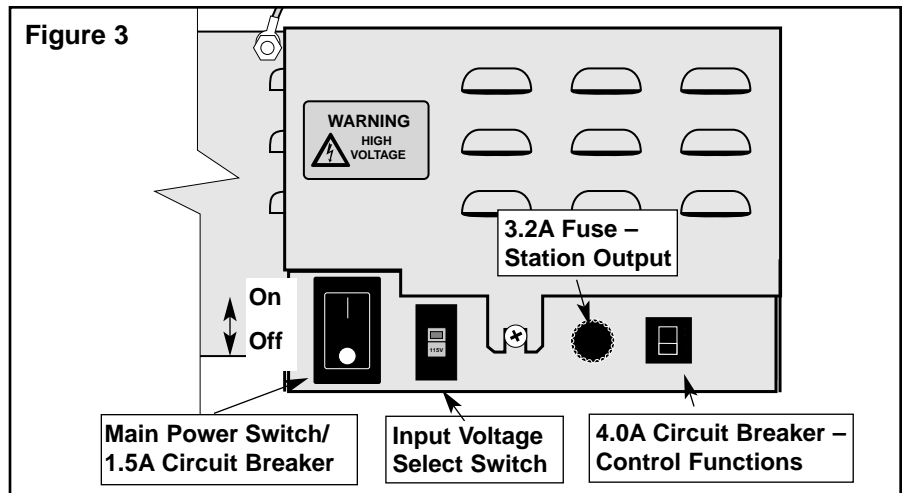
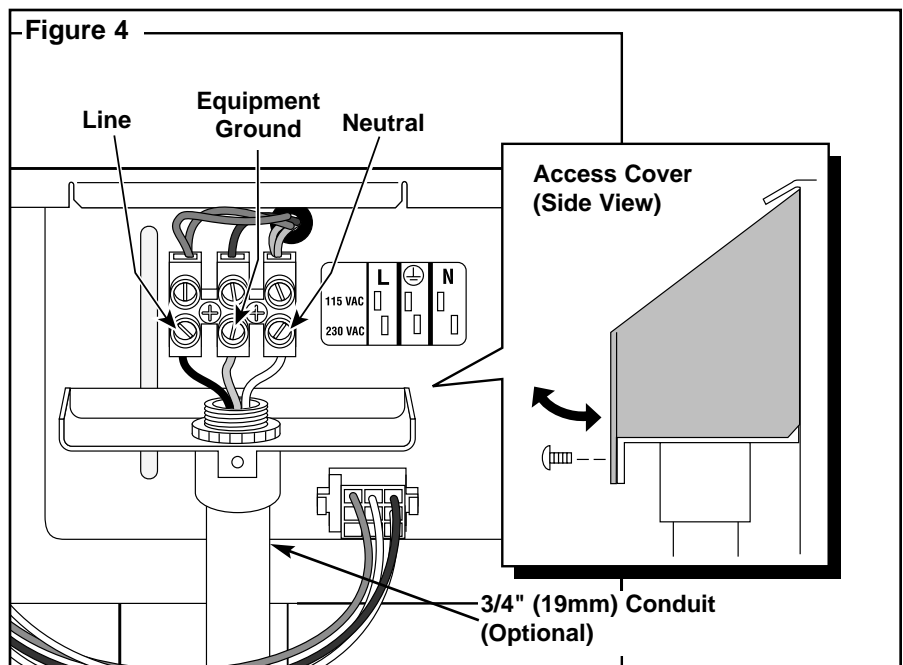


Table 1

AC Service Type	Line	Equip. Grnd.	Neutral
115 V a.c. (Domestic)	Hot (Black)	Green	Neutral (White)
230 V a.c. (3-Phase)	Hot (Black)	Green/Yellow	Hot (Blue or Red)
230 V a.c. (International)	Hot (Brown)	Green/Yellow	Neutral (Blue)



Field Wire Installation (continued)

- Secure the field common wire(s) and pump start relay (or master valve) wire to the appropriate terminals on the Pump/Com module OR (optional) Pump/Com Surge Protection module. See **Figure 6**.
- Momentarily touch each valve control wire to the Hot Post to activate and identify the corresponding valve(s).
- Secure the valve control wires to the station terminals in the preferred order of operating sequence. Station terminals are numbered left to right, 1–32 (front) and 33–64 (back). See **Figure 7**.

Note: A cable tie support loop is provided on the plastic chassis below the standard terminal block. After installing the field wires, insert a nylon cable tie through the loop and around the wire bundle. Cinch the wires tightly to secure. Ensure the terminal block is properly inserted after securing the wires. See **Figure 7**.

Note: A 3-position switch is provided on the Pump/Com module for additional control of the pump relay circuit. In addition, the optional station terminal modules with optional control switches have one switch for each station output. See **Figures 6 and 7**. The three switch positions control the circuits as follows:

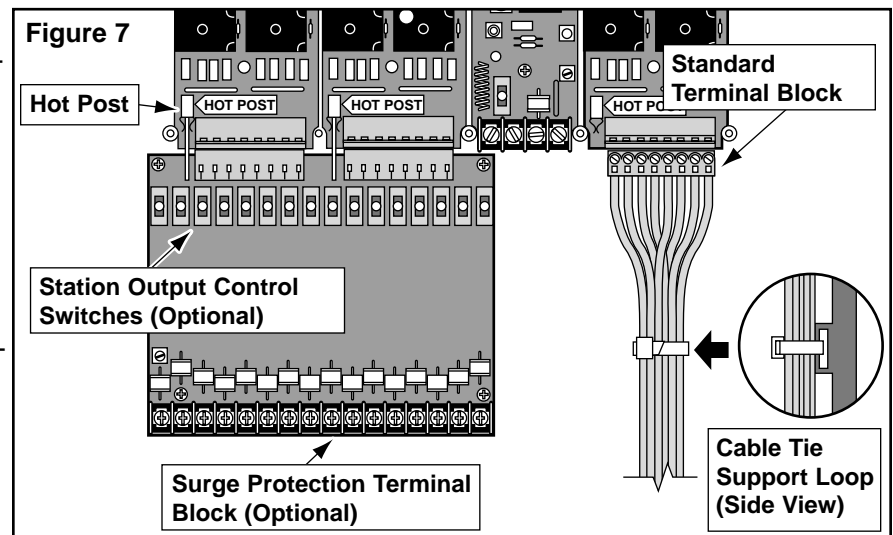
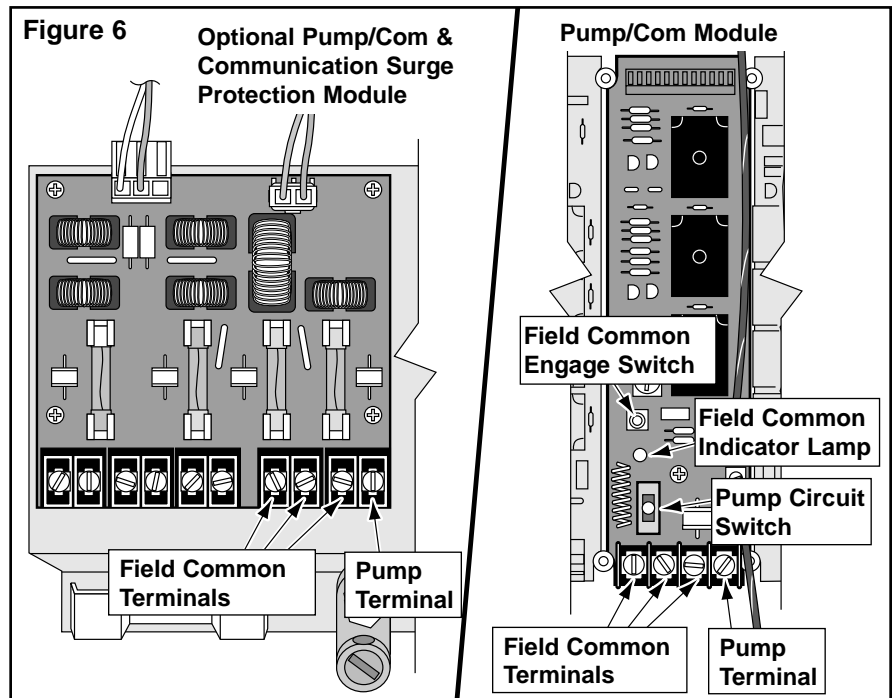
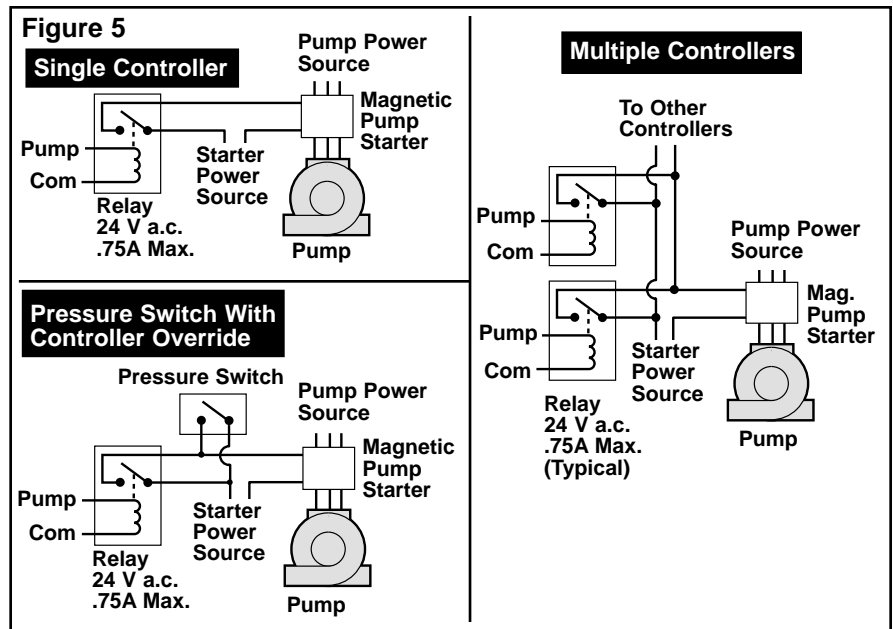
On – Manually activates the circuit. The pump or station will remain on until the switch is moved to the Auto or Off position.

Off – Switches the circuit off, preventing pump or station operation from the satellite.

Auto – The circuit is automatically activated by the controller during automatic or manual watering operation.

As an added lightning protection measure, the field common circuit is normally open when the controller is inactive. Therefore, to use the field output control switches for manual operation, the common circuit must be engaged first. Press the Field Common Engage push button switch to activate the circuit. The Field Common Indicator Lamp will turn on when the circuit is active. The common circuit will automatically disconnect upon completion of an automatic or manually activated watering operation initiated through the timing mechanism. The circuit can also be disconnected by momentarily switching the power supply off.

Caution: To prevent damage to the 3.2A field output circuit fuse, do not exceed 3.2A load when manually activating multiple field outputs.



Communication Cable Installation

Please note the following communication cable installation requirements and suggestions:

- The satellite is designed for use with shielded, twisted-pair, communication cable. Consult with your local Toro distributor for the cable type and wire size best suited for your installation.
- More than one cable run can be connected to the SPU.
- A satellite communication cable can emanate from another satellite connection.
- If additional communication cable runs are installed for future system expansion, each cable wire pair must be terminated with a 600 ohm resistor.
- If the communication cable is routed in the same trench as main power wires, a minimum of 12" (30.5cm) separation is recommended to prevent voltage induction on the communication cable. Check local codes for actual requirements.
- Refer to the installation instructions provided with the central control system for communication cable testing procedures.
- If in-ground cable splices or repairs are required, the connection must be properly insulated with a waterproof splicing device. Using an appropriate splicing kit, such as Scotchcast 82-A1 (or equivalent), is recommended. Placing the cable splice in a small valve box for protection and accessibility is also recognized as good installation practice.

Procedure

1. Starting at the SPU, route the communication (comm) cable to each satellite leaving enough cable at each location to enable connection. See **Figure 8**.

***Note:** If additional communication cable is installed for future system expansion, connect a 600 ohm resistor across the wire pair at the end of the cable as shown in **Figure 8A**.

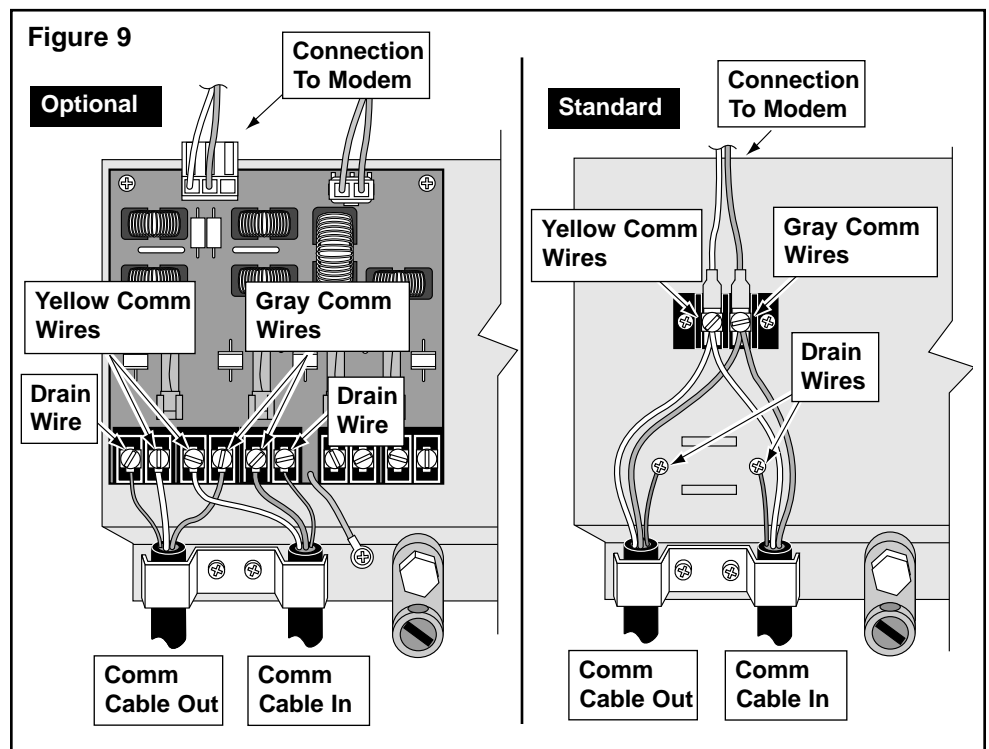
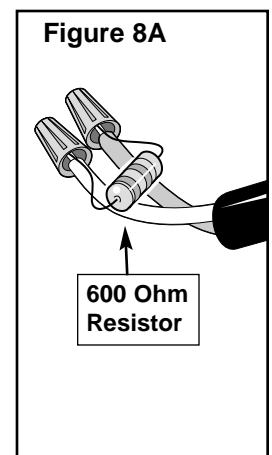
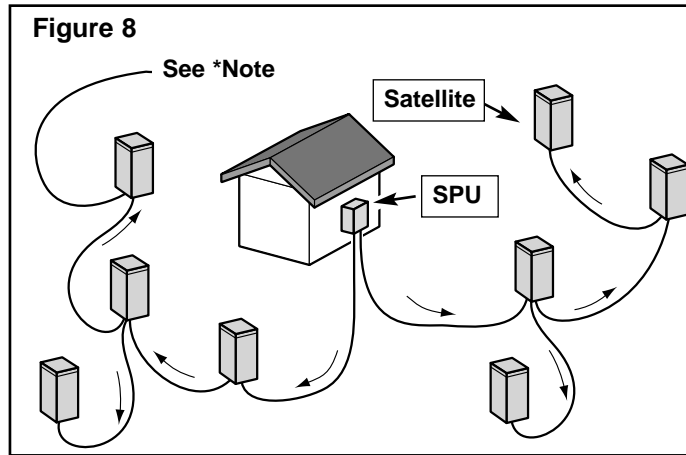
2. At the satellite, cut the cable and pull both ends into the satellite through the 3/4" (16mm) sweep conduit.

3. From the cable ends, carefully remove the outer jacket and inner insulation to expose the comm wires and drain wire. If installing cable in a satellite without surge protection, expose 5" (12.7cm) of wire; with surge protection, expose 2" (5.1cm) of wire. Remove 3/8" (10mm) insulation from the ends of each comm wire.

4. Clamp the cable to the chassis assembly and secure the comm and drain wires as shown in the optional or standard configurations as shown in **Figure 9**.

Note: Remove the modem wire connector(s) until the comm cable has been tested. Refer to the installation instructions provided with the central controller for testing procedures.

This completes the controller installation process. Refer to the Network LTC Plus Satellite User's Guide for programming and operation procedures.



Specifications

Line Voltage: 115-120 or 230-240 V a.c. 50/60 Hz (switchable), 130 VA

Current Draw (no load): 0.21A @ 115-120 V a.c., 60 Hz or 0.10A @ 230-240 V a.c., 50 Hz

Current Draw (maximum load): 0.91A @ 115-120 V a.c., 60 Hz or 0.45A @ 230-240 V a.c., 50 Hz

Secondary Voltage Output: 24 V a.c., 50/60 Hz, 3.0A (85 VA)

Maximum Load Per Station Output: 0.75A (18 VA)

Maximum Load Per Pump/Master Valve Output: 1A (24 VA)

Maximum Load Per Pump/Master Valve Output: 1A (24 VA)

Operating Temperature: -10°C to +60°C (14°F to 140°F)

Storage Temperature: -30°C to +65°C (-22°F to 149°F)

Hardware Features

Plastic or Painted Stainless-Steel Cabinetry

Front, Back and Top Locking Covers

Removable Station Output and Common/Pump Modules

Modular Station Output: 16 to 64 stations in 8-station increments

Optional Surge Protection Modules for Field and Communication Circuits

Fuses and Circuit Breakers

Power Supply:

1.5A On/Off Switch/Circuit Breaker – Main Power Input

3.2A Fuse (Slow-Blow) – Field Output

4.0A Circuit Breaker – Control Functions (Timing Mechanism)

Communication Modem (optional): 0.75A Fuse

Pump/Common & Communication Surge Protection Module (optional): 0.5A Fuse



WARNING

IF FUSE REPLACEMENT IS REQUIRED, REPLACE WITH A FUSE OF THE SAME TYPE AND AMPERAGE RATING. FAILURE TO COMPLY CAN RESULT IN SERIOUS INJURY AND/OR EQUIPMENT DAMAGE DUE TO FIRE HAZARD.

Electromagnetic Compatibility

Domestic: This equipment has been tested and found to comply with the limits for a FCC Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. The equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to the radio communications. Operation in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

International: This is a CISPR 22 Class A product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.



Irrigation Division
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