



Sentinel Field Satellite Controller Metal Pedestal, Plastic Pedestal and Wall Mount Models Installation Instructions

⚠ Important: For your protection and the safety of the product user, please comply with all Caution and Warning statements within this document. All installation practices must comply with all applicable national and/or local electrical and building codes and be performed by qualified personnel only.

Introduction

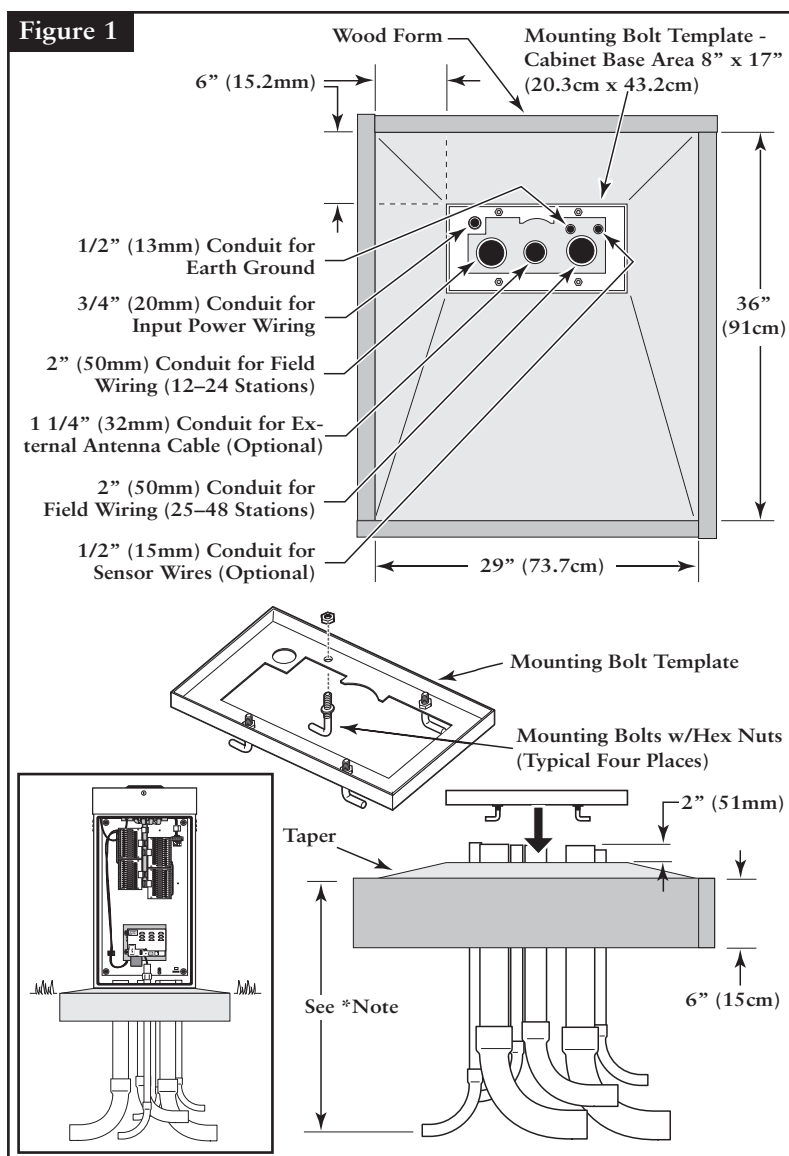
The metal or plastic pedestal-mount satellite controller unit is designed for installation on a substantial concrete pad with embedded conduit of various diameters to enable wiring connections for power, field, earth ground, sensor and optional external antenna. Pedestal anchor bolts and a steel bolt pattern template are supplied with the controller.

The wall-mount satellite unit is designed for installation on a structurally-sound building wall. The stainless steel cabinet is moisture resistant and suitable for outdoor installation. The cabinet has upper and lower support attachments and is supplied with a mounting bracket which attaches directly to the wall. Refer to wall mount installation procedures on page 2.

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.

Metal Pedestal Installation

1. Prepare a hole for the pad and wiring conduit using the minimum recommended dimensions shown in **Figure 1**. This size pad requires approximately 4cu ft (122cu cm) of concrete.
***Note:** Refer to local electrical codes for the required wire burial depth.
2. Position straight and sweep elbow conduit sections in foundation hole as shown.
Placing the controller toward the back of the pad as shown protects the ground near the front of the controller from wear.
3. Tape the conduit ends to seal out dirt. Backfill soil to form a 6" (15cm) foundation depth. The conduit should not extend more than 2" (51mm) above the finished top surface of the foundation.
4. Form the perimeter of the pad area using 2 x 6 boards or 3/4" (19mm) plywood.
5. Prepare the mounting bolt template with the provided L-shaped bolts and hex nuts as shown in **Figure 1**.
6. Pour concrete into the formed area and trowel smooth. Finish the concrete pad with a level flat area for the pedestal base approximately 8" x 17" (20cm x 43cm).
7. Aligning the mounting bolt template with the conduit, press the L-shaped bolts into the concrete until the template makes contact. To prevent pooling at the base of the pedestal, add a slight taper away from the template. Allow the concrete to sufficiently harden before continuing.
8. Remove the mounting bolt hex nuts. **Remove and discard the mounting bolt template.** Place the pedestal on the pad ensuring all bolts are inserted into the pedestal base. Install a flat washer and a hex nut on each bolt and tighten securely.

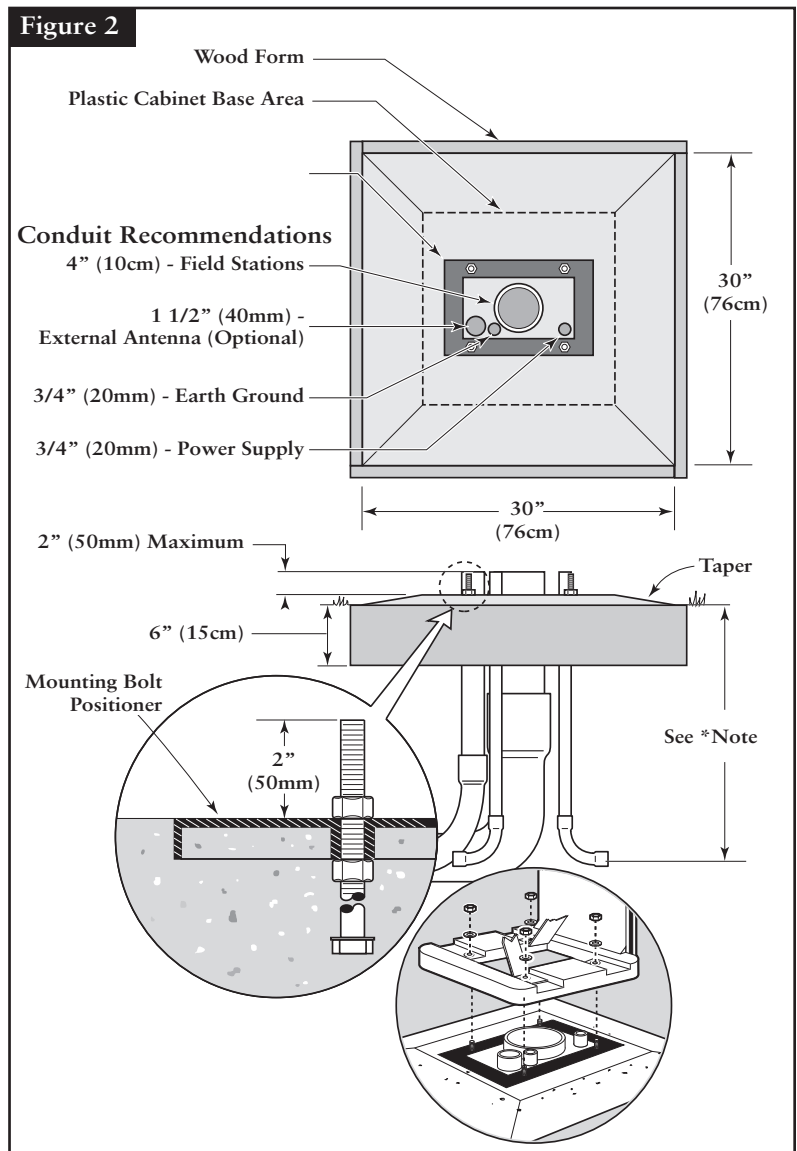


Plastic Pedestal Installation

1. Prepare a hole for the foundation and wiring conduit using the minimum recommended dimensions shown in **Figure 2**.

***Note:** Refer to local electrical codes for required wire burial depth.

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" (51mm) 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 2**. 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 of 16" x 16" (41cm x 41cm) for the pedestal base. 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. Remove the cabinet cover and doors. Carefully position the controller onto the studs. Install a flat washer and a hex nut on each stud and tighten securely.



Wall-Mount Cabinet Installation

1. Position the upper support bracket on the wall with the joggle edge up to accept the mating upper cabinet bracket. The support bracket must be level and at a height approximately 2" (51mm) above eye level to enable the Sentinel control module display to be easily viewed.
2. Mark the two mounting screw hole locations and drill pilot holes for the screws or screw anchors.

Note: Use 3/8" (10mm) diameter fasteners to attach the cabinet support brackets. If installing the cabinet on dry wall or masonry, install the appropriate size and type screw anchors.

3. Secure the support bracket to the wall. Hang the cabinet on the wall by engaging the upper cabinet bracket and the support bracket.
4. Draw a pencil line the entire length of the lower support bracket.
5. Remove the cabinet from the wall and remove the lower support bracket from the cabinet.
6. Place the lower support bracket on the wall aligning it with the pencil mark.
7. Mark the two screw hole locations and drill pilot holes for the mounting screws or screw anchors.
8. Secure the bottom support bracket to the wall.

***Note:** On early model cabinets, conduit access holes are only provided for power and one field wire conduit. Additional conduit access holes for earth ground, additional field wire conduit, optional sensor wires and optional external antenna must be cut or punched by the installer. All conduit access holes and knock-outs are provided on current production cabinets.

9. Remove optional conduit knock-outs as required for installation. See ***Note** above.
10. Hang the cabinet on the wall mount support bracket. The bottom edge of the cabinet should now rest squarely on the lower support bracket.
11. Secure the cabinet to the lower support bracket using the carriage bolts and nuts removed in Step 5 above.
12. Install electrical conduit for all wiring connections per local and national code. See **Figure 4**.

Figure 3

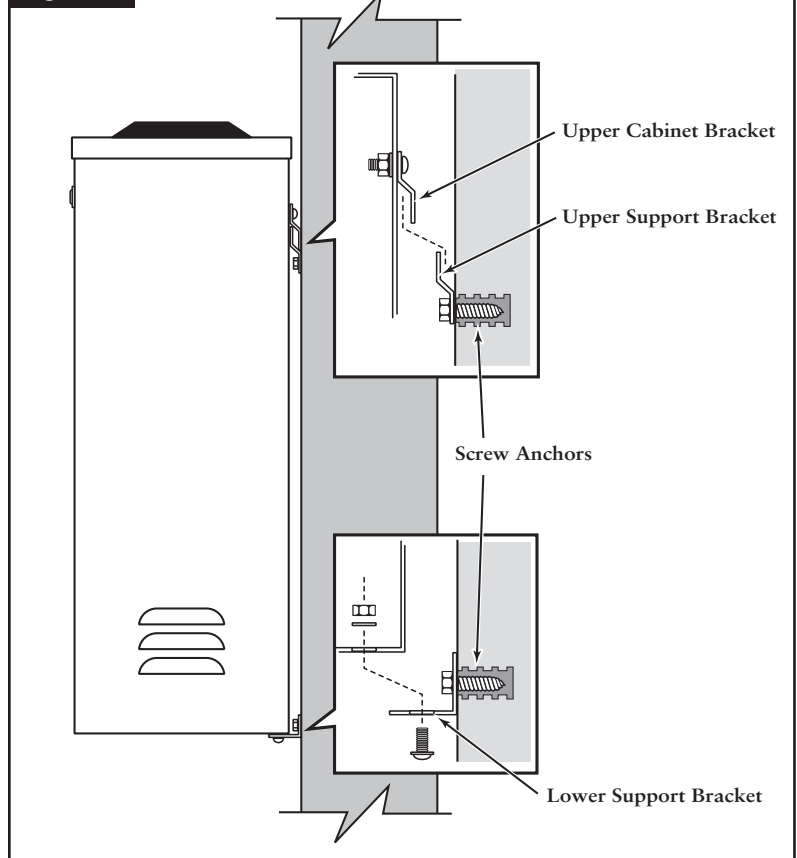
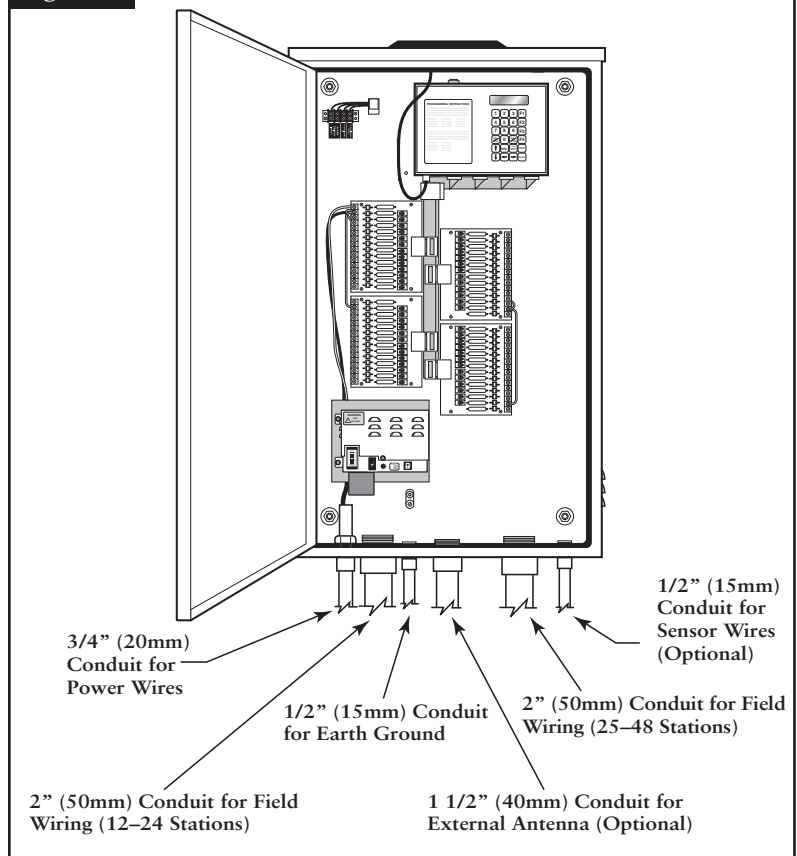


Figure 4



Earth Ground Installation

IMPORTANT! The TDC 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 Ohm resistance (when measured with an earth ground resistance device). All electrical components throughout the irrigation system should be grounded similarly to provide 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.

Step 1 – Drive a 5/8" x 8' (17mm x 2.5m) copper-clad steel rod into well moistened soil not less than 8' (2.5m) or not more than 12' (3.7m) from the controller cabinet. The top of the ground rod should be 12" (30.5cm) below grade level. See **Figure 2**.

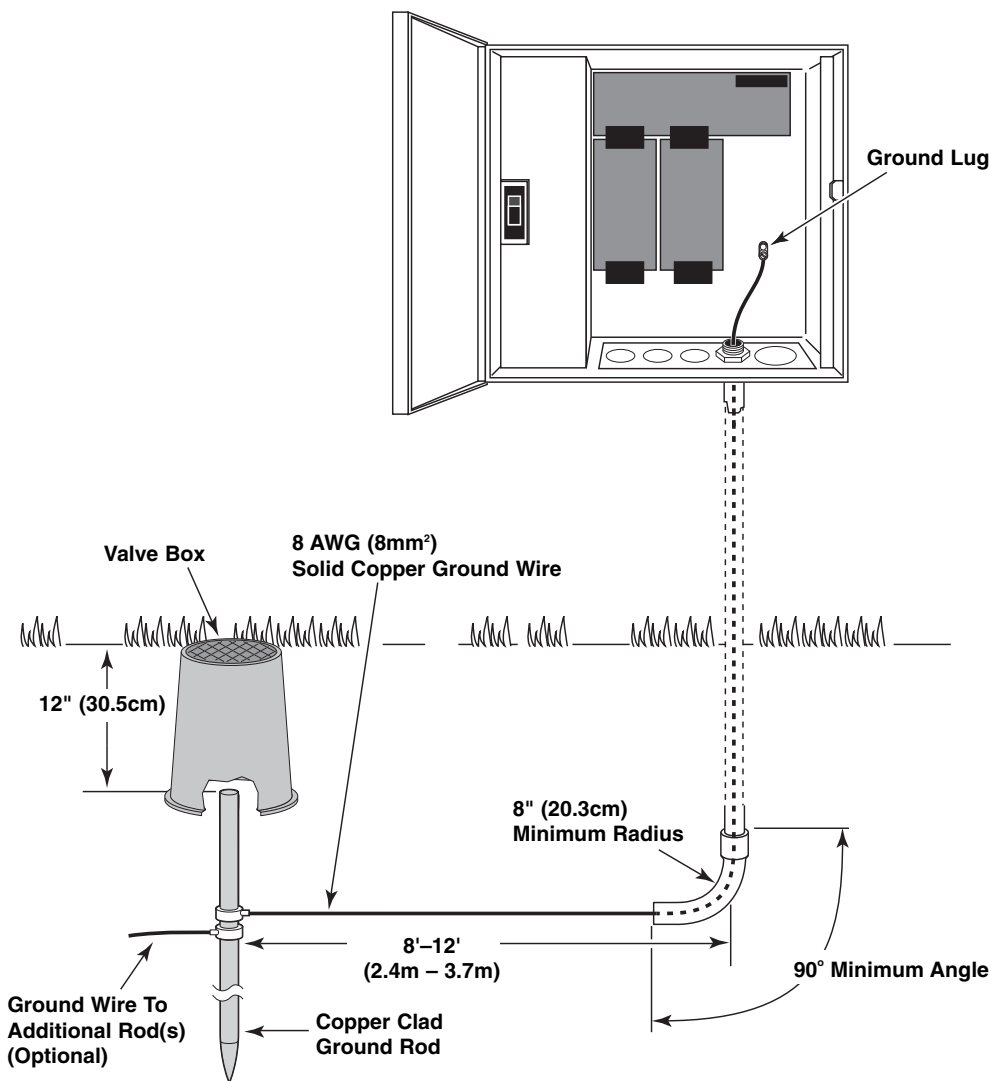
Step 2 – Using a 5/8" (17mm) clamp or "Cad weld" fastener, attach an 8 AWG (8mm²) solid copper wire near the top of the ground rod. Avoiding wire bends of less than 8" (20.3cm) radius and more than 90°, route the wire through conduit and into the cabinet. Secure the wire to the copper ground lug.

Note: Make sure the soil surrounding the ground rod(s) remains well moistened at all times. The addition of some form of irrigation may be required if the cabinet is installed in a non-irrigated location.

Step 3 – Measure the ground resistance per the instructions provided with the ground test instrument. A reading of 0.0 Ohm is optimum, up to 10 Ohm is good and 11–30 Ohm is acceptable in most cases. If the resistance exceeds the acceptable limit, additional ground rod(s) can be installed at a distance equal to twice the buried depth of the first rod; i.e., 16' (4.9m). Interconnect the ground rods using 8 AWG (8mm²) solid copper wire and test again. If the measured ground resistance continues to read above the acceptable limit, contact your local Toro distributor for further assistance and recommendations.

Note: Installing a round valve box over the ground rod enables the ground rod to be easily located as well as providing access to the ground wire connection(s).

Figure 2



Power Source Installation



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 3mm IN THE LINE AND NEUTRAL POLES.

ENSURE THE AC POWER SOURCE IS OFF PRIOR TO SERVICING. FAILURE TO COMPLY MAY RESULT IN SERIOUS INJURY DUE TO ELECTRICAL SHOCK HAZARD.

Step 1 – Turn off the power at the power source location and place the controller's power switch to OFF. Connect and route the appropriate size 3-conductor cable (10 AWG [2.5mm²] maximum) from the power source to the controller cabinet.

The provided power cable access hole can accommodate a 1" (25mm) conduit fitting. If conduit is required, install a section of flexible 1" (25mm) electrical conduit from the power source conduit box to the cabinet's access hole.

Step 2 – Open the cabinet door and remove the two retaining screws from the power supply cover.

Step 3 – Locate the voltage cable assembly and note the voltage on the label. The TDC is equipped with 120V cable assembly from the factory. Replace the voltage cable assembly with the proper rating as necessary. See **Figure 3**.

Step 4 – Strip the power cables and secure them to the terminal block. Reference **Table 1** for the appropriate type of power connection.

Step 5 – Reinstall the power supply cover.

Step 6 – Apply power to the controller.

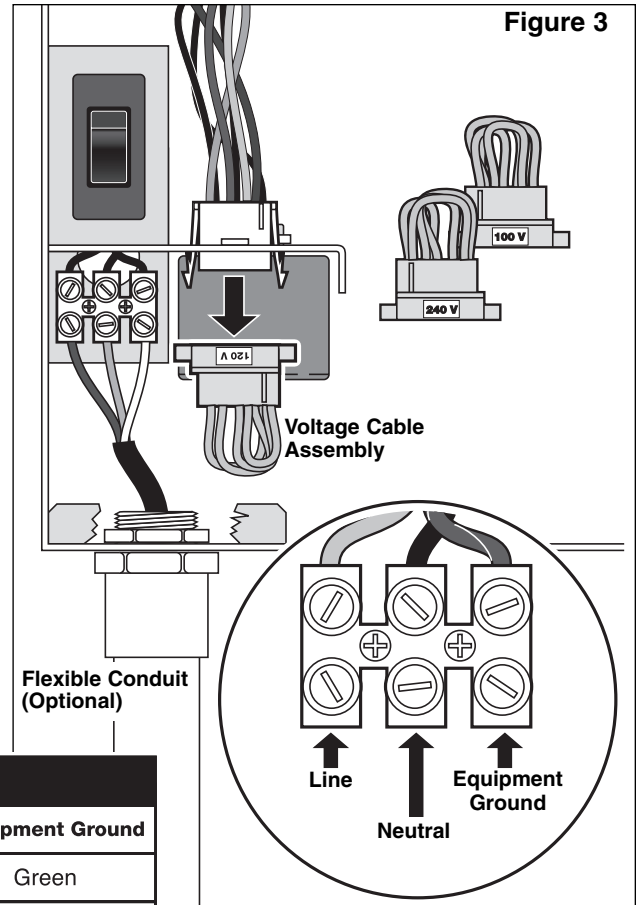


Table 1

AC Service Type	Line	Neutral	Equipment Ground
100 – 120 VAC (Domestic)	Hot (Black)	Neutral (White)	Green
220 – 240 VAC (International)	Hot (Brown)	Neutral (Blue)	Green / Yellow

Station Decoder Installation

The station decoder module is available in 1-station, 2-station or 4-station configuration. The decoder modules are installed into the TDC output board terminals.

The stand-alone TDC model can handle up to 100 stations per output board. These stations can be connected to the output board terminals in any configuration (25 stations connected to each of the four terminal pairs or 100 stations connected to one terminal pair, etc.). The decoder modules can be connected in parallel anywhere on the two-wire communication line connected to the station terminals. Each station can activate up to two solenoids.

It is recommended that the decoder modules are installed in an approved valve box to provide easy access to the wiring. Use high-voltage waterproofing to all the wire connections.

Recommended Controller-to-Decoder cable: 14 AWG (2.5mm²), solid copper, jacketed 2-conductor, direct burial. The preferred wire make and model is the Paige Irrigation Wire, Spec P7350D.

Recommended Decoder-to-Solenoid cable: 14 AWG (2.5mm²), solid copper, 2-conductor, direct burial. The preferred wire make and model is the Paige Irrigation Wire, Spec P7351D.



IMPORTANT!

Cable Splices: In order for the wire connections to comply with the 2005 edition of the National Electric Code® Article 300.5 (Underground Installations) and 110.14 (Electrical Connections), in wet or damp locations, the connector must be listed under specification “UL 486D” if installed in a valve box. It must be listed under specification “UL 486D-Direct Burial” if buried in dirt. This requirement applies to all electrical connections in wet or damp locations, regardless of voltage. The 3M DBY-6 and DBR-6 are listed as “UL 486D-Direct Burial” and meet these requirements for all underground installations.

Cable Burial Depth: The TDC decoder operate at voltages between 30–40 volts. The 2005 edition of the National Electrical Code®, Article 300-5, requires that wires and cables subjected to voltages higher than 30 volts are to have a minimum cover of 24" (60.96 cm).

- Use only wire approved for direct burial if installing the wires underground without conduit.
- All field wiring splices must be accessible to facilitate troubleshooting and/or service.

Step 1 – Route communication cable from the controller to the station decoder module installation location.

Note: The maximum wire length between the controller and the decoder module is 15,000' (4500m).

Step 2 – Secure the communication wires to terminal 1 of the TDC output board. White wire onto the 1st terminal and black wire onto the second terminal. See **Figure 4**.

Step 3 – Install the decoder module in a valve box. Record the decoder module's address number found on the side label. This address number identifies the station(s) that the decoder module control.

Step 4 – Secure the communication wires to the decoder module's black and white wires. Connect the black communication wire to the black decoder module wire. Connect the remaining communication wire (red or white) to the white decoder module wire. Use proper water proofing method for all wire connections.

Step 5 – Route output wires from the decoder module to the solenoid.

Note: The maximum wire length between the decoder module and the solenoid is 410' (125m).

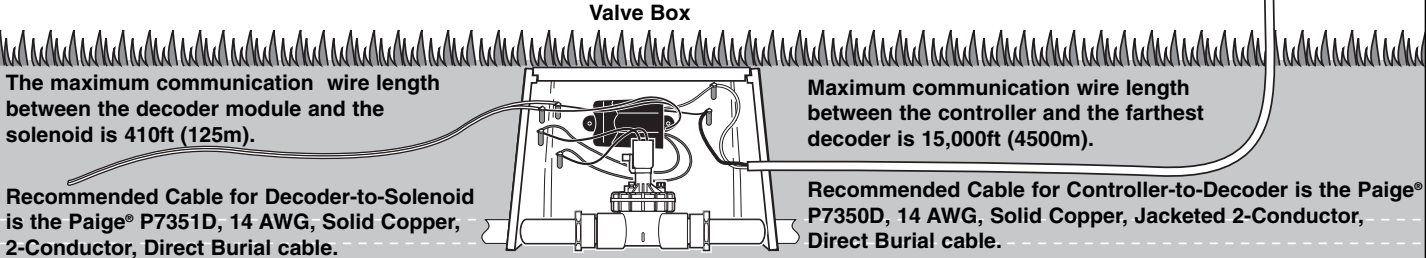
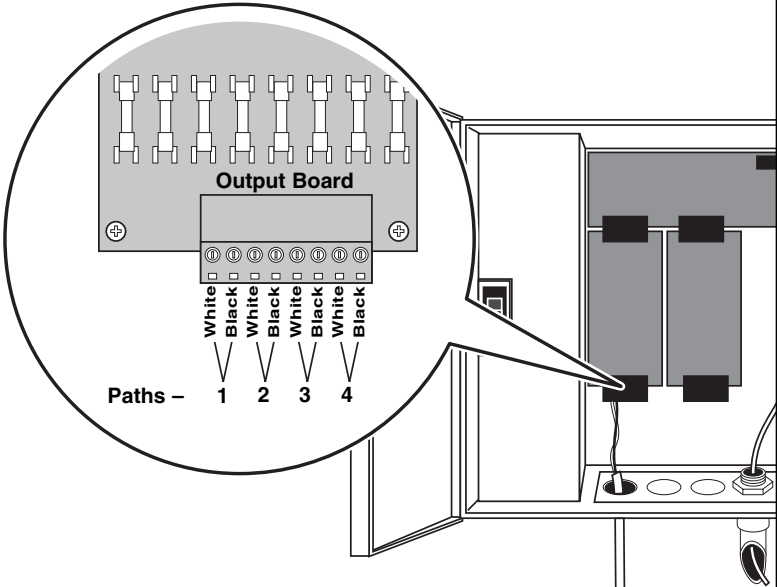
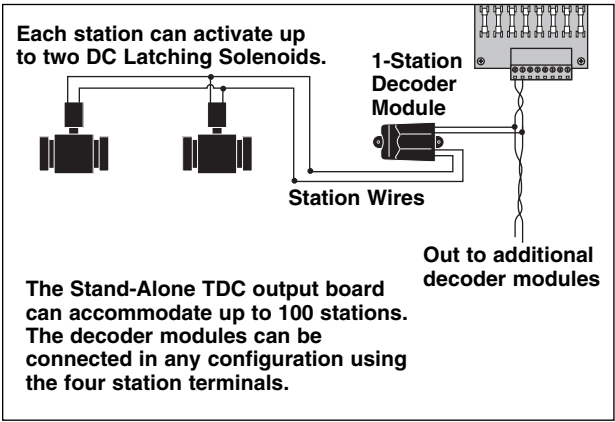
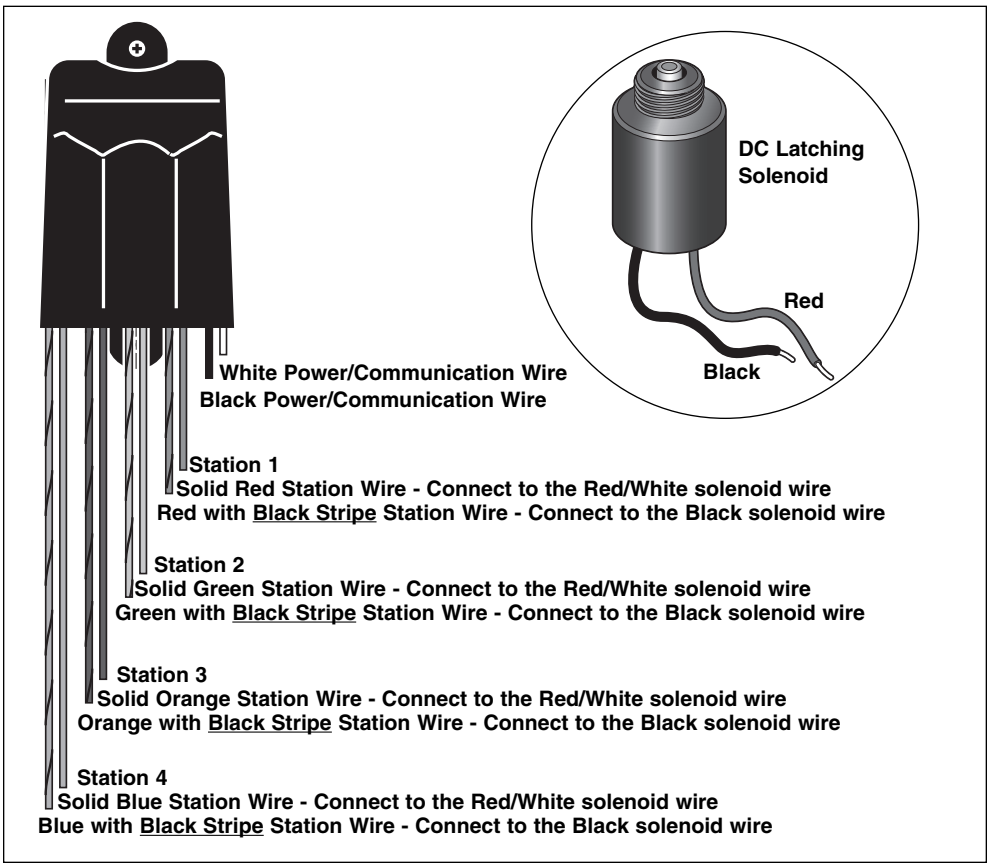
Step 6 – Connect the solenoid wires to the decoder module's station wires. The station wires are color coded for easy identification. Connect the solid colored (red, green, orange or blue) station wire to the red/white solenoid wire. Connect the similar color station wire with black stripe to the black solenoid wire. Waterproof all wire connections.

Step 7 – Connect an additional solenoid to the station wire as necessary.

Note: Each station has a maximum load of two solenoids.

Step 8 – Repeat Steps 3–8 for additional decoder modules.

Figure 4



Note: To easily identify stations for troubleshooting, install wires with the same color code as the station wires.

Note: When possible, install the decoder module in a valve box for ease of service.

Grounding Communication Cable



IMPORTANT!

Cable Splices: In order for the wire connections to comply with the 2005 edition of the National Electric Code® Article 300.5 (Underground Installations) and 110.14 (Electrical Connections), in wet or damp locations, the connector must be listed under specification “UL 486D” if installed in a valve box. It must be listed under specification “UL 486D-Direct Burial” if buried in dirt. This requirement applies to all electrical connections in wet or damp locations, regardless of voltage. The 3M DBY-6 and DBR-6 are listed as “UL 486D-Direct Burial” and meet these requirements for all underground installations.

Cable Burial Depth: The TDC decoder operate at voltages between 30–40 volts. The 2005 edition of the National Electrical Code®, Article 300-5, requires that wires and cables subjected to voltages higher than 30 volts are to have a minimum cover of 24" (60.96 cm).

The optional lightning arrester (Toro P/N DEC-SG-LINE) is available to protect the decoder module in lightning prone areas. Without lightning arrester, the decoder are vulnerable to lightning damage. In order for these arrester to discharge lightning energy efficiently, they must be properly grounded. Figure 5 illustrates the proper grounding and wiring of the arrester.

- Step 1** – Locate decoder’s power/communication wires (black and white wires). Disconnect the wire connectors that joins it to the controller-to-decoder cable.
- Step 2** – Strip the insulation from lightning arrester’s white wire and connect it to the white wires from the decoder and controller-to-decoder cable. Secure the splices with a water proofed wire connector. (See **Figure 5**.)
- Step 3** – Strip the insulation from lightning arrester’s black wire and connect it to the black wires from the decoder and controller-to-decoder cable. Secure the splices with a water proofed wire connector. (See **Figure 5**.)
- Step 4** – Connect the lightning arrester’s ground wire to the ground plate’s wire. If the ground plate is not pre-wired, use a 10 AWG bare copper wire. (See **Figure 5**.)



IMPORTANT! Verify that the wire length between the lightning arrester and the ground plate is no less than 3' (91.44 cm). Longer lengths will decrease the lightning arrester’s effectiveness.

- Step 5** – Bury the Ground plate next to the valve box or decoder’s location. Set it at the maximum depth that the ground wire would allow. Surround the ground plate with 50 lbs (2.68 Kg) of Earth contact material such as PowerSet® (Paige Electric, part number 1820058).
- Step 6** – Check the system for proper operation.

