Rain Bird

ESP-SMTe Smart Modular Controller
Contractor's Manual

Contents

Check Box Contents

It is recommended that you familiarize yourself with the various items below, prior to beginning the installation process.

1. ESP-SMTe Modular Controller (Outdoor model shown)
2. Door Keys (Outdoor model only)
3. Controller Mounting Hardware (Four #8 screws and wire nuts)
4. Grounded Power Supply (Indoor model only)
5. Mounting Template
6. ESP-SMTe Homeowner's Guide
7. Site Profile Chart
8. Installation & Quick Setup Poster
9. SMTe Weather Sensor
10. Weather Sensor Debris Screen
11. Weather Sensor Mounting Bracket
12. Mounting Bracket Hardware (Four Phillips head screws + finger screw for mounting sensor to bracket)
13. Sensor Wire - 25 feet of 20-2 UV rated wire (not rated for direct burial)
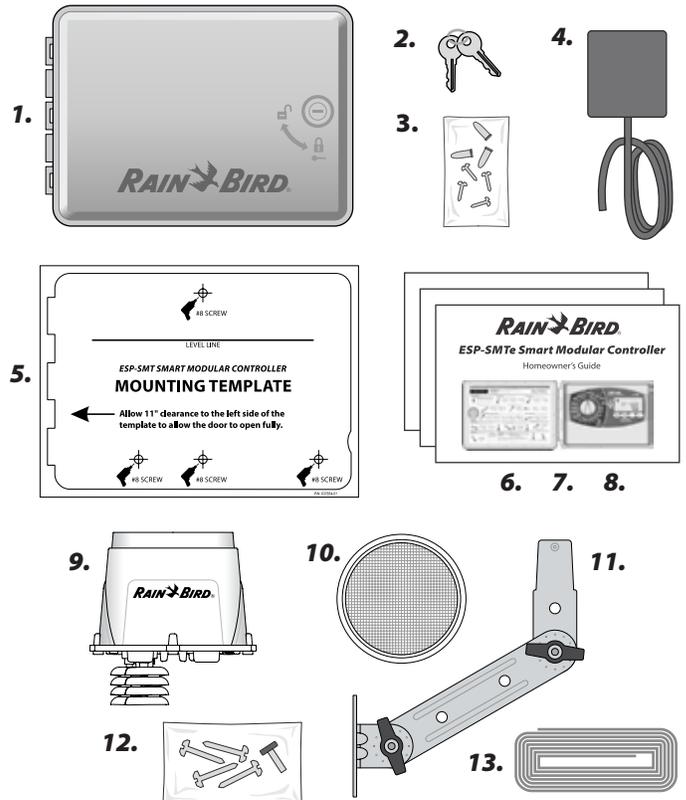
Symbols

CAUTION: Symbol is intended to alert the user to important instructions or conditions that could seriously affect irrigation effectivity or controller operation.

DIAL: Symbol indicates that the user is required to turn the dial on the controller to the appropriate position in order to follow subsequent instructions as described in that section.

NOTE: Symbol is intended to alert the user to important operating functionality, installation or maintenance instructions.

REPEAT: Symbol indicates that a repetition of previous steps may be required in order to continue or complete the controller programming process.

WARNING: Symbol alerts the user to the presence of electricity or electromagnetic energy which may constitute a risk of electric shock, radiation exposure or other hazard.

Technical Support

For assistance, contact Rain Bird at 1-800-247-3782 or visit our website at www.rainbird.com/esp-smte

Additional copies of the user documentation for the ESP-SMTe Smart Modular Control System can also be downloaded there, including:

- ESP-SMTe Homeowner's Guide
- ESP-SMTe Contractor's Manual (this document)
- ESP-SMTe Site Profile Chart
- ESP-SMTe Installation and Quick Setup Poster

To learn more about Rain Bird irrigation systems, visit the Rain Bird Academy at www.rainbirdservicescorporation.com/training

Foreign Language Support

Spanish and French language versions of all user documentation for the ESP-SMTe Smart Modular Control System can be found online at www.rainbird.com/esp-smte

Introduction

Welcome to Rain Bird

Thank you for choosing the ESP-SMTe Smart Modular Control System from Rain Bird.

For more than seven decades, Rain Bird has led the irrigation industry by providing the highest quality products and services available for state of the art water management.

The Intelligent Use of Water

We believe it is our responsibility to develop products that use water efficiently.

Using weather-based irrigation control, the ESP-SMTe Smart Control System will help maintain your landscape while using 30% to 50% less water than traditional time based controller systems.

ESP-SMTe Smart Modular Control System

Your new Rain Bird control system is designed to provide many years of advanced irrigation control.

The ESP-SMTe Controller is an indoor or outdoor weather-based irrigation controller for residential and light commercial use. There are two ESP-SMTe models available that can be expanded up to 22 stations:

- 4 Station Indoor Controller (ESP4SMTEI)
- 4 Station Outdoor Controller (ESP4SMTE)

> [!] **NOTE**: An upgrade kit (ESPSMTEUPG) is available for the ESP-M controller to provide ESP-SMTe functionality but does not increase the number of stations.
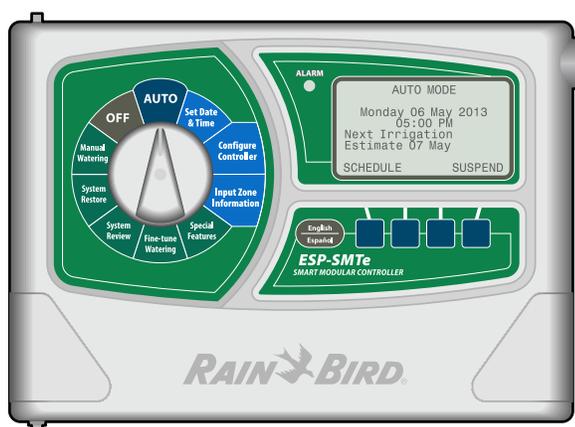
Features and Benefits

The ESP-SMTe Smart Control System has a variety of advanced water management features, including:

- The ESP-SMTe controller supports 4 zones standard, plus a master valve or pump start relay and includes an SMTe Weather Sensor.

- Station Modules can increase the total number of available zones to 22, should your irrigation needs expand in the future.

- The SMTe Weather Sensor provides weather-based irrigation control, adjusting each zone's watering needs based on the actual site conditions.

- Watering occurs as needed and can be restricted to selected days of the week, odd or even calendar days, or at set intervals.

- Automatic and manual Cycle+Soak™ feature for each zone allows watering duration to be split up to avoid run-off.

- Next Irrigation Estimate shows an estimate of the current soil moisture, the next scheduled irrigation date and an estimated schedule up to three weeks in advance.

- Manual Watering allows immediate watering of selected zones or all zones.

- Event Days Off allows you to select up to four specific dates to block watering for special occasions.

- SMTe Weather Sensor acts as a rain shut-off device and sends rainfall and temperature data to the controller on an hourly basis.

- Rainfall Shutdown suspends all irrigation if the measured rainfall exceeds a user set threshold.

- Cold Weather Shutdown suspends all irrigation to prevent potential freeze damage if the measured temperature is too low.

- English/Spanish Button easily switches the display text between languages.

Basic Irrigation Description

The ESP-SMTe Controller operates sprinklers when irrigation is required.

When irrigation is scheduled to begin for a particular zone, the controller sends a signal to the associated valve to open. This allows the sprinklers to begin watering. When the calculated run time is over, the controller shuts off the valve.

Sprinkler Nozzles

Sprinkler nozzles, such as rotors and sprays, are the most common method to apply water quickly and effectively to a large area of landscape.

Drip Emitters

Drip emitters apply water directly to the root zone or base of a plant, using a network of small diameter tubes and emitters. This type of irrigation is more efficient and requires less water than sprinkler nozzles.
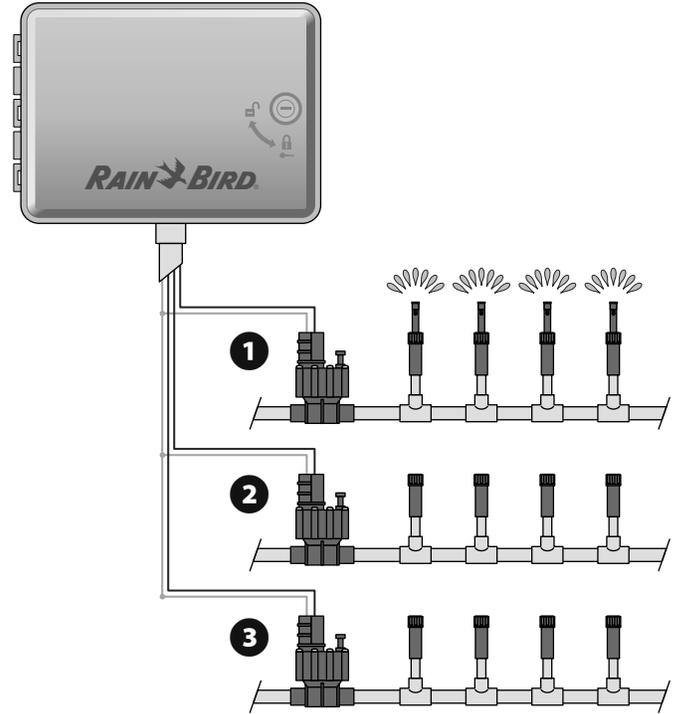
Controls and Indicators

Controller Features

Key operational features of the ESP-SMTe Controller:

Programming Dial

Initial Controller & Zone Set-Up Dial Positions

Alarm Light Illuminates
When conditions prevent watering

AUTO
Watering occurs automatically

OFF
Cancels all irrigation after 3 seconds

Manual Watering
Start watering selected zones immediately

System Restore
Set initial soil moisture, restore contractor defaults, or restore factory defaults

System Review
View system settings, weather information, estimated schedules 3 weeks in advance, and event logs

Fine-Tune Watering
Adjust run times by zone for weather based zones

Special Features
Select advanced irrigation features and controller setup options, such as block irrigation on days of special events

Large Back-Lit Dot-Matrix Display

Programming Buttons
Press and Hold to accelerate settings

English/Spanish Button
For easy switching of display language

Remotely Programmable
Using 9V battery

ESP-SMTe Controller Front Panel

Weather Sensor Features

Removable Debris Screen
Easily remove and clean when clogged

Sensor Housing

Adjustable Mounting Bracket

Bracket Holes (3)
Route wiring and provide "strain relief"

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↑ TOP ↑
LEVEL HERE

Solar Shield With Temperature Sensor
Measures temperature and sends to controller

Removable Tipping Rain Bucket
Measures rainfall amounts and sends to controller

Wing Nuts (2)
Provides sensor positioning adjustments

Mounting Base
Install on eave, roof, side of house or post

Mounting Base Slot
Allows easy leveling of unit

Station Modules

Optional upgrade of additional Station Modules can increase the number of available zones up to 22.

The ESP-SMTe Controller comes standard with a base module that supports four zones (valves). If more zones are required, up to three additional Station Modules (not included) can be installed.

! **NOTE**: The 6-Station module is only compatible with the ESP-SMTe controller, and not the ESP-SMT controller.

Base Module
(included)

VT MV COM

Expansion Modules
(sold separately)

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3-STATION
(ESPSM3)

RAIN BIRD

6-STATION
(ESPSM6)
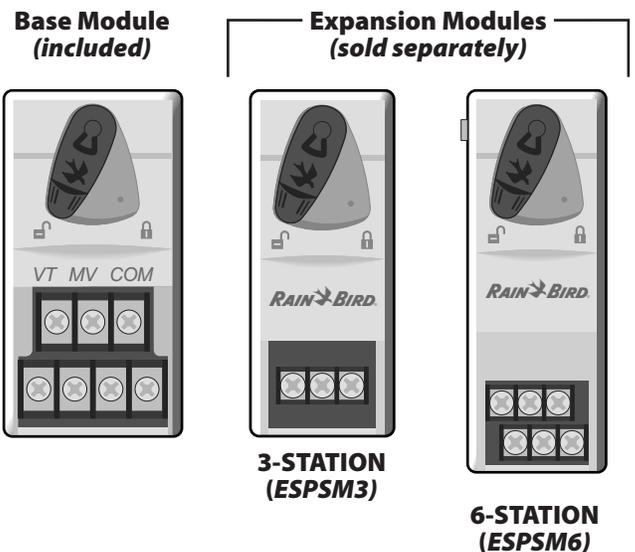
Normal Operation

Auto

AUTO is the normal operating mode for the controller.

Irrigation starts automatically when required, and the next estimated watering date is displayed.

AUTO

1. Turn the dial to **AUTO.**

In AUTO Mode:

The display shows the current day of the week, date, time, and the next estimated watering day.

```
      AUTO MODE

   Monday 06 May 2013
        05:00 PM
   Next Irrigation
   Estimate 07 May

  SCHEDULE        SUSPEND
```
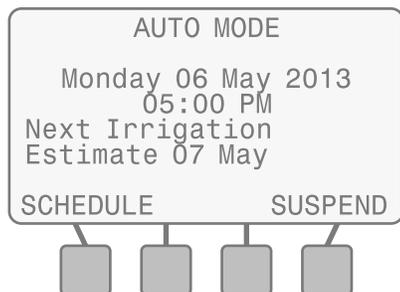
During Watering:

The display shows the current day, current active zone, and the Time Remaining for that Zone.

```
   WATERING — AUTOMATIC
   Wednesday 06:45 PM

   Watering Zone         2
   Minutes Remaining    14

                  SUSPEND
```
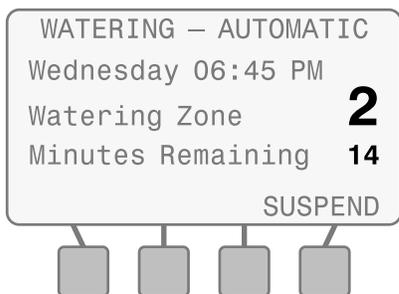
To Suspend Automatic Irrigation:

Automatic irrigation can be suspended for a period of time from one minute up to 14 days.

> **!** **NOTE**: This can be useful if you want to temporarily suspend watering. For example, you may want to pick up the newspaper, walk the dog, or are having guests. You can suspend irrigation if rain is in the forecast.

2. Press **SUSPEND**.

```
      AUTO MODE

   Monday 05 May 2013
        10:25 AM
   Next Irrigation
   Estimate 07 May

  SCHEDULE        SUSPEND
```
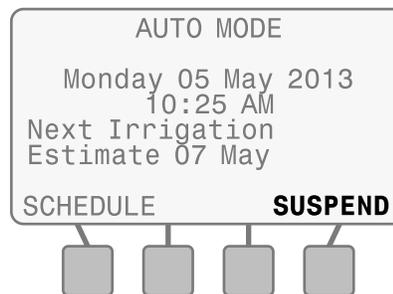
3. Press **–** or **+** to set the desired amount of time. The display will show the countdown of the time remaining.

```
   SUSPEND WATERING

       Watering
     Suspended For:

      30 Minutes

  RESUME   –     +
```
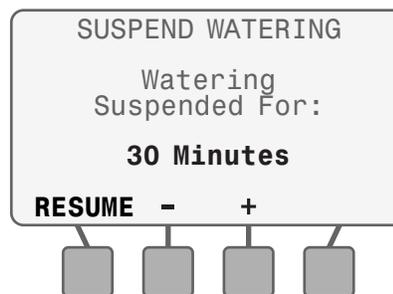
4. Press **RESUME** at any time to resume automatic irrigation.

Alarms, Notes and Messages:

In **AUTO** Mode, the controller will indicate problems or issues with normal operation on the display. Refer to the Troubleshooting section for details.

ALARMS indicate there is a significant problem, such as a short in the wiring.

```
       ALARM 3
     Short Circuit
   Detected On Stations
 MV   1   7

      Check Wiring
        IGNORE
```
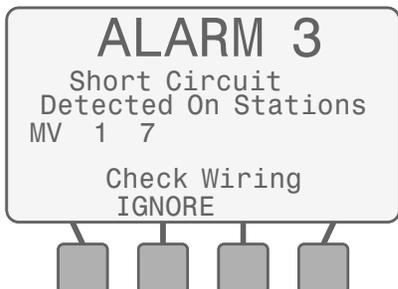
NOTES provide information about why the controller is not watering as expected.

```
        NOTE 7
  Irrigation Suspended
       Due To Rain

  Rain In Last 24 Hours
        01.50 in
     IGNORE      CLEAR
```
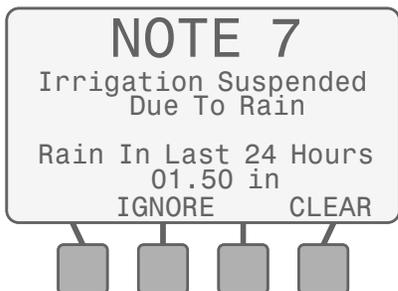
MESSAGES provide information about temporary conditions that are affecting normal irrigation.

```
        AUTO MODE
   No Pod Communication
    Monday 06 May 2013
        05:00 PM
   Next Irrigation
   Estimate 07 May

 SCHEDULE       SUSPEND
```
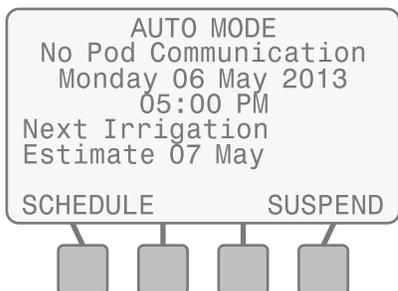
OFF

Cancel all active watering immediately and stop automatic irrigation.

OFF
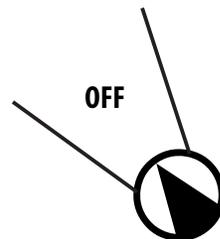
1. Turn the dial to **OFF.**

2. Press ▬ or ✚ to adjust the LCD contrast if desired.

```
 ALL WATERING   OFF
 Tuesday 24 Mar 2009

        7:25 PM

   ADJUST CONTRAST
        ▬      ✚
```
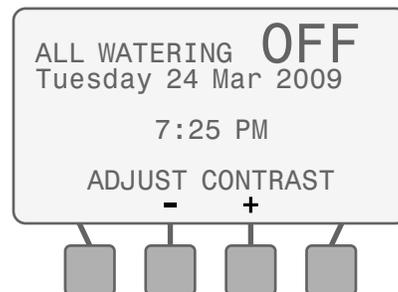
Controller Configuration and Zone Information settings remain stored in memory while the controller is **OFF** or if there is a loss of power. Date and time are also maintained for up to 10 years by an internal battery. A 9V battery is not required to maintain settings or date and time.

[!] **NOTE**: Automatic irrigation will **NOT** occur if the controller remains in **OFF** mode.

Programming

Online training and other resources are available at www.rainbird.com/esp-smte to help understand the theory and programming of the ESP-SMTe Controller.

Set Date and Time

Set the current calendar Date and Time of day.

▶ Turn the dial to **Set Date & Time**.

Set Date & Time

```
    SET CURRENT
  DATE AND TIME

   01 Jan 2013

    12:00 AM

BACK    −    +    NEXT
```
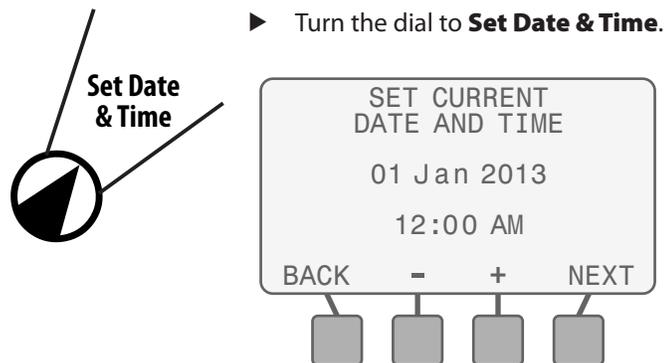
1. Set the current month, day and year.

2. Set the current time (ensure that the AM/ PM setting is correct).

```
    SET CURRENT
  DATE AND TIME

   05 Mar 2013

    10:30 AM

BACK    −    +    NEXT
```
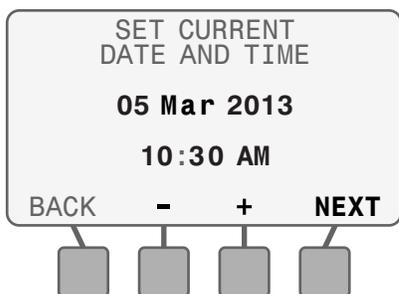
Configure Controller

Enter site location data and setup irrigation schedules.

Configure the controller by entering site location information for your site, selecting the days to allow watering, and entering the times that watering can occur.

Use the provided checklist and the ESP-SMTe Site Profile Chart as a guide to configure the controller.

Configuration Checklist

Site Location
❒ Location By Zip Code
5 Digit Zip Code _____
OR
❒ Site Custom Data
Site Latitude _____
Site Elevation _____
Monthly Avg. Wind Speed (for all 12 months)
Monthly Avg. Humidity (for all 12 months)
Set Allowed Watering Days (select one)
❒ No Restrictions
❒ By Days of the Week
❒ Even Days of the Month
❒ Odd Days of the Month
❒ Cyclical
Days between Cycles _____ Beginning Date _____
Block Day of the Week
❒ Select day(s) of the week to block watering _____
Set Allowed Watering Windows
❒ Set 1st Watering Window _____
❒ Set 2nd Watering Window _____
❒ Set Daily Water Window
❒ Set Rain Shutoff

▶ Turn the dial to **Configure Controller**.

Configure Controller

```
 CONFIGURE CONTROLLER

 Enter Site Zip Code
        - OR -
 Enter Custom Data for
 Location

        ↑     ↓   SELECT
```
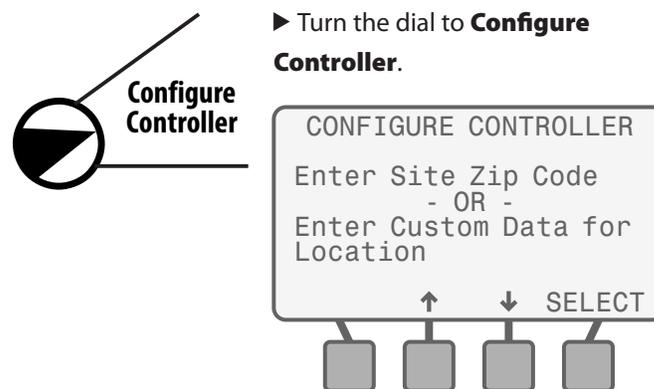
① Enter Site Location

The ESP-SMTe controller will use historical weather data (for wind speed and humidity) based on zip code or you can enter custom values for your site.

! **NOTE**: If outside the United States you must use Custom Data for Location.

Select Location by Zip Code

1. Select **Enter Site Zip Code**.

```
CONFIGURE CONTROLLER

Enter Site Zip Code
          - OR -
Enter Custom Data for
Location

          ↑      ↓   SELECT
```
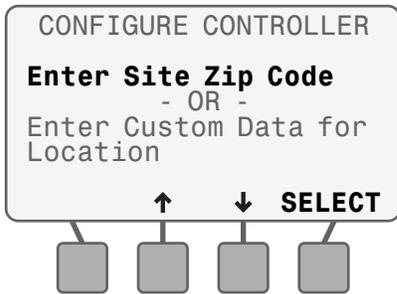
2. Enter the complete zip code for your site; then press **NEXT**.

```
SITE ZIP CODE

Enter Site Zip Code
      92010

BACK    –    +    NEXT
```
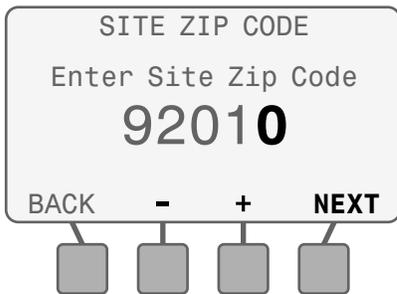
! **NOTE**: If the zip code you entered is not found in the database, the closest zip code will be used.

3. If the zip code is correct, press **YES**.

```
SITE ZIP CODE


      92010

    Is This Correct?
NO                  YES
```
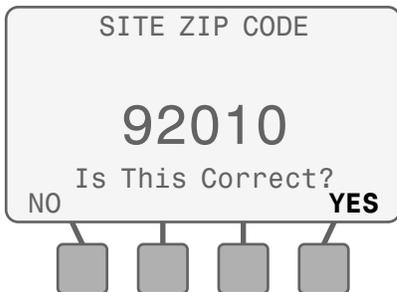
Enter Custom Data for Location

! **NOTE**: Contact your local weather station for Custom Data information.

1. Select **Enter Custom Data for Location**.

```
CONFIGURE CONTROLLER

Enter Site Zip Code
          - OR -
Enter Custom Data for
Location

          ↑      ↓   SELECT
```
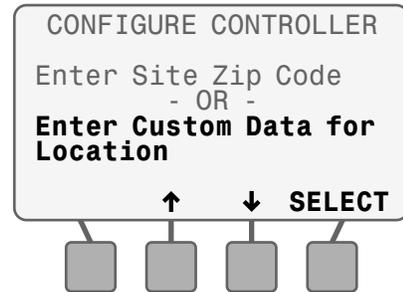
2. Enter the latitude and elevation for your site; then press **NEXT**.

```
LATITUDE & ELEVATION


Latitude        41 °N
Elevation      100 ft

BACK    –    +    NEXT
```
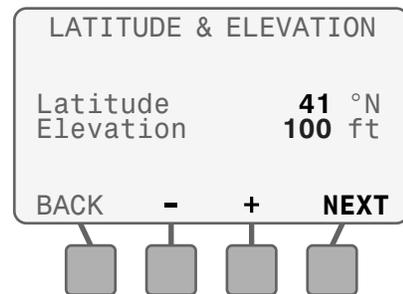
3. Enter the average wind speed for each month; then press **ACCEPT**.

```
AVG WIND SPEED     MPH
Jan   7.5   Feb   5.2
Mar   4.8   Apr   4.3
May   3.7   Jun   5.1
Jul   4.4   Aug   2.3
Sep   6.1   Oct   1.8
Nov   2.5   Dec   1.2
BACK    –    +   ACCEPT
```
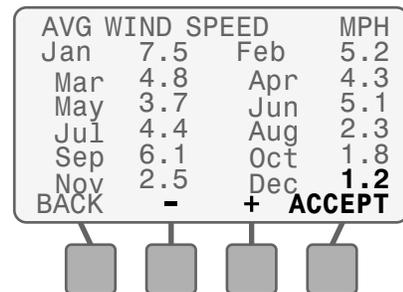
4. Enter the average humidity for each month; then press **ACCEPT**.

```
  AVERAGE HUMIDITY
Jan   22%   Feb   27%
Mar   21%   Apr   31%
May   38%   Jun   45%
Jul   52%   Aug   46%
Sep   39%   Oct   32%
Nov   28%   Dec   23%
BACK    –    +   ACCEPT
```
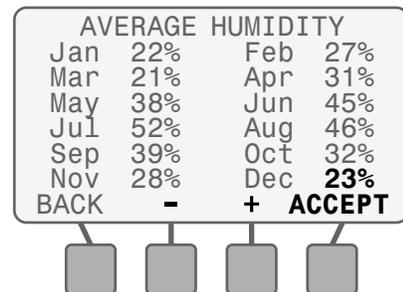
② Set Allowed Watering Days

Check with your local water authorities to see if there are any current water restrictions in effect that would limit the days or times of day that you can schedule irrigation.

Select one of the following options to determine the days that the controller is allowed to water.

No Restrictions:

1. Select **No Restrictions** if there are no restrictions on days that you can irrigate.

```
 ALLOWED WATER DAYS

No Restrictions
By Days of the Week
Even Days: 2,4,6,… 30
Odd Days: 1,3,5,…no31
Cyclical:Every x Days
BACK      ↑    ↓  SELECT
```
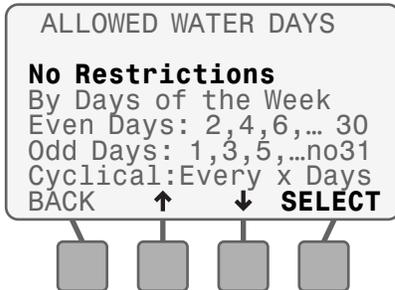
>> *Go To Step 3, Block One Day a Week*

Days of the Week:

2. To set a custom weekly schedule, select **By Days of the Week**.

```
 ALLOWED WATER DAYS

No Restrictions
By Days of the Week
Even Days: 2,4,6,… 30
Odd Days: 1,3,5,…no31
Cyclical:Every x Days
BACK      ↑    ↓  SELECT
```
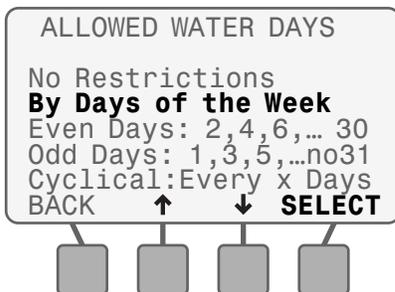
3. Press **OFF** or **ALLOW** to set each day of the week as an Allowed Watering day or a non-watering day.

4. When each day is set, press **NEXT**.

```
WATER BY DAY OF WEEK
Allow Watering:
Mo    We    Fr

Watering OFF:
   Tu    Th    Sa Su

BACK   OFF  ALLOW  NEXT
```
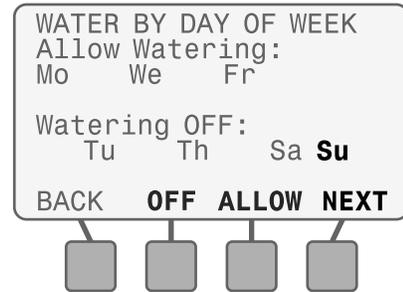
>> *Go To Step 4, Set Allowed Watering Windows*

Even Days:

5. To water on all even calendar days of each month, select **Even Days: 2, 4, 6, …30**.

```
 ALLOWED WATER DAYS

No Restrictions
By Days of the Week
Even Days: 2,4,6,… 30
Odd Days: 1,3,5,…no31
Cyclical:Every x Days
BACK      ↑    ↓  SELECT
```

>> *Go To Step 3, Block One Day a Week*

Odd Days:

6. To water on all odd calendar days of each month (except the 31st on Feb. 29), select **Odd Days: 1, 3, 5, …no31**.

```
 ALLOWED WATER DAYS

No Restrictions
By Days of the Week
Even Days: 2,4,6,… 30
Odd Days: 1,3,5,…no31
Cyclical:Every x Days
BACK      ↑    ↓  SELECT
```
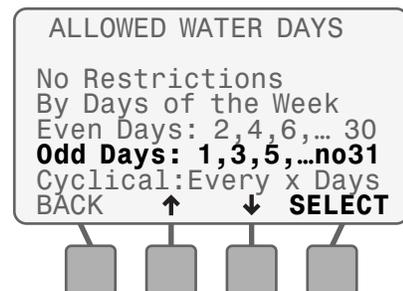
>> *Go To Step 3, Block One Day a Week*

Cyclical:

7. To water on a cycle of every 2 to 14 days, select **Cyclical: Every X Days**.

```
   ALLOWED WATER DAYS

No Restrictions
By Days of the Week
Even Days: 2,4,6,… 30
Odd Days: 1,3,5,…no31
Cyclical:Every x Days
BACK      ↑     ↓   SELECT
```
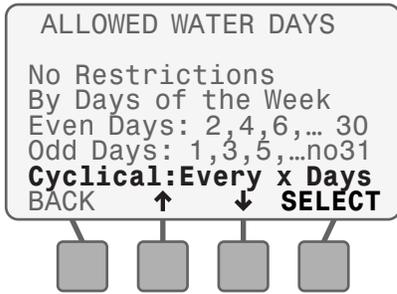
8. Enter a value from 2 to 14 to set the irrigation cycle.

9. Set the date that you want the first irrigation cycle to begin; then press **NEXT**.

```
     CYCLICAL WATERING


Water Every  3 Days

Begin Watering 01 Jan

BACK     −     +      NEXT
```
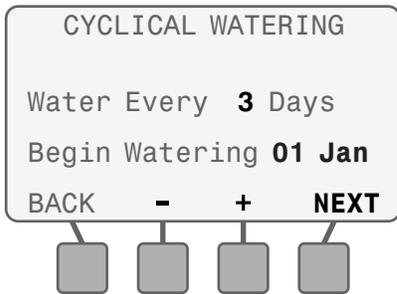
③ Block One Day a Week

Select a specific day of the week to block irrigation. The controller will always block irrigation on this day.

1. Select a day of the week (or none) to block irrigation.

```
BLOCK WATERING ON A
SPECIFIC DAY OF WEEK
None           Monday
Tuesday     Wednesday
Thursday       Friday
Saturday       Sunday
Sat & Sun
BACK     ↑     ↓   SELECT
```
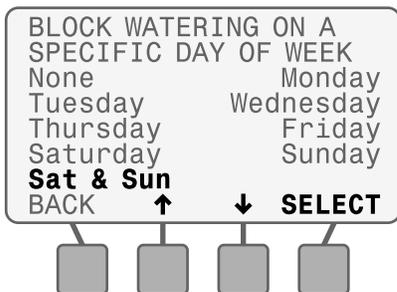
④ Set Allowed Watering Windows

Set a time that irrigation can occur on Allowed Watering Days.

1. Set the start and end times for the 1st Watering Window; then press **NEXT**.

```
SET ALLOWED WATER TIME
1st Watering Window
05:00 AM  To  09:00 AM

2nd Watering Window
        OFF

BACK    −     +     NEXT
```
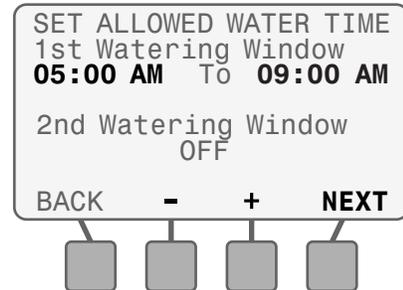
2. Set the 2nd Watering Window to **ON** if desired.

3. Set the start and end times for the 2nd Watering Window; then press **NEXT**.

```
SET ALLOWED WATER TIME
1st Watering Window
05:00 AM   To  09:00 AM

2nd Watering Window
        ON
04:00 PM   To  06:00 PM
BACK    −     +     NEXT
```
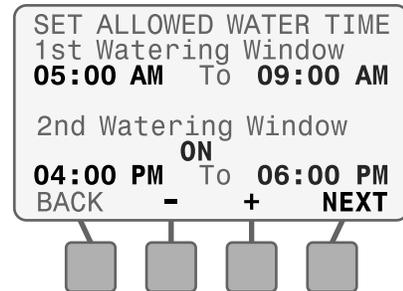
[!] **NOTE**: The controller maintains at least a 15 minute time frame between the first Watering Window and the second Watering Window.

4. Set the Daily Water Window for new plants and zones that may water every day regardless of allowed watering days; then press **NEXT**.

```
DAILY WATER WINDOW

Water Every Day Except
Blocked Days Between

09:00 AM  and  04:00 PM

BACK    −    +    NEXT
```
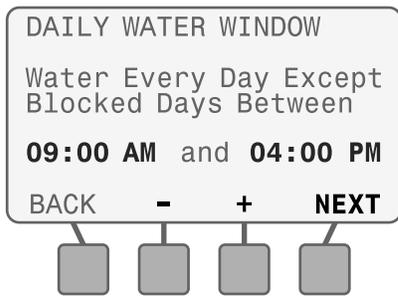
NOTE: The Daily Water Window allows irrigation of new plants every day, and is not affected by Allowed Watering Days, Blocked Days or Event Days Off. The number of days that a Daily Water Window is in effect is set in the Enter Plant Maturity step under Input Zone Information.

5. Set Rain Shutoff (days and inches); then press **NEXT**.

```
       RAIN SHUTOFF
For Time-base and
Grow-in Zones Only:
Shutoff Watering for
  1 Full Day(s) when
Rain Reaches:  0.20 in
BACK    −    +    NEXT
```
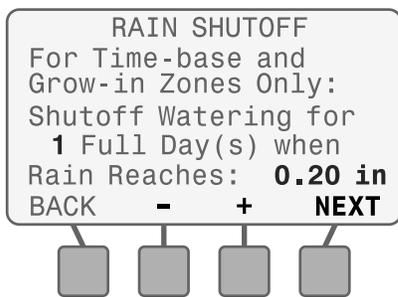
NOTE: Once the desired amount of rain has been exceeded, the controller will stop watering time based and grow-in zones for the number of Full Days specified. Full Days begin at midnight so 1 Full Day is the rest of today and all of tomorrow.

5 **Review**

1. Review controller configuration settings. Press **BACK** to make changes if desired, then press **MORE**.

```
   CONTROLLER SETTINGS
Zip Code          92010
By Days of the Week
Mo    We    Fr
    Water Windows
05:00 AM  To  09:00 AM
04:00 PM  To  06:00 PM
BACK             MORE
```

2. Review controller configuration settings. Press **BACK** to make changes if desired, then press **MORE**.

```
   CONTROLLER SETTINGS

  Daily Water Window

 09:00 AM  To  04:00 PM

  BACK           MORE
```

3. Review controller configuration settings. Press **BACK** to make changes if desired, then press **DONE**.
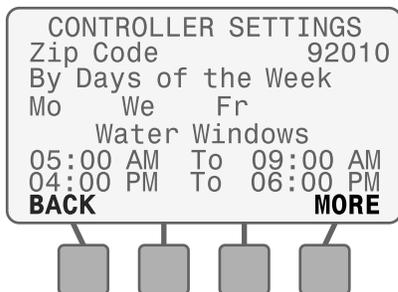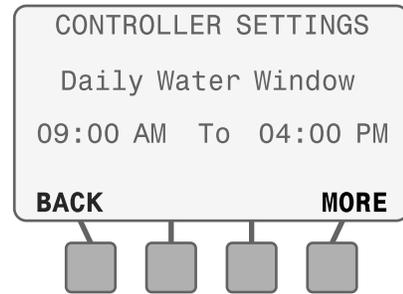
```
   CONTROLLER SETTINGS
For Time-base and
Grow-in Zones Only:
Shutoff Watering for
  1 Full Day(s) when
Rain Reaches:  0.20 in
 BACK            DONE
```
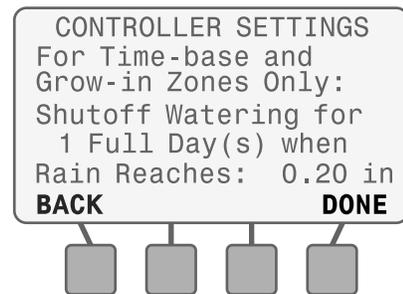
Input Zone Information

Enter site information for each zone.

Detailed site information about soil, sprinklers, and plant types is needed to determine irrigation schedules. Once the information is entered for one zone, the settings can be copied to other zones.

The Appendix contains helpful instructions and information that can be used to determine the proper settings for your site.

Use the provided checklist and the ESP-SMTe Site Profile Chart as a guide to input zone information.

> **!** **NOTE**: The ESP-SMTe Site Profile Chart is available at www.rainbird.com/esp-smte and is included in the ESP-SMTe Controller box.

Zone Information Checklist

Zone Number	
❏ Turn Zone to Enabled or OFF	
Soil Type	
❏ Sand	❏ Loamy Sand
❏ Sandy Loam	❏ Loam
❏ Clay Loam	❏ Silty Clay
❏ Clay	
Zone Type	
❏ Sprinkler	❏ Inline Grid Drip
❏ Point Source Drip	❏ Time-Based
❏ Select Water Window (1st+2nd: Restricted or Daily Water Window)	
Sprinkler Type	
❏ Sprays	
❏ Rotors	
❏ Bubblers	
❏ Rotary Nozzle	
❏ Set Net Application Rate for selected type _____	
Cycle and Soak (Degree of Slope)	
❏ 0 - 2 (Degree of Slope)	❏ 3 - 4 (Degree of Slope)
❏ 5 - 7 (Degree of Slope)	❏ 8- up (Degree of Slope)
❏ Automatic Mode	❏ Custom Mode
❏ Max Cycle (Custom) _____ min	❏ Min Soak (Custom) _____ min

Plant Type		

❏ Grass Lawn
  ❏ Cool Season Turf (Fescue, Bluegrass, Rye)
  ❏ Warm Season Varieties (Bermuda, St. Augustine)
	❏ Annuals	

❏ Ground Cover	❏ Shrubs	
❏ Desert Plants	❏ Trees	
❏ Mixed Planting		
OR		
❏ Custom Plant Factors (Species Factor, Root Depth)		
Plant Water Need (non grass)		
❏ High	❏ Average	❏ Low
Root Depth		
❏ Set Root Depth to _____ in		
Plant Density (non grass)		
❏ Dense	❏ Medium	❏ Sparse
Shade Factor (all plants)		
❏ Full Sun	❏ 25% Shade	
❏ 50% Shade	❏ 75 % Shade	
❏ Full Shade		
Refill Point		
❏ Refill Point _____ %		
Plant Maturity (all plants)		
❏ Established	❏ Newly Planted	

Zone Setup Wizard
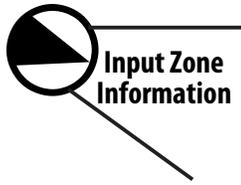
▶ Turn the dial to **Input Zone Information** and select **Zone Setup Wizard**.

```
INPUT ZONE INFORMATION


Zone Setup Wizard
Copy Zone to Zone


              ↑      ↓   SELECT
```
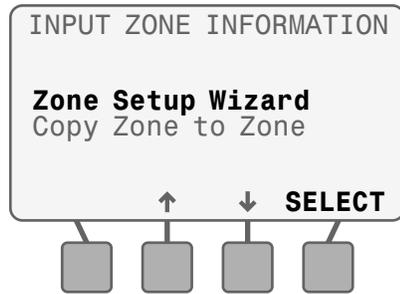
1 Enter Zone Number

The number of available zones depends on the number and type of station modules that are installed.

> **NOTE**: If you select a zone number that does not have an associated module installed, "No Module" is displayed.

1. Select the desired Zone Number; then press **NEXT**.

```
      SELECT ZONE

    Zone  1

       OFF
BACK    −    +    NEXT
```
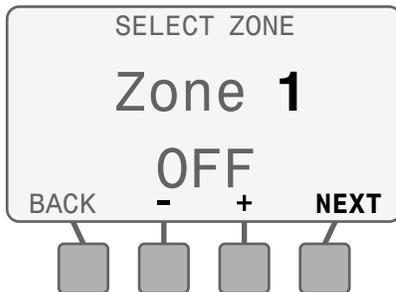
2. Press **ENABLE** to enable the selected Zone; then press **NEXT**.

```
      SELECT ZONE

    Zone  1

    ENABLED
BACK   OFF ENABLE  NEXT
```
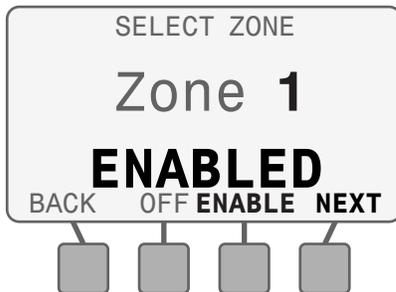
> **NOTE**: Zone information can still be entered when the Zone is in **OFF** mode, but the controller will not include the zone in irrigation scheduling. This is useful if you want to pre-program all your zones.

2 Select Soil Type

If you are not sure what the soil type is for your site, refer to the Soil Type section in the Appendix. Also, you can highlight a soil type and press **Help** for a brief soil description.

1. Select the soil type for your site.

```
SOIL TYPE         Zone 1

Sand          Loamy Sand
Sandy Loam          Loam
Clay Loam   Silty Clay
Clay

BACK   Help   ↓  SELECT
```
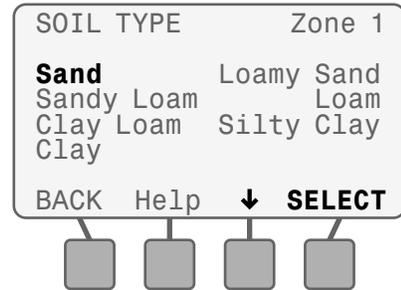
> **NOTE**: The default values for soil data that the controller uses to determine irrigation are listed below. The soil type you choose will affect irrigation frequency (number of days between watering) and watering run times.

Soil Types

Soil Type	Available Water (inches of water per inch of soil)	Basic Intake Rate (inches per hour)	Management Allowed Depletion (MAD)
Sand	0.06"	0.60"	50%
Loamy Sand	0.08"	0.50"	50%
Sandy Loam	0.12"	0.40"	55%
Loam	0.17"	0.35"	50%
Clay Loam	0.18"	0.20"	50%
Silty Clay	0.17"	0.15"	40%
Clay	0.17"	0.10"	35%

3 Select Zone Type

Select the Zone Type based on the type of sprinkler that is installed in the selected zone.

1. Select the Zone Type or select Time-Based.

```
ZONE TYPE        Zone 1
        Sprinkler
     Point Source Drip
     Inline Grid Drip
        Time-Based
   BACK    ↑      ↓    SELECT
```
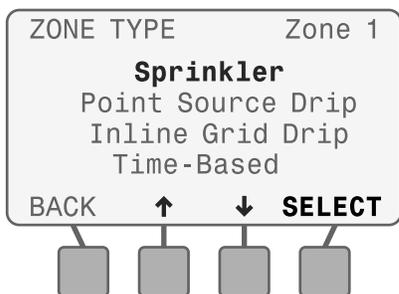
! **NOTE**: Time-Based is typically used for zones that irrigate potted plants or is used to fill a pool.

2. Select the desired option for the Water Window.

```
ZONE TYPE        Zone 1
        Sprinkler

   Select Water Window:
   1st+2nd: Restricted
     Daily Water Window
   BACK    ↑      ↓    SELECT
```
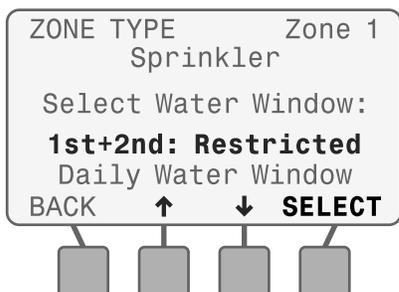
! **NOTE**: If **1st+2nd: Restricted** is selected, any restrictions entered during Controller Configuration will be applied. If **Daily Water Window** is selected, the programmed Daily Water Window will be used and zones will be allowed to water **only if required**.

4 Select Sprinkler Type

To enter information for the installed sprinklers based on the Zone Type selection, follow the appropriate step:

- If **Sprinklers** is selected, go to **Step 4a**.
- If **Point Source Drip** is selected, go to **Step 4b**.
- If **Inline Grid Drip** is selected, go to **Step 4c**.
- If **Time-Based** is selected, go to **Step 4d**.

4a Sprinklers

1. Select the appropriate sprinkler type from the list.

```
SPRINKLER TYPE  Zone 1
        Sprays
        Rotors
     Rotary Nozzle
        Bubblers
   BACK    ↑      ↓    SELECT
```
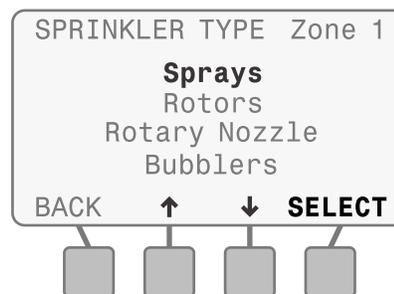
2. Adjust the default Net Application Rate if desired; then press **NEXT**.
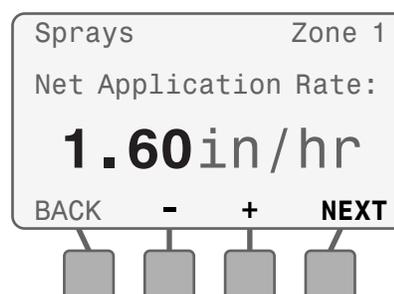
```
Sprays           Zone 1

Net Application Rate:

   1.60 in/hr
   BACK    −      +    NEXT
```

! **NOTE**: Increasing the Net Application Rate will decrease irrigation run times, and decreasing the value will increase the run times.

Default Net Application Rates

Sprinkler Type	Net Application Rate (in/hr)
Sprays	1.60
Rotors	0.45
Rotary Nozzle	0.50
Bubblers	2.50

! **NOTE**: Detailed instructions on alternate methods to determine Net Application Rates are found in the Appendix.

>> *Go To Step 5, Cycle+Soak*

4b Point Source Drip

1. Use the instructions on the display and the following tables to determine the Net Application Rate for a Point Source sprinkler type.

```
Point Source Emitters
Application Rate is
calculated by first
calculating the Total
Zone GPM and
Estimated Wetted Area
in Sq Ft.
BACK    1 of 3    MORE
```

```
Point Source Emitters

Zone GPM is (# of
Emitters * Flow Rate
of Emitters in GPH)
and dividing by 60

BACK    2 of 3    MORE
```

```
Point Source Emitters
Net Application Rate
is calculated as
(96.25 * Zone GPM  ÷
Estimated Soil Wetted
Area of all  point
source emitters.
BACK    3 of 3    DONE
```

Drip Irrigation Emitter Application Rates

Clay Soil

Flow in Gallons per Hour	Wetted Area (Dia. Ft.)	Wetted Area (Sq. Ft.)	Application Rate (in/hr)
0.5	2.0'	3.14	0.26"
1	2.5'	4.91	0.33"
2	3.0'	7.07	0.45"
5	3.0'	7.07	1.13"

Loam Soil

Flow in Gallons per Hour	Wetted Area (Dia. Ft.)	Wetted Area (Sq. Ft.)	Application Rate (in/hr)
0.5	1.5'	1.77	0.45"
1	2.0'	3.14	0.51"
2	2.5'	4.91	0.65"
5	2.5'	4.91	1.63"

Sandy Soil

Flow in Gallons per Hour	Wetted Area (Dia. Ft.)	Wetted Area (Sq. Ft.)	Application Rate (in/hr)
0.5	1.0'	0.79	1.02"
1	1.0'	0.79	2.03"
2	1.25'	1.23	2.61"
5	1.25'	1.23	6.52"

2. Enter the Net Application Rate; then press **NEXT**.

```
DRIP              Zone 1

Net Application Rate:
  0.80 in/hr

BACK    –    +    NEXT
```

! **NOTE**: Increasing the Net Application Rate will decrease irrigation run times, and decreasing the value will increase the run times.

>> *Go To Step 5, Cycle+Soak*

4c Inline Grid Drip

Refer to the drip tubing documentation for your installed system and the tubing layout at your site to determine the Inline Grid values.

1. Set the values for emitter Flow Rate, Emitter Spacing, and Row Spacing; then press **NEXT**.

```
INLINE GRID    Zone 1

Flow Rate     0.90 GPH

Emitter Spacing  18  in

Row Spacing      12  in

BACK    -    +    NEXT
```

2. Change the Adjust Factor to adjust the Estimated Application Rate if desired; then press **NEXT**.

```
INLINE GRID    Zone 1
Est.Application Rate:
      0.64 in/hr
 Adjust Factor   100%
Net Application Rate:
0.64 in/hr
BACK    -    +    NEXT
```

> ⚠ **NOTE**: Increasing the Estimated Application Rate will decrease irrigation run times, and decreasing the value will increase the run times.

>> Go To Step 5, Cycle+Soak

4d Time-Based

The Time-Based screen will display the Allowed Watering Days that were selected during controller configuration.

> ⚠ The controller will irrigate a Time-Based zone based on the programmed schedule, and will not use any weather information to determine irrigation.

1. Set the desired number of calendar days between irrigation.

2. Set the minutes for each irrigation cycle.

3. Set the desired number of irrigation cycles per day; then press **NEXT**.

```
TIME-BASED      Zone 1
By Days of the Week
Mo    We    Fr

Desired Every 2 Days
 Water For 30 Minutes
  2 Times Per Day
BACK    -    +    NEXT
```

>> Go To Step 10, Enter Plant Maturity.

5 Cycle+Soak™

Irrigation run times may be divided into several cycles to prevent runoff based on soil type, precipitation rate, and landscape slope. Steeper slopes will require more cycles, but will not affect the total run time.

1. Select the **Slope** degree (by pressing ━ or ✚) that best represents the zone topography; then press **NEXT**.

```
CYCLE/SOAK      Zone 1
Select Slope in Deg.
0-2°               3-4°
5-7°               8°-up
Cycle/Soak    Automatic
Max Cycle (21)      Min
Min Soak  (40)      Min
 BACK     ━     ✚   NEXT
```
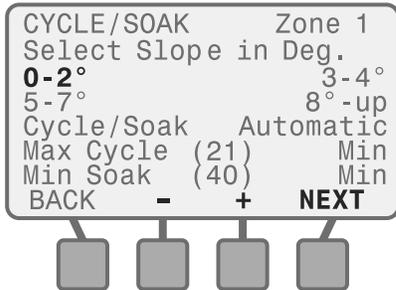
2. The **Automatic** mode is selected. To accept the automatically calculated cycle and soak values, press **NEXT**.

```
CYCLE/SOAK      Zone 1
Slope in Deg.     0-2°

Cycle/Soak Mode
Automatic       Custom
Max Cycle (21)  21 Min
Min Soak  (40)  40 Min
 BACK     ━     ✚   NEXT
```
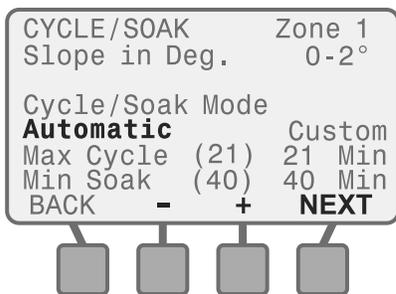
>> *Go To Step 6, Select Plant Type.*

3. To use Custom values, press ✚ to select **Custom**; then press **NEXT**.

```
CYCLE/SOAK      Zone 1
Slope in Deg.     0-2°

Cycle/Soak Mode
Automatic       Custom
Max Cycle (21)  21 Min
Min Soak  (40)  40 Min
 BACK     ━     ✚   NEXT
```
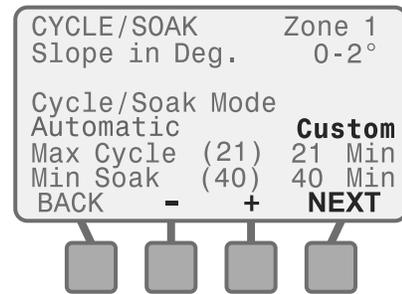
4. Adjust the Maximum Cycle and Minimum Soak values; then press **NEXT**.

```
CYCLE/SOAK      Zone 1
Slope in Deg.     0-2°

Cycle/Soak Mode
                Custom
Max Cycle (21)  15 Min
Min Soak  (40)  30 Min
 BACK     ━     ✚   NEXT
```
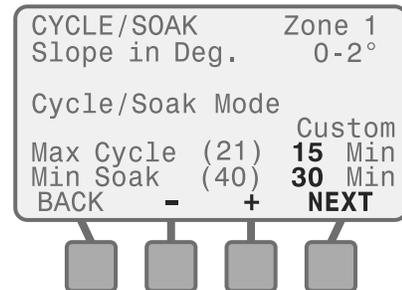
The following table lists the values for the Allowable Surface Accumulation by slope for each soil type:

Surface Accumulation Values

Soil Texture	0 - 3% Slope	4 - 6% Slope	7 - 12% Slope	>13% Slope
Sand	0.40	0.35	0.30	0.25
Loamy Sand	0.36	0.30	0.26	0.22
Sandy Loam	0.33	0.29	0.24	0.20
Loam	0.30	0.25	0.21	0.17
Clay Loam	0.26	0.22	0.18	0.15
Silty Clay	0.23	0.19	0.16	0.13
Clay	0.20	0.15	0.10	0.10

6 Select Plant Type

Select the dominant plant type for the zone or enter custom plant factors.

- To select a **Plant Type** from the list, use **Step 6a**.

- To enter **Custom Plant Factors**, use **Step 6b**.

6a To select Plant Type:

1. Select the plant type for the zone.

```
PLANT TYPE       Zone 1
Grass Lawn       Annuals
Ground Cover     Shrubs
Desert Plants     Trees
Mixed Planting
         - OR -
Custom Plant Factors
BACK      ↑      ↓   SELECT
```
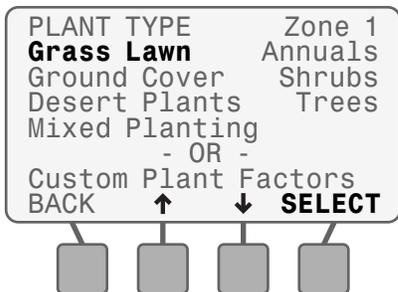
If Grass Lawns is selected:

2. Select either **Cool Season Varieties** or **Warm Season Varieties**.

```
GRASS VARIETY    Zone 1

Cool Season Varieties
Fescue, Blue Grass, Rye
         - OR -
Warm Season Varieties
Bermuda, St Augustine
BACK      ↑      ↓   SELECT
```
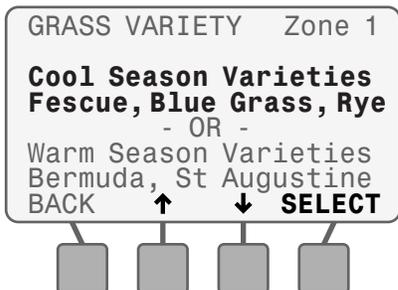
[!] **NOTE**: The figures below show the difference between Cool and Warm Season Varieties.

Cool Season Variety
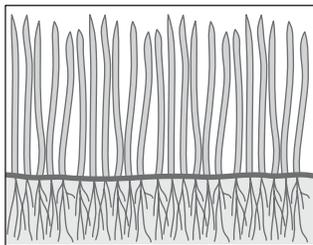
Most "Cool Season" grasses do not spread through runners, but rather from actual seed that germinates. Cool Season Varieties usually have individual blades that grow in a vertical orientation.

Warm Season Variety
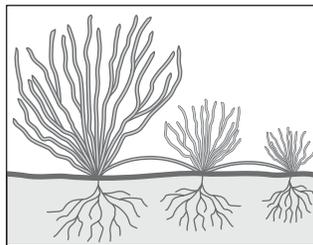
Most "Warm Season" grasses grow (spread) through runners that branch out horizontally from the established lawn or from planted stolons. In general, Warm Season grasses go dormant in the winter.

3. Enter Root Depth; then press **NEXT**.
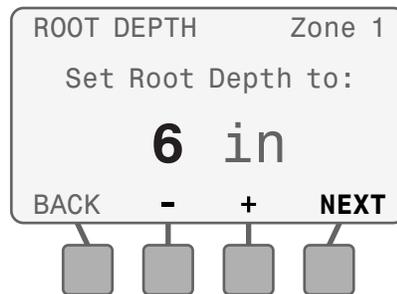
```
ROOT DEPTH       Zone 1

  Set Root Depth to:

        6 in

BACK    –    +    NEXT
```

[!] **NOTE**: Increasing the root depth will decrease irrigation frequency (water less often) and increase watering run times. Decreasing the root depth will increase irrigation frequency (water more often) and decrease run times.

Default Root Depth by Plant Type

Plant Type	Root Depth
Cool Grass	3"
Warm Grass	3"
Annual Color	2"
Ground Cover	6"
Shrubs	8"
Desert (Natives)	12"
Trees	12"
Mixed Planting	6"

>> *Go to Step 8, Enter Shade Factor.*

If any other plant type is selected:

4. Select an estimated Plant Water Need.

```
PLANT WATER      Zone 1
NEEDS
Mixed Plants
         High
      Average
         Low
BACK     ↑     ↓   SELECT
```
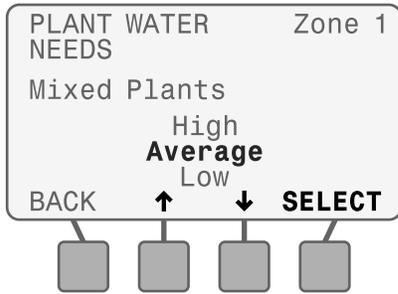
⚠ **NOTE**: Increasing the Water Need (Low to High) will increase irrigation frequency (water more often). Decreasing Water Need will decrease irrigation frequency (water less often).

Plant Water Needs Default Values

Plant Type	High Need	Average Need	Low Need
Grass (Cool Season)	Uses monthly Kc values, published in the Irrigation Association SWAT Testing Protocol - 8th Draft.		
Grass (Warm Season)			
Annual Color	150%	120%	100%
Ground Cover	90%	50%	20%
Shrubs	70%	50%	20%
Desert Plants (Natives)	50%	30%	15%
Trees	90%	50%	20%
Mixed Planting	90%	50%	20%

5. Enter Root Depth; then press **NEXT**.
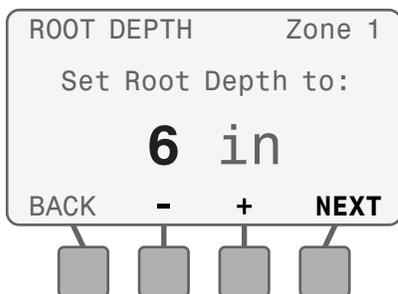
```
ROOT DEPTH       Zone 1

   Set Root Depth to:

        6  in
BACK    −     +     NEXT
```

⚠ **NOTE**: Increasing the root depth will decrease irrigation frequency (water less often) and increase watering run times. Decreasing the root depth will increase irrigation frequency (water more often) and decrease run times.

>> Go to Step 7, Enter Plant Density.

6b **To select Custom Plant Factors:**

1. Select **Custom Plant Factors**.

```
PLANT TYPE        Zone 1
Grass Lawn      Annuals
Ground Cover     Shrubs
Desert Plants     Trees
Mixed Planting
      - OR -
Custom Plant Factors
BACK     ↑     ↓   SELECT
```

2. Enter the Species Factor value for the plants in the zone; then press **NEXT**.

```
CUSTOM PLANT    Zone 1
FACTORS

Species Factor(Ks)0.8

Root Depth        6 in

BACK    −     +     NEXT
```

⚠ **NOTE**: Increasing the Species Factor will increase irrigation frequency (water more often). Decreasing the Species Factor will decrease irrigation frequency (water less often).

3. Enter the Root Depth; then press **NEXT**.
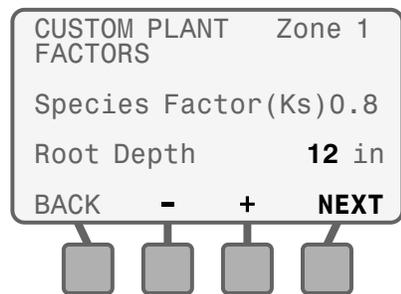
```
CUSTOM PLANT    Zone 1
FACTORS

Species Factor(Ks)0.8

Root Depth       12 in

BACK    −     +     NEXT
```

⚠ **NOTE**: Increasing the root depth will decrease irrigation frequency (water less often) and increase watering run times. Decreasing the root depth will increase irrigation frequency (water more often) and decrease run times.

7 Select Plant Density (non-grass)

Plant Density is the relative amount of foliage (leaf surface area and plant spacing) in the zone.

1. Select the appropriate plant density for the zone.

```
PLANT DENSITY    Zone 1
Mixed Plants
          Dense
          Medium
          Sparse
BACK      ↑      ↓   SELECT
```

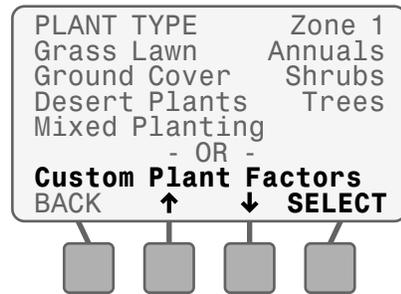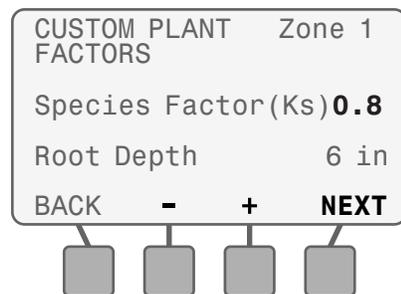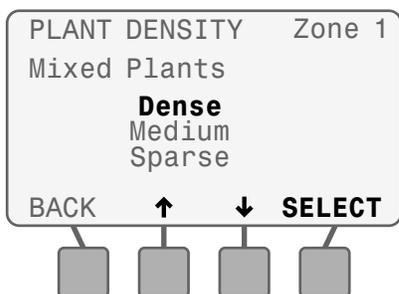**!** **NOTE**: Increasing the Plant Density (Sparse to Dense) will increase irrigation frequency (water more often). Decreasing the Plant Density will decrease irrigation frequency (water less often).

Density Factor by Plant Type

Plant Type	Dense	Medium	Sparse
Grass (Cool Season)	Density is not a factor for Grass Types		
Grass (Warm Season)			
Annual Color	1.0	1.0	0.8
Ground Cover	1.1	1.0	0.5
Shrubs	1.1	1.0	0.6
Desert Plants (Natives)	1.3	1.0	0.6
Trees	1.3	1.0	0.6
Mixed Planting	1.2	1.0	0.6
Custom Plant Factor	1.2	1.0	0.6

8 Select Shade Factor

Shade Factor is the approximate amount of time that plants are exposed to direct sunlight each day.

1. Select the appropriate shade factor for the zone.

```
SHADE FACTOR     Zone 1
          Full Sun
          25% Shade
          50% Shade
          75% Shade
          Full Shade
BACK      ↑      ↓   SELECT
```
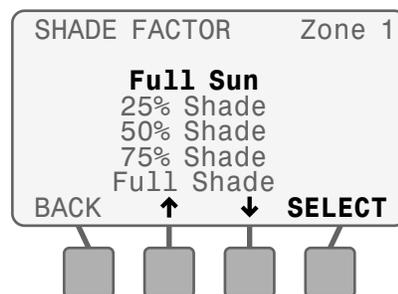
! **NOTE**: Increasing the Shade Factor (less exposure to the sun) will decrease irrigation frequency (water less often). Decreasing the Shade Factor (more exposure to the sun) will increase irrigation frequency (water more often).

Shade Factor Default Values

Exposure	Non-Turf	Turf
Full Sun	1.30	1.00
25% Shade	1.15	0.89
50% Shade	1.00	0.77
75% Shade	0.75	0.67
Full Shade	.50	0.56

⑨ Enter Refill Point

1. Adjust the Refill Point if desired; then press **NEXT**.

```
RE-FILL POINT    Zone 1
  ⋎ ⋎   Plant Available
     ⇐F Water: 0.50 in
        Re-fill when
   →    Soil Moisture
     ∠E Drops To:
        50% =  0.25 in
  BACK    -    +    NEXT
```
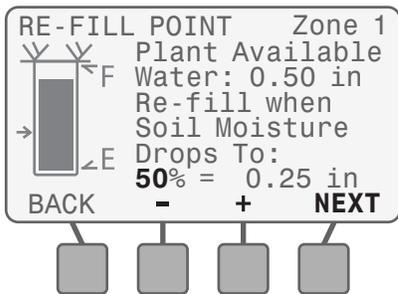
⚠ **NOTE**: The graphic on the left of the screen shows the amount of water in the soil. When this amount drops to the level indicated by the arrow (Refill Point) then irrigation is scheduled. Increasing the Refill Point will cause shorter, more frequent irrigation, and decreasing the Refill Point will cause longer, less frequent irrigation.

⑩ Select Plant Maturity

New plants have different watering needs than plants that are already established. New plants are watered every day during the Daily Period, then are considered Established when the Daily Period ends.

Established:

1. Select **Established**.

```
PLANT MATURITY   Zone 1

        Established
         - OR -
       Newly Planted
      (Grow-in Period)
  BACK    ↑    ↓    SELECT
```
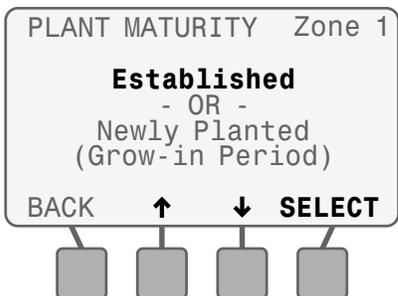
>> Go to Step 11, Select Next Action.

Newly Planted:

2. Select **Newly Planted (Daily Period)**.

```
PLANT MATURITY   Zone 1

        Established
         - OR -
      Newly Planted
     (Grow-in Period)
  BACK    ↑    ↓    SELECT
```
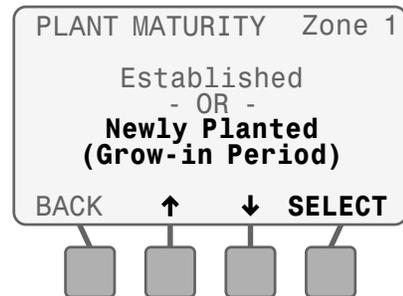
3. Set the number of days (1-199) for the desired Daily Period.

4. Set the desired number of Cycles per Day (1-8).

5. Set the desired Minutes per Cycle (1-30); then press **NEXT**.

```
NEWLY PLANTED    Zone 1

Water Every Calendar
Day For Next   14 Days
Cycles Per Day       2
Minutes Per Cycle    5
09:00 AM  to  04:00 PM
BACK    -    +    NEXT
```
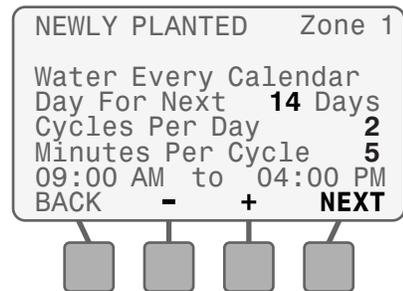
⑪ Select Next Action

After programming is complete for a zone, select the desired Next Action.

- **Program Next Zone** returns to the Select Zone screen (Step 1) to program another zone.

- **Review This Zone** displays all the zone information selected during programming. Press MORE to view all the Review screens.

- **Change This Zone Data** returns to the Select Zone screen (Step 1) to edit zone information.

- **Copy Zone To Zone** displays the Copy Zone Data screen, to copy zone information from one zone to another zone if desired.

```
NEXT ACTION       Zone 1
     Program Next Zone
      Review This Zone
   Change This Zone Data
      Copy Zone To Zone
  DONE     ↑     ↓   SELECT
```
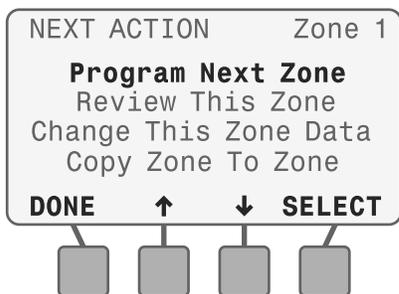
↻ **REPEAT** the Zone Setup Wizard for each zone at your site.

Copy Zone to Zone

Copy zone information from one zone to another zone.

▶ Turn the dial to **INPUT ZONE INFORMATION** and select **Copy Zone to Zone**.

Input Zone Information

```
INPUT ZONE INFORMATION


Zone Setup Wizard
Copy Zone to Zone


            ↑    ↓   SELECT
```
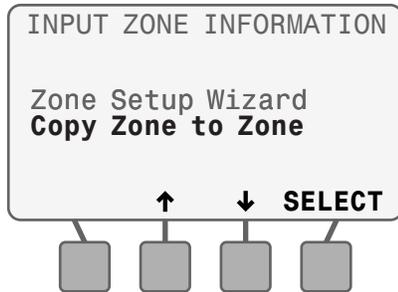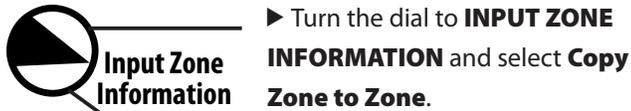
1. Select the source Zone number (**Copy From Zone**).

2. Select up to three destination zones (**To Zone**); then press **NEXT**.

```
     COPY ZONE DATA

Copy From Zone        1
        To Zone       2
    And To Zone       3
    And To Zone      --

BACK     −     +     NEXT
```
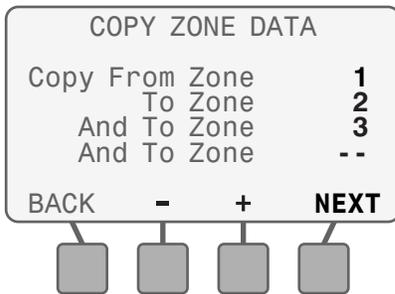
3. Select **COPY** if the selections are correct.

4. Select **QUIT** to re-enter selections.

```
     COPY ZONE DATA

Copy From Zone        1
        To Zone       2
    And To Zone       3
    And To Zone      --
    Start Copy or Quit
QUIT          COPY
```
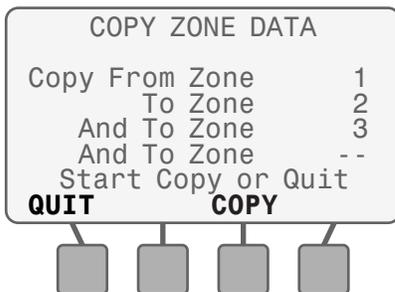
⚠ **NOTE**: If **QUIT** is selected, NOT COPIED will be displayed on the screen.

5. When the copy is complete, press **NEXT**.

```
     COPY ZONE DATA

   Copy Complete
From Zone      1
     To Zone   2
And To Zone    3
And To Zone  --
BACK              NEXT
```
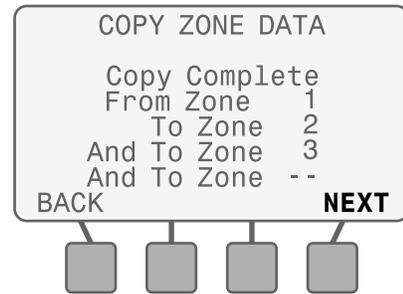
Advanced Options

Special Features

Select advanced irrigation scheduling and controller setup options.

▶ Turn the dial to **Special Features**.

```
      SPECIAL FEATURES
Event Days Off
Short Circuit Test
Adv. Controller Setup
Advanced Zone Setup
Save Contractor Dflts
Set Units
              ↑    ↓  SELECT
```
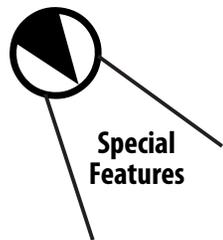
Special Features
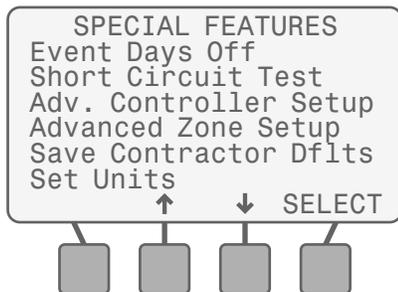
Event Days Off

Event Days Off allows you to select up to four specific dates to block irrigation for special occasions.

1. Select **Event Days Off.**

```
      SPECIAL FEATURES
Event Days Off
Short Circuit Test
Adv. Controller Setup
Advanced Zone Setup
Save Contractor Dflts
Set Units
              ↑    ↓  SELECT
```
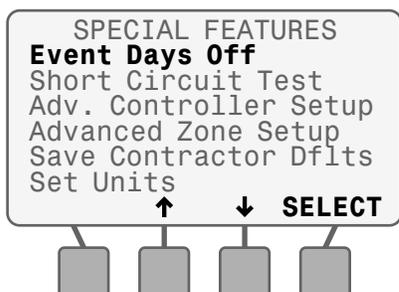
2. Press ✚ to add a new date.

3. Set the desired date; then press **NEXT**.

> **!** **NOTE**: Event Days Off dates can be entered in any chronological order, and will be re-arranged after leaving the screen.

```
      EVENT DAYS OFF

      03 Jul 2013
      - - - - - - - - - -
      - - - - - - - - - -
      - - - - - - - - - -

BACK     -     +     NEXT
```
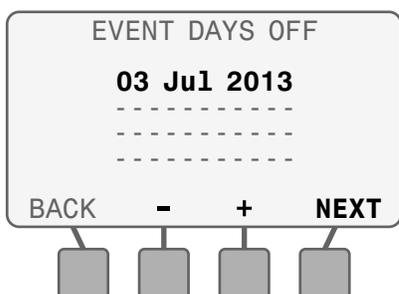
🔄 **REPEAT** to enter up to four dates.

4. To delete an Event Day Off, select the date using **NEXT** or **BACK** and press and HOLD ━.

5. When an Event Day Off date has passed, it will automatically be deleted.

Short Circuit Test

Verify the integrity of the wires between the controller and the valves.

1. Select **Short Circuit Test**.

```
      SPECIAL FEATURES
Event Days Off
Short Circuit Test
Adv. Controller Setup
Advanced Zone Setup
Save Contractor Dflts
Set Units
              ↑    ↓  SELECT
```
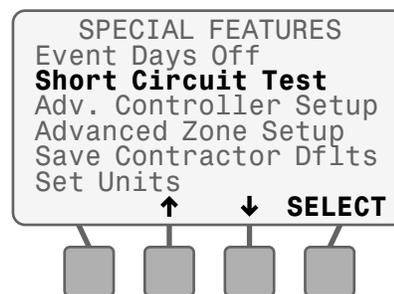
The test result for each zone is displayed; the test takes about 30 seconds to complete.

2. Press **RETEST** to run the test again if desired.

```
      SHORT CIRCUIT TEST
M:G  5:G 10:G 15:N 20:N
1:G  6:G 11:G 16:N 21:N
2:G  7:G 12:G 17:N 22:N
3:G  8:G 13:G 18:N
4:G  9:G 14:N 19:N
Short G:NoShort NoMod
BACK          RETEST
```
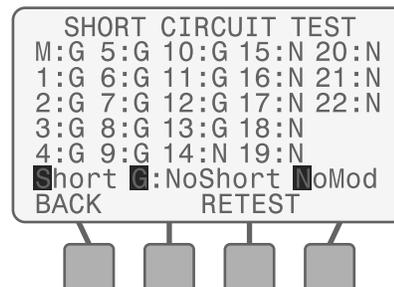
> **!** **NOTE**: "NoMod" indicates that no module is present for that station number.

Advanced Controller Setup

1. Select **Adv. Controller Setup**.

```
     SPECIAL FEATURES
Event Days Off
Short Circuit Test
Adv. Controller Setup
Advanced Zone Setup
Save Contractor Dflts
Set Units
              ↑    ↓   SELECT
```
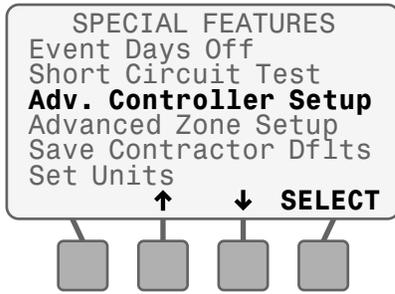
Adjust calculated ET values, set time delays between zones, and set thresholds that determine when the controller will suspend irrigation due to weather conditions.

- **ETo Adjust Factor** globally increases or decreases the calculated daily ET value.

- **Zone to Zone Delay** sets a time delay between one station valve turning off and the next station valve turning on.

- **Suspend Watering When Rain Reaches** value suspends irrigation when measured rainfall reaches the specified amount.

- **Suspend Watering When Temp Below** value suspends irrigation when the temperature falls below a specific value.

2. Adjust the desired value.

```
ADV CONTROLLER SETUP
ETo Adjust Factor 100%
Zone To Zone Delay
              2 Seconds
Suspend Watering When
Rain Reaches   0.04in
-OR- Temp Below  35°F
BACK     –    +    NEXT
```
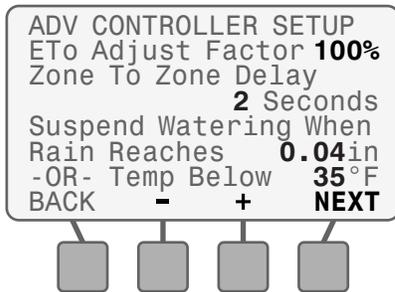
Advanced Zone Setup

1. Select **Advanced Zone Setup**.

```
     SPECIAL FEATURES
Event Days Off
Short Circuit Test
Adv. Controller Setup
Advanced Zone Setup
Save Contractor Dflts
Set Units
              ↑    ↓   SELECT
```
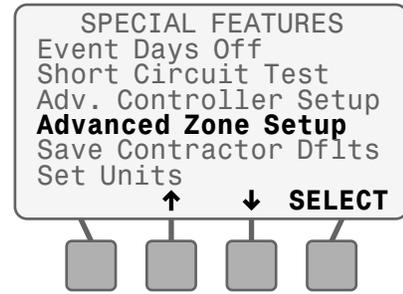
Set each zone to use (or not to use) an installed master valve, pump start relay, or the ESP-SMT Rain Gauge.

> **!** **NOTE**: If you are irrigating potted plants in a covered courtyard that does not receive rainfall, you can set Use Rain Gauge to **NO** so that zone is not affected by rain.

2. Select the desired **Zone**.

3. Set Use Master Valve (or Pump Start Relay) to **YES** or **NO**.

4. Set Use Rain Gauge to **YES** or **NO**.

```
ADVANCED SETUP  Zone 1

Use Master Valve    YES

Use Rain Gauge      YES

BACK    –    +    NEXT
```
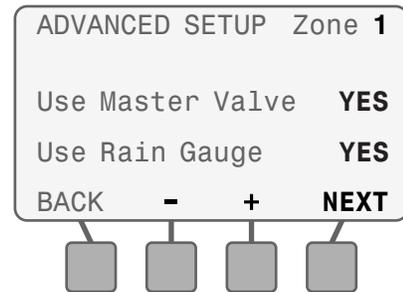
> **!** **NOTE**: If Use Rain Gauge is set to **NO**, the selected zone will not receive rainfall information from the weather sensor but will continue to receive temperature data.

Save Contractor Defaults

Save the current Configure Controller and Input Zone Information settings for all zones to memory.

1. Select **Save Contractor Defaults**.

```
   SPECIAL FEATURES
Event Days Off
Short Circuit Test
Adv. Controller Setup
Advanced Zone Setup
Save Contractor Dflts
Set Units
          ↑      ↓  SELECT
```

2. Press **SAVE** to save zone settings to Contractor Defaults.

```
    SAVE CURRENT
    SETTINGS TO:

  Contractor Defaults


QUIT          SAVE
```
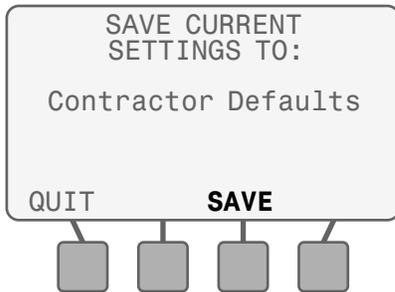
3. Read the Warning; then press **SAVE**.

```
   WARNING
 Saving Settings To
Contractor Defaults
 Will Overwrite All
   Previously Saved
Contractor Defaults.
QUIT          SAVE
```

4. Current Settings are saved; press **CONTINUE**.

```
  CURRENT SETTINGS

    SAVED
   To Contractor
  Settings Backup

          CONTINUE
```
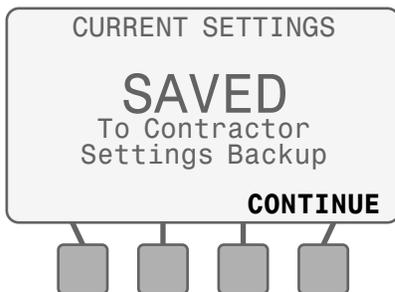
Set Units

Set the Time format (AM/PM or 24-Hour) and Units format (English or Metric) that is displayed by the controller.

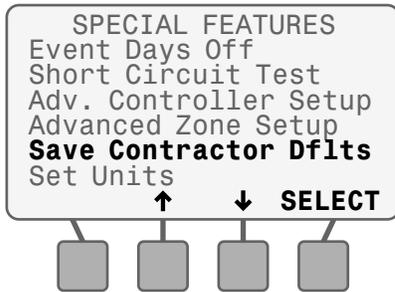> **!** **NOTE**: The Automatic setting will set the Time format to AM/PM and the Unit format to English when the controller is connected to a 60 Hz power source, and use 24-Hour and Metric when connected to 50 Hz.

1. Select **Set Units**.

```
   SPECIAL FEATURES
Event Days Off
Short Circuit Test
Adv. Controller Setup
Advanced Zone Setup
Save Contractor Dflts
Set Units
          ↑      ↓  SELECT
```
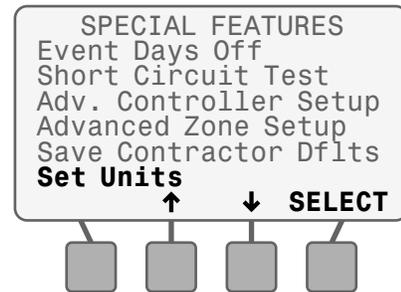
2. Select the desired Time Format.

```
  SET TIME FORMAT

     Automatic
      AM/PM
     24-Hour
BACK   ↑      ↓  SELECT
```
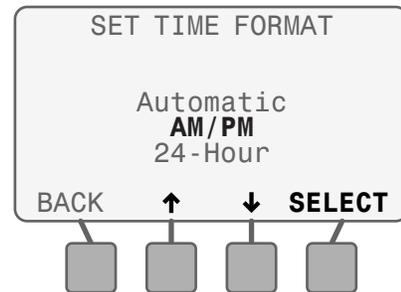
3. Select the desired Unit Format.

```
  SET UNITS FORMAT

     Automatic
      English
      Metric
BACK   ↑      ↓  SELECT
```
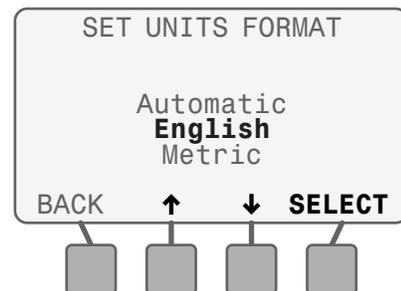
Fine-Tune Watering

Adjust the calculated run time for each individual zone.

If minor adjustments are required to calculated run times, you can increase or decrease run times for ET zones by a selected percentage. These adjustments will apply until you set the value back to 0.

> ⚠ **NOTE**: The Fine Tune % By Zone value can be adjusted from -60% to +60%. For example, if a +50% adjustment is set, then a calculated run time of 10 minutes will become 15 minutes.

Fine-Tune Watering adjustments only affect Weather-Based zones, and do not affect any zone that is programmed in Newly Planted or Time-Based mode.

> ⚠ **NOTE**: Fine Tune settings can be adjusted for Newly Planted zones, but will not take effect until the Newly Planted mode expires.

Fine-Tune Watering

1. Turn the dial to **Fine-Tune Watering.**

2. Select the zone to adjust.

3. Set the adjustment percentage for the selected zone.

```
        FINE TUNE % BY ZONE
      1 +20   7  +0  13   +0  19 n/a
      2  +0   8  +0  14 n/a  20 n/a
      3  +0   9  +0  15 n/a  21 n/a
      4 n/a  10  +0  16 n/a  22 n/a
      5  +0  11  +0  17 n/a
      6  +0  12  +0  18 n/a
       BACK    –      +      NEXT
```

4. After completing all adjustments, return the dial to **AUTO**.

> ⚠ **NOTE**: Any zone that is programmed in Time-Based mode will display **n/a**.

System Review

View system settings, weather information, and the next scheduled irrigation event.

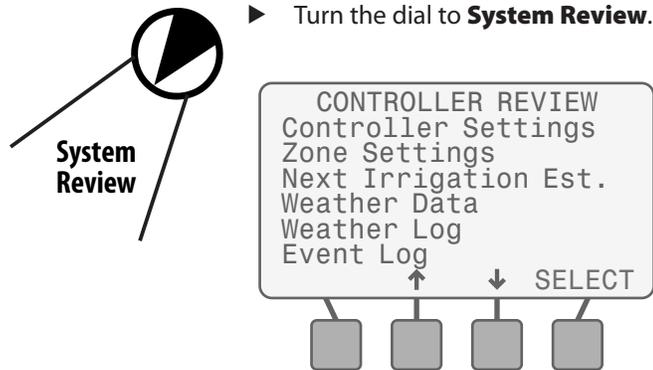The information that is available under System Review is for review purposes only. This allows the review of programming settings without accidentally making unwanted changes.
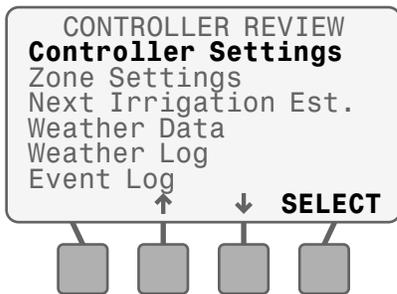
To make changes to any of the settings, refer to the Configure Controller, Input Zone Information or Special Features sections.

▶ Turn the dial to **System Review**.

System Review

```
    CONTROLLER REVIEW
    Controller Settings
    Zone Settings
    Next Irrigation Est.
    Weather Data
    Weather Log
    Event Log
         ↑      ↓   SELECT
```

Controller Settings

Review the settings used to determine irrigation scheduling, such as watering days and times.

1. Select **Controller Settings**.

```
    CONTROLLER REVIEW
    Controller Settings
    Zone Settings
    Next Irrigation Est.
    Weather Data
    Weather Log
    Event Log
         ↑      ↓   SELECT
```

2. Review location data, Allowed Watering Days and Water Windows; then press **MORE**.

```
    CONTROLLER SETTINGS
    Zip Code        92010
    By Days of the Week
    Mo    We    Fr
        Water Windows
    05:00 AM  To  09:00 AM
    04:00 PM  To  06:00 PM
    BACK              MORE
```
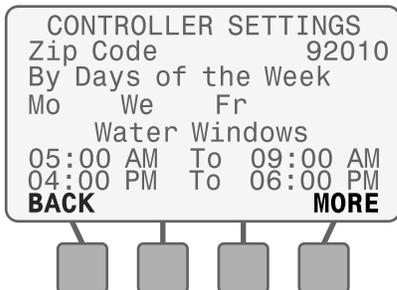
3. Review the Grow-In Water Window for new plants; then press **MORE**.

```
    CONTROLLER SETTINGS
    Daily Water Window
    06:00 AM  To   11:00 AM
    BACK              MORE
```
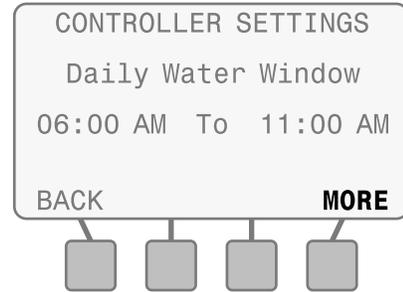
4. Review the Rain ShutOff Setting; then press **DONE**.

```
    CONTROLLER SETTINGS
    For Time-base and
    Grow-in Zones Only:
    Shutoff Watering For
     1 FULL Day(s) when
    Rain Reaches: 0.20 in
    BACK              DONE
```
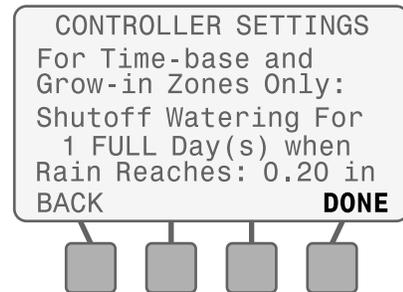
> **⚠ NOTE**: When the Weather Sensor detects the set amount of rain, Time-Based and Newly Planted irrigation is shut off for the set number of days. Automatic irrigation (ET zones) are delayed by the added moisture in the soil.

Zone Settings

Review the site information entered for each zone, such as plant, soil, and sprinkler type.

1. Select **Zone Settings**.

```
    CONTROLLER REVIEW
Controller Settings
Zone Settings
Next Irrigation Est.
Weather Data
Weather Log
Event Log
           ↑    ↓  SELECT
```

! **NOTE**: On any Review screen, press **–** or **+** to see information for other zones. Press **BACK** to view previous screens.

2. Review zone settings; then press **MORE**.

```
REVIEW   Zone 1     ON

        Plants Are
        Established
Watering In:
   Daily Water Window
BACK    –     +     MORE
```

3. Review zone settings; then press **MORE**.

```
REVIEW   Zone 1     ON
        Sprinkler

 Rotary Nozzles
 Net Application Rate
        0.50 in/hr
BACK    –     +     MORE
```
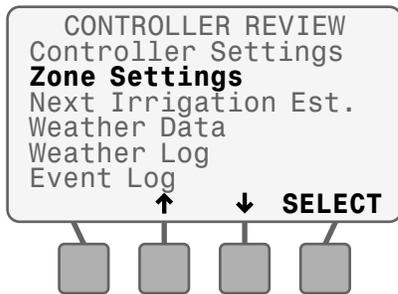
4. Review zone settings; then press **MORE**.
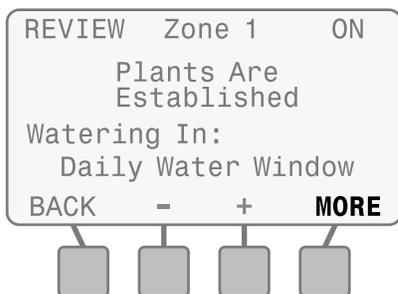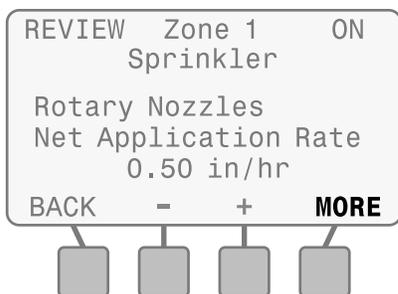
```
REVIEW   Zone 1     ON
   Cool Season Grass

Root Depth       12 in
             Full Shade
Refill Threshold   50%
BACK    –     +     MORE
```

5. Review zone settings; then press **DONE**.
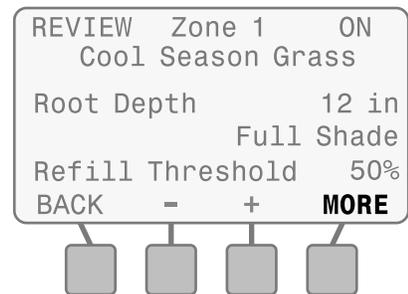
```
REVIEW   Zone 1     ON
Sandy Loam        0°-2°
Cycle/Soak   Automatic
Max Cycle        6 Min
Min Soak        40 Min
Use Master Valve   Yes
Use Rain Gauge     Yes
BACK    –     +     DONE
```
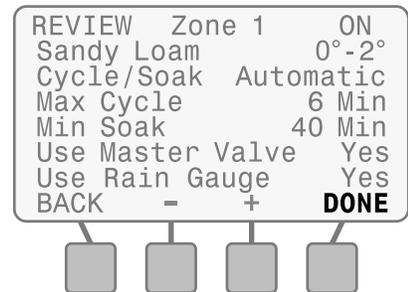
Next Irrigation Estimate

Review the estimated soil moisture content for each zone, the next scheduled irrigation event and an estimated irrigation schedule for up to three weeks in advance.

1. Select **Next Irrigation Est**.

```
   CONTROLLER REVIEW
  Controller Settings
  Zone Settings
  Next Irrigation Est.
  Weather Data
  Weather Log
  Event Log
            ↑    ↓  SELECT
```

2. Select **Soil Moisture**.

```
  NEXT IRRIGATION EST.

  Soil Moisture
  Estimated Schedule
  Help

  BACK    ↑    ↓  SELECT
```
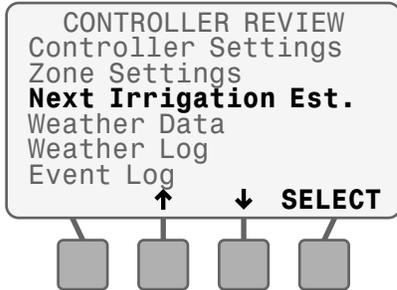
> **NOTE**: Initial Temperature Values must be set when programming the SMTe controller for the first time. See **Set Initial Temperature Values** for more details.

3. Press ▬ or ✚ to view the desired zone.

4. Review Soil Moisture and the Next Irrigation Estimate; then press **SCH**.

```
SOIL MOISTURE   Zone 1
      Estimated Soil
    ⌐F  Moisture
          0.43 in
      Next Irrigation
    ∠E Estimate 60 min
      On 08 Jul
  BACK    ▬    ✚    SCH
```
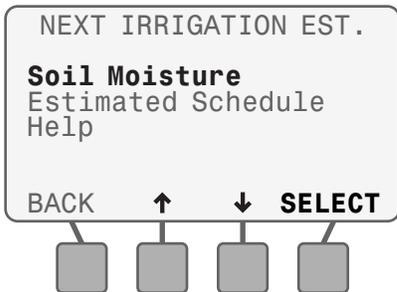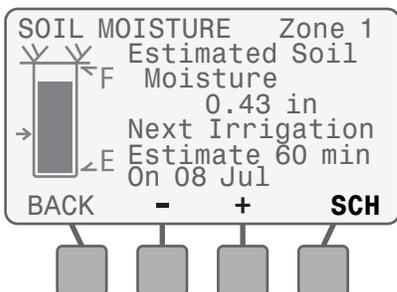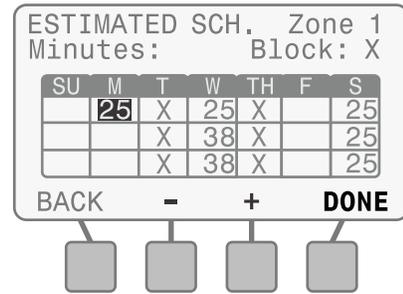
> **NOTE**: Soil Moisture is only displayed for Weather-Based zones. The bar represents the current Plant Available Water and the arrow represents Management Allowed Depletion.

5. Press ▬ or ✚ to view the desired zone.

6. Review the estimated irrigation schedule for the next three weeks; then press **DONE**.

```
ESTIMATED SCH.  Zone 1
Minutes:      Block: X
  SU  M  T  W  TH  F   S
      25  X  25  X     25
          X  38  X     25
          X  38  X     25
  BACK    ▬    ✚    DONE
```

Set Initial Temperature Values

The ESP-SMTe cannot provide valid irrigation estimates until temperature values from the previous day are set. To determine irrigation estimates the same day the unit is installed, the screen below will be displayed to enter the highest and lowest temperatures from the previous day.

Once this temperature data is entered and accepted, this screen will no longer be displayed.

1. Set the highest temperature from the previous day; then press **ACCEPT**.

2. Set the lowest temperature from the previous day; then press **ACCEPT.**

```
ESTIMATED SCHEDULE
Weather Data Not Yet
Available.  Enter
Yesterdays's Temp:

Highest           80°
Lowest            60°
BACK    ▬    ✚  ACCEPT
```
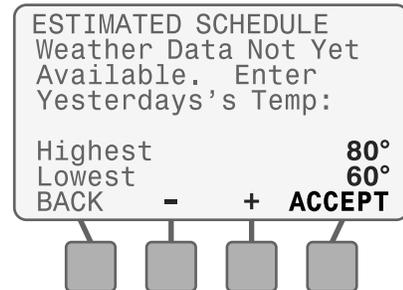
> **NOTE**: Initial temperature values will have to be set again if Factory Defaults are restored.

Weather Data

Review the current temperature and measured rainfall over the past 24 hours based on data from the SMTe Weather Sensor.

1. Select **Weather Data**.

```
    CONTROLLER REVIEW
  Controller Settings
  Zone Settings
  Next Irrigation Est.
  Weather Data
  Weather Log
  Event Log
              ↑     ↓   SELECT
```
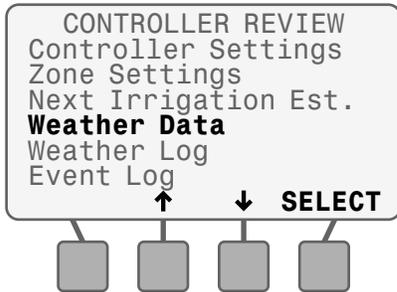
2. Review weather data; then press **BACK**.

```
      WEATHER DATA

  Current Temp:    72°F

  Rain in Last
     24 Hours: 1.24 in
  BACK
```
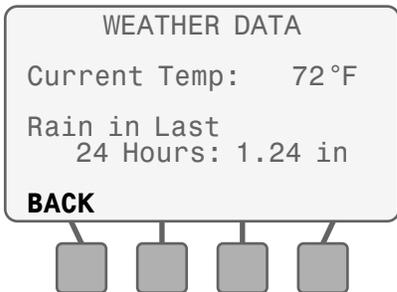
Weather Log

Review a daily log of high and low temperatures, calculated ET values, and rainfall over the past month based on data from the SMTe Weather Sensor.

1. Select **Weather Log**.

```
    CONTROLLER REVIEW
  Controller Settings
  Zone Settings
  Next Irrigation Est.
  Weather Data
  Weather Log
  Event Log
              ↑     ↓   SELECT
```
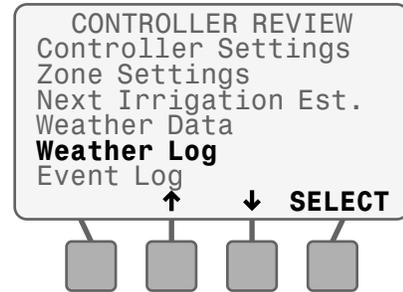
2. Review weather data. Press **PgUp** or **PgDn** to see more info if necessary; then press **BACK**.

```
  WEATHER LOG   (°F,in)
  Date   Hi  Low ETo Rain
  03May  85   55 .12    0
  02May  87   56 .15    0
  01May  84   53 .11    0
  30Apr  80   55 .14  .23
  29Apr  86   54 .15  .15
  BACK   PgDn PgUp
```
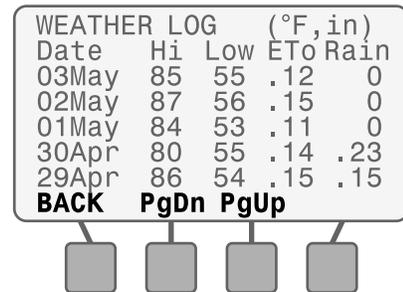
Event Log

Review notifications and error messages concerning irrigation events by date or by zone. Check these messages if the controller is not operating as expected.

> **!** **NOTE**: A table at the end of this section lists all the messages that can appear in the Event Logs.

1. Select **Event Log**.

```
    CONTROLLER REVIEW
 Controller Settings
 Zone Settings
 Next Irrigation Est.
 Weather Data
 Weather Log
 Event Log
            ↑      ↓   SELECT
```

View Alarms and Notes

1. Select **Alarms and Notes**.

```
         EVENT LOG

 Alarms and Notes
 Events by Date
 Events by Zone

 BACK      ↑      ↓   SELECT
```
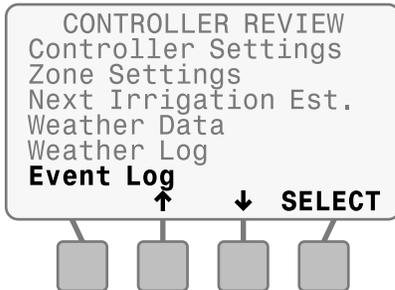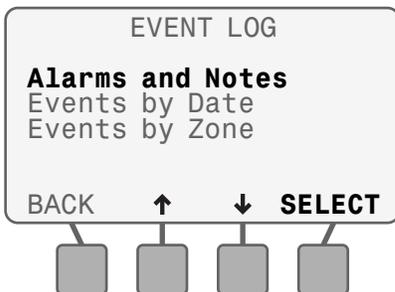
2. Review alarms and notes. Press **PgUp** or **PgDn** to see more info if necessary; then press **BACK**.

```
     ALARMS AND NOTES
 05 May 10:02A Short Z10
 04 May 11:24A Rain Susp
 03 May 10:16A High Temp


 BACK   PgDn  PgUp
```
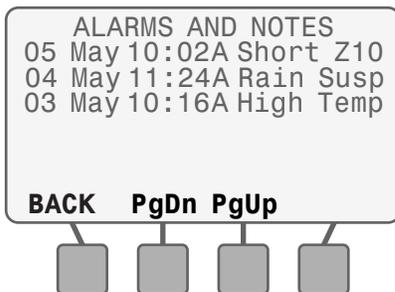
View Events by Date

1. Select **Events by Date**.

```
         EVENT LOG

 Alarms and Notes
 Events by Date
 Events by Zone

 BACK      ↑      ↓   SELECT
```
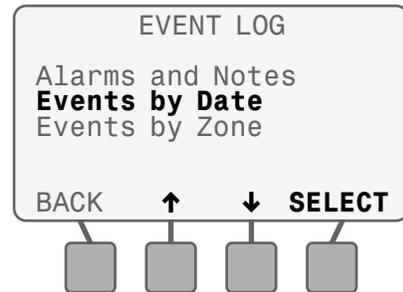
2. Review events. Press **PgUp** or **PgDn** to see more info if necessary; then press **BACK**.

```
      EVENTS BY DATE
 03 May 06:13A Z05  Done
 03 May 06:10A Z08  Done
 03 May Schl'd Z08 10 Mi
 03 May Schl'd Z05  3 Mi


 BACK   PgDn  PgUp
```
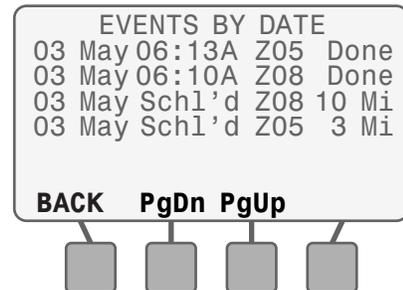
View Events by Zone

1. Select **Events by Zone**.

```
      EVENT LOG

Alarms and Notes
Events by Date
Events by Zone


BACK     ↑     ↓    SELECT
```
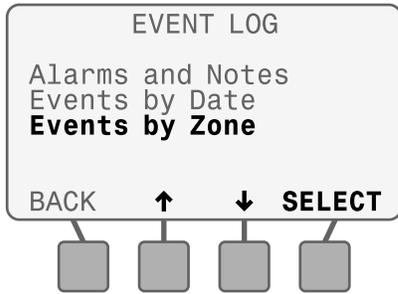
2. Review events for the selected zone. Press **PgUp** or **PgDn** to see more info if necessary.

3. Press **NEXT** to review events for the next zone.

```
EVENTS FOR       Zone 1
04 May 06:14A Z01  Done
04 May Schl'd Z01  3 Mi
03 May 06:21A Z01  Done
03 May Schl'd Z01 10 Mi


BACK   PgDn PgUp   NEXT
```
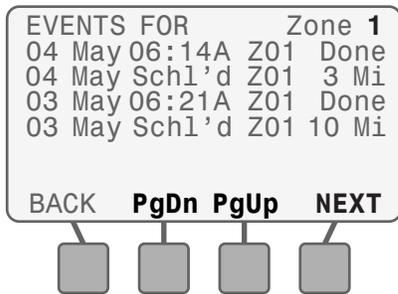
! **NOTE**: New log entries will not be displayed while the log is open. Press **BACK** and then **SELECT** to update the display.

Event Logs

Normal Operation Notifications

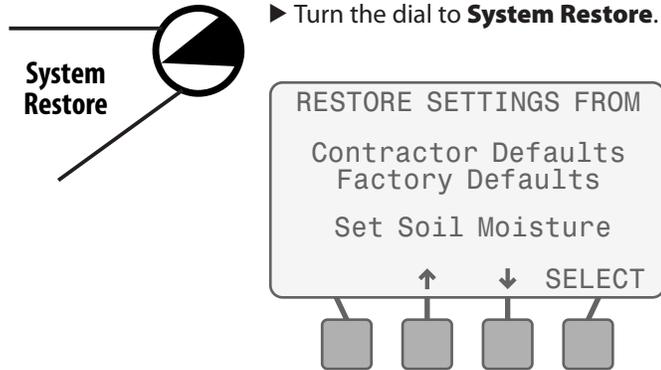| Screen Text	Event Description
Schl'd Zxx xxx mi	Irrigation is scheduled for Zone xx for xxx minutes
Zxx Done	Zone xx completed the scheduled irrigation
Cold Susp	All irrigation delayed due to near freezing temperature
Rain Susp	All irrigation delayed due to rain reaching Suspend Watering threshold
Rain SOff	Time-Based and Daily irrigation shut off due to rain reaching Rain Shut Off threshold

User Initiated Actions

Screen Text	Event Description
User Susp	User suspended irrigation
User Term	User terminated irrigation
C Save	User saved Contractor Defaults to backup storage
C Default	User restored Contractor Defaults from backup storage
F Default	User reset all settings to Factory Defaults (does not affect Contractor Defaults saved in storage)
Reset x02	The Reset button was pressed (if a short was logged right before Reset, the short may have caused by the MV or zone wiring short)

Errors

Screen Text	Event Description
Incomplet	The scheduled irrigation did not complete in the time permitted by the Watering Windows. (Select HELP on the NOTE 5 screen or refer to symptom "NOTE 5 on Display Screen" in the Troubleshooting section in this manual.)
Short MV	The wiring or solenoid for the Master Valve has a short. Always fix any Master Valve short before fixing any shorted Zones.
Short Zxx	The wiring or solenoid for Zone xx has a short
Alarm-Sen	Weather sensor wiring may be damaged
High Temp	Weather sensor may be affected by a local heat source (air conditioner, reflective surface or other source of heat)
Reset x07	AC Power was lost
	1. Verify that the 120 VAC is not being shut off by a wall switch
	2. Contact electrician or power company if necessary
	3. Install a 9V battery to protect against momentary outages
Init	Controller detected an error and cleared the error (no action required unless Init occurs frequently)
Alarm-Temp	Possible temperature sensor malfunction (Reset the front panel - if the error doesn't reoccur no action is required)

System Restore

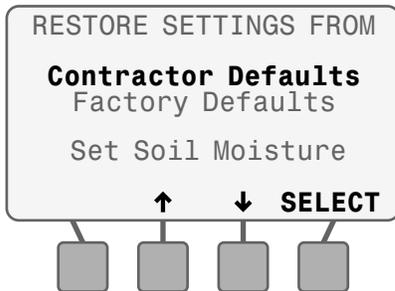***Restore Contractor or Factory Defaults and adjust soil moisture values.***

Restore Contractor Default settings, restore original factory settings, or make adjustments to estimated soil moisture values for all zones.

▶ Turn the dial to **System Restore**.

System Restore

```
RESTORE SETTINGS FROM

  Contractor Defaults
    Factory Defaults

  Set Soil Moisture

         ↑     ↓  SELECT
```

Contractor Defaults

Restore the Configure Controller and Input Zone Information settings that were saved using the Save Contractor Defaults under **SPECIAL FEATURES**. Current settings are overwritten.

1. Select **Contractor Defaults**.

```
RESTORE SETTINGS FROM

 Contractor Defaults
    Factory Defaults

  Set Soil Moisture

       ↑     ↓   SELECT
```

2. Press **RESTORE** to restore the Contractor Defaults.

```
 RESTORE CURRENT
  SETTINGS FROM:

 Contractor Defaults



QUIT       RESTORE
```

3. The following screen is displayed while the controller reconfigures.
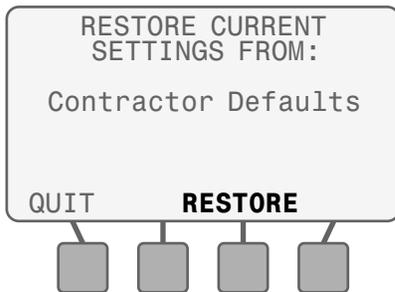
```
    RESTORING TO
  Contractor
   Defaults

  Please Wait While
  Unit Reconfigures
```
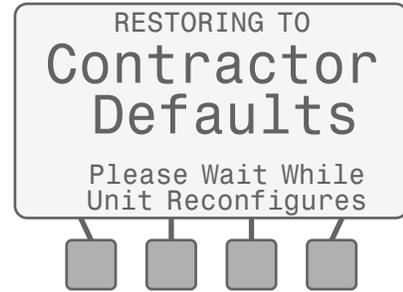
4. When the restore is complete, the display returns to the **RESTORE SETTINGS** menu.

Factory Defaults

Restore the original factory default settings. All current zone settings are erased. Any settings saved using Save Contractor Defaults are NOT affected.

1. Select **Factory Defaults**.

```
RESTORE SETTINGS FROM

 Contractor Defaults
   Factory Defaults

 Set Soil Moisture
        ↑      ↓   SELECT
```

2. Press **RESTORE** to restore the Factory Defaults.

```
  RESTORE CURRENT
  SETTINGS FROM:


  Factory Defaults

 QUIT       RESTORE
```

3. The following warning is displayed; press **RESTORE**.

```
   WARNING
  Restoring Factory
 Defaults Will Delete
 ALL Current Settings.
 Contractor Defaults
   Will Be Retained.
 QUIT         RESTORE
```
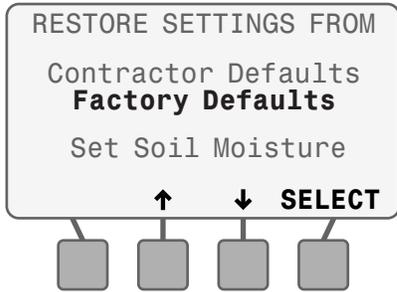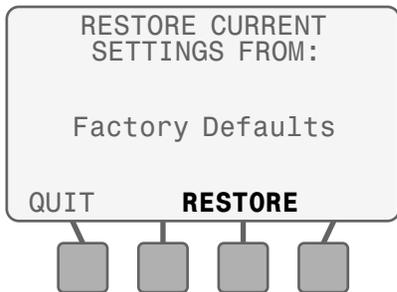
4. The following screen is displayed while the controller reconfigures.

```
    RESTORING TO
   Factory
   Defaults
  Please Wait While
 Unit Reconfigures
```
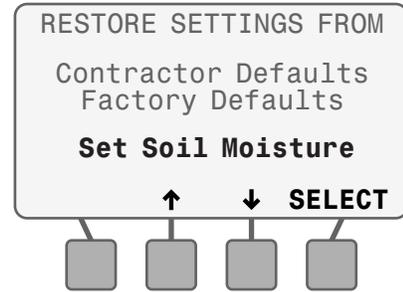
**5.** When the restore is complete, the display returns to the **RESTORE SETTINGS** menu.

Set Soil Moisture

Set the estimated Soil Moisture value (DRY, MEDIUM, or FULL). This affects the irrigation calculations for all weather based zones for the next few days.

1. Select **Soil Moisture**.

```
RESTORE SETTINGS FROM

 Contractor Defaults
  Factory Defaults

  Set Soil Moisture
        ↑      ↓   SELECT
```

2. Adjust the value if desired; then press **NEXT**.

```
SET SOIL MOISTURE
  ⅄ ⅄
      F Set Estimated
         Soil Moisture
         For All Zones
      E  To:   FULL
 BACK    -     +    NEXT
```
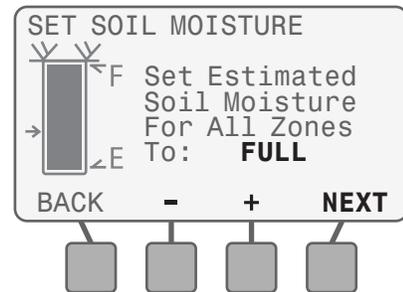
NOTE: The bar shows what the soil moisture will be after it is set.

3. The following warning is displayed; press **SET ALL**.

```
   Warning
   Setting Soil
 Moisture Will Update
  Soil Moisture For
  ALL ZONES
 QUIT          SET ALL
```
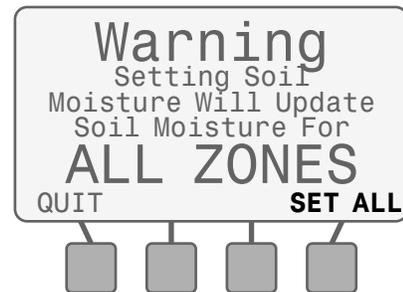
4. The following screen is displayed when Soil Moisture has been reset; press **CONTINUE**.

```
   Soil Moisture

  Has Been Reset For

  ALL ZONES
             CONTINUE
```
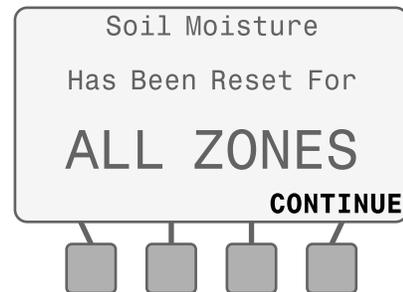
Manual Watering

Start watering immediately for selected zones or for all zones.
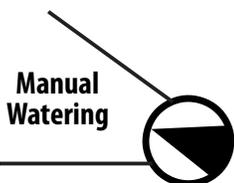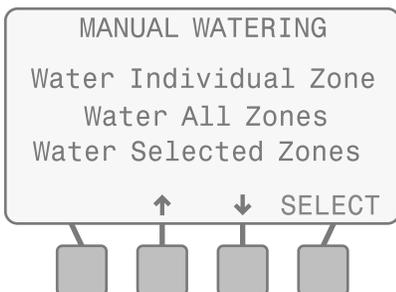
Manual Watering is used to conduct a system check or perform a "system winterization".

[!] **NOTE**: If Manual Watering is started during automatic irrigation, the automatic watering schedule is canceled for the day and resumes on the next Allowed Watering Day.
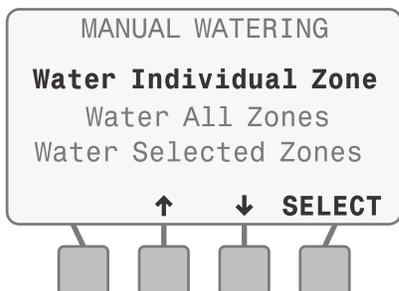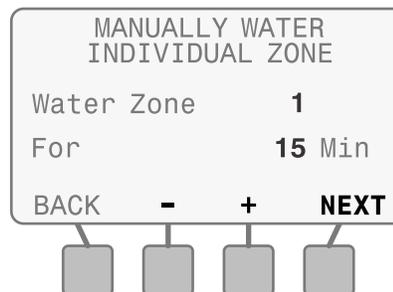
1. Turn the dial to **Manual Watering**.

Manual Watering

```
       MANUAL WATERING
   Water Individual Zone
      Water All Zones
    Water Selected Zones

          ↑    ↓   SELECT
```

Water Individual Zone

1. Select **Water Individual Zone**.

```
       MANUAL WATERING

   Water Individual Zone
      Water All Zones
    Water Selected Zones

          ↑    ↓   SELECT
```

[!] **NOTE**: Selected zone will be activated even if it is not ENABLED. A zone that does not have an associated station module will display **No Module**.

2. Select the desired zone; then press **NEXT**.

3. Set the run time for the selected zone; then press **NEXT**.

```
      MANUALLY WATER
      INDIVIDUAL ZONE

   Water Zone        1
   For             15 Min

   BACK    -    +      NEXT
```

During Manual Watering:

The Watering - Manual screen shows the current zone and time remaining.

4. Adjust the time remaining up or down if desired.

```
      WATERING-MANUAL

   Watering Zone        1
   Minutes Remaining    9

                      ADV.
   CANCEL   -    +     ZONE
```
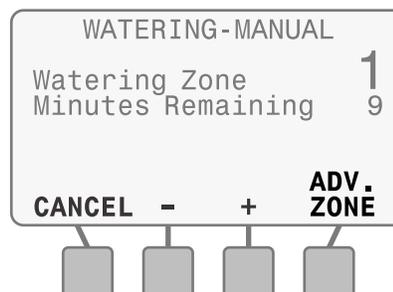
5. To cancel watering, press **CANCEL, ADV. ZONE** or turn the dial to **OFF** for three seconds and then return the dial to the AUTO position.

Water All Zones

1. Select **Water All Zones**.

```
     MANUAL WATERING
   Water Individual Zone
     Water All Zones
   Water Selected Zones

         ↑     ↓   SELECT
```
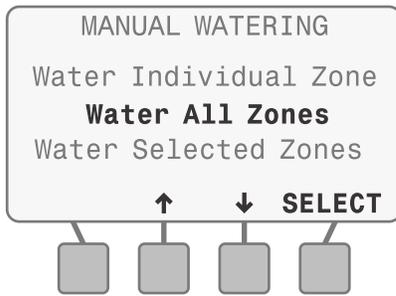
⚠ **NOTE**: All zones will be activated even if they are not ENABLED. Zones will not activate that do not have an associated station module installed.

2. Set the run time for all zones; then press **START**.

```
     MANUALLY WATER
        ALL ZONES

      Water All Zones
   For  10  Minutes Each

   CANCEL  -    +   START
```

During Manual Watering:

The Watering - Manual screen shows the current zone and time remaining.

3. Adjust the time remaining up or down if desired.

```
    WATERING-MANUAL

   Watering Zone        1
   Minutes Remaining    9

                      ADV.
   CANCEL  -    +     ZONE
```

4. To cancel watering, press **CANCEL, ADV. ZONE** or turn the dial to **OFF** for three seconds and then return the dial to the AUTO position.

Water Selected Zones

1. Select **Water Selected Zones**.

```
     MANUAL WATERING
   Water Individual Zone
      Water All Zones
   Water Selected Zones

         ↑     ↓   SELECT
```
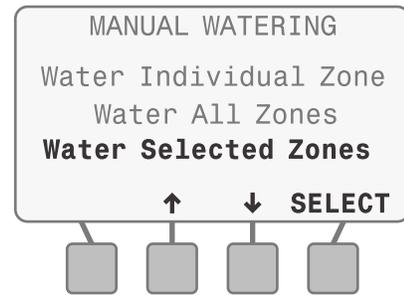
⚠ **NOTE**: Selected zones will be activated even if they are not ENABLED. Zones that do not have an associated station module will display **n/a**.
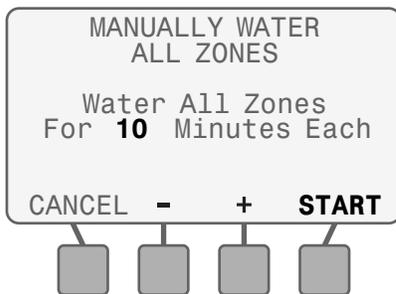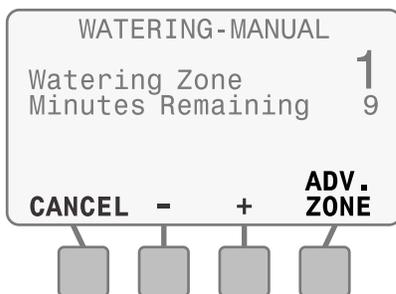
2. Select the desired zone or zones.

3. Set the run time for every desired zone; then press **NEXT** until you reach the end of your available zones.

```
      MANUAL WATERING
   1 10   7  0 13   0 19 n/a
   2  0   8  0 14 n/a 20 n/a
   3  5   9  0 15 n/a 21 n/a
   4  0  10  0 16 n/a 22 n/a
   5  0  11  0 17 n/a
   6  0  12  0 18 n/a
   BACK    -    +     NEXT
```

4. **NEXT** will change to **START**; then press **START**.
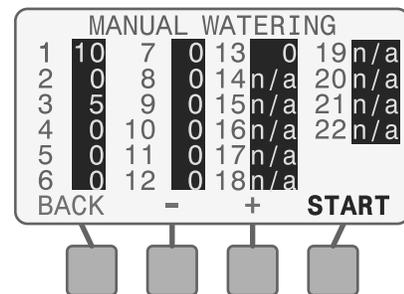
```
      MANUAL WATERING
   1 10   7  0 13   0 19 n/a
   2  0   8  0 14 n/a 20 n/a
   3  5   9  0 15 n/a 21 n/a
   4  0  10  0 16 n/a 22 n/a
   5  0  11  0 17 n/a
   6  0  12  0 18 n/a
   BACK    -    +    START
```

During Manual Watering:

The Watering - Manual screen shows the current zone and time remaining.

5. Adjust the time remaining up or down if desired.

```
    WATERING-MANUAL

Watering Zone        1
Minutes Remaining    9


                    ADV.
CANCEL    -    +     ZONE
```
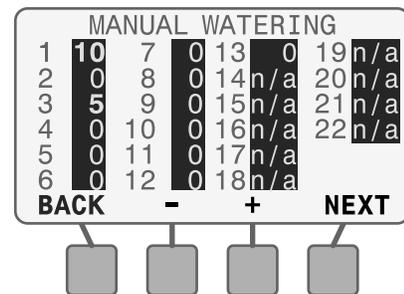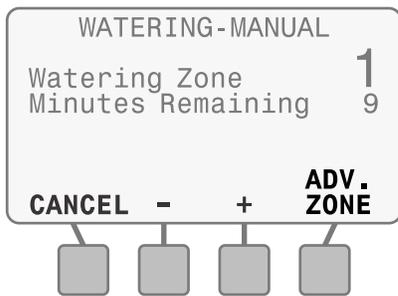
6. To cancel watering, press **CANCEL, ADV. ZONE** or turn the dial to **OFF** for three seconds and then return the dial to the AUTO position.

Installation

Installation Checklist

When installing the ESP-SMTe controller for the first time, it is recommended that you complete the following steps in order.

For your convenience, a check-off box is provided for each step.

❑   Check box contents (see Page IV)

❑   Gather installation tools

❑   Choose a location

❑   Mount the controller

❑   Connect controller power

❑   Install station modules (optional)

❑   Connect field wires

❑   Complete the controller installation

❑   Install the Weather Sensor

Gather Installation Tools

Before beginning installation, gather the following tools and materials:

a. Marking pencil

b. Phillips screwdriver (#1, #2, #3 tip)

c. Flathead screwdriver

d. Hammer

e. Level

f. Drill and drill bit

g. Wire Stripper
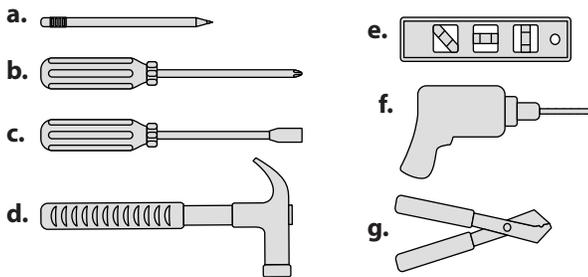
Optional Items:

•   If the communication wire run is greater than 25 feet, additional wire will be required (#18 AWG or #16 AWG, 2 strand UV rated wire recommended - 200 feet maximum distance from controller to sensor)

•   Ladder to reach sensor mounting location

Mount Controller
Choose Location

1. Choose a suitable mounting location with access to an electrical power source. Allow clearance for conduit connections below the unit, and for the hinged door (outdoor model only) to swing fully open to the left.


11 IN.

3 IN.

PROXIMITY TO POWER AS REQUIRED
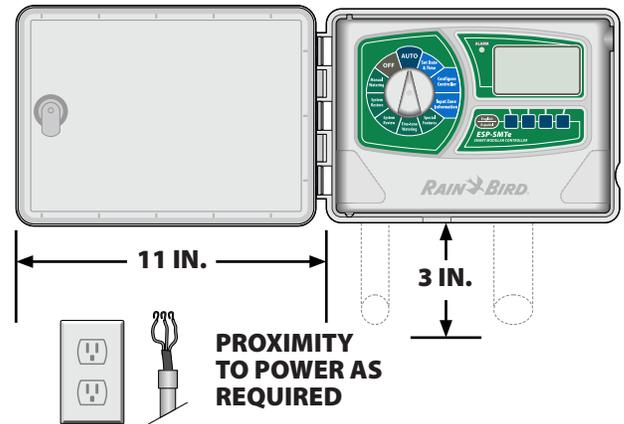
⚠ **NOTE:** DO NOT use an outlet or power source that is controlled by a secondary ON/OFF light switch or GFI outlet.

⚠ **NOTE:** Select a location that allows the communication wire (a pair of #16 AWG or #18AWG UV rated wire maximum distance 200 feet) to be easily run from the ESP-SMTe controller to the SMT Weather Sensor.

⚠ **NOTE:** The ESP-SMTe controller must be installed in compliance with local electrical codes. Indoor models must be installed indoors only. Outdoor models (with locking cabinets) may be installed either indoors or outdoors.

✋ **CAUTION:** To minimize electromagnetic interference, select a location at least 15 feet (4,6 m) away from high-draw motors, such as air conditioners or refrigerators.

✋ **CAUTION**: Never share a 120 VAC circuit with pumps, motors, shop tools, etc. as they may interfere with the correct operation of the controller.

Remove Front Panel

1. Open the door of the controller and swing it to the left. If desired, remove it from the hinges by applying pressure upward and outward until the door unsnaps from the hinges.

2. Pull open the front panel, swing it to the left and disconnect the ribbon cable by gently pulling the connector out of the socket.

🖐 **CAUTION:** Be careful not to bend the pins in the sockets when detaching the ribbon cable.
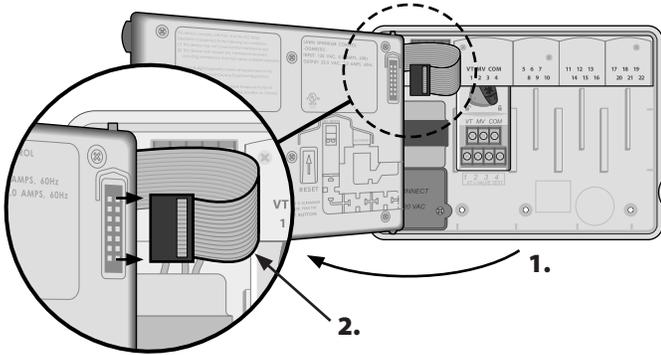
🗒 **NOTE:** Outdoor model shown with internal transformer.

3. Remove the front panel by pressing down on the left side of the cabinet near the bottom corner pin with the fingers of your right hand, while pushing up on the front panel with your right thumb.
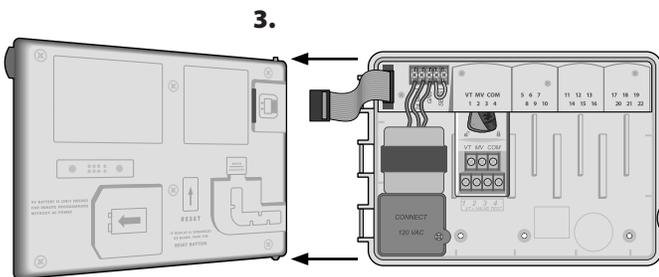
Remove Knock-outs

The ESP-SMTe controller cabinet has four "knock-outs" available for connecting conduit and routing field wires.
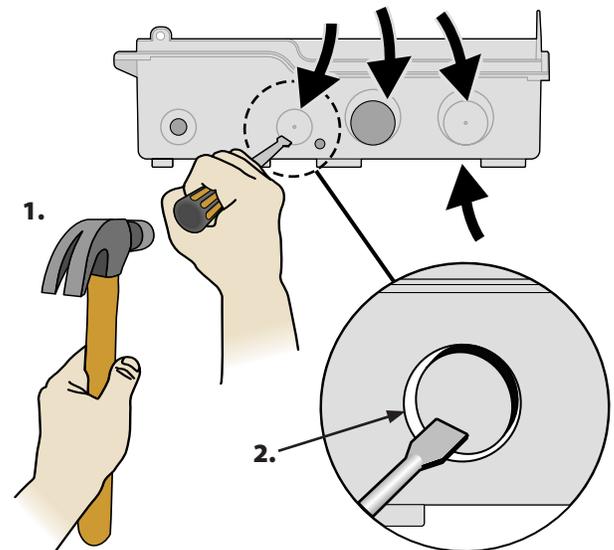
Three knock-outs are located on the underside of the cabinet and one is located on the back.

Tools Required:

- Flat-head screwdriver
- Hammer

If a knockout needs to be removed:

1. Place the blade of the screwdriver into the groove around the knockout and tap it with a hammer.

2. Punch a hole through the material in two or more places and twist to remove.

Mount Controller

1. Mark the four screw locations with a marking pencil.

2. Drill holes in the mounting surface, installing wall anchors if necessary.

3. Drive a mounting screw for the top anchor into the wall. Leave an 1/8 inch gap between the screw head and the wall surface.

4. Locate the keyhole slot on back of the controller unit and hang the unit securely on the mounting screw.
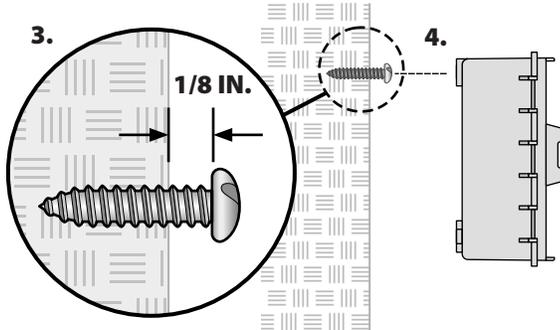
5. Drive three additional mounting screws through the open holes inside the controller and into the wall. Verify that the unit is fastened securely to the wall.
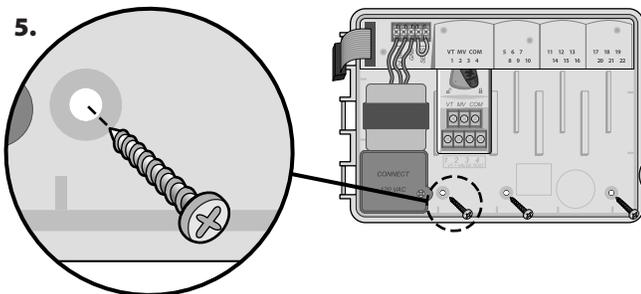
Connect Power

Indoor Model

⚡ **WARNING:** DO NOT plug in the transformer until you have completed and checked all wiring connections.

⚡ **WARNING:** All electrical connections and wiring runs must comply with local building codes.

1. Route the transformer power cord through the conduit opening at the bottom left of the unit. Knot the cable/cord inside the controller cabinet to prevent it from being pulled out.

✋ **CAUTION:** Do not route the power cord through the field wire opening at the bottom right of the unit.

2. Connect the two red power wires on the cord to the two 24VAC terminal connections on the controller.

3. Connect the green ground wire on the cord to the GND terminal.

4. Plug the transformer into the electrical outlet.

Connect Power

Outdoor Model

The ESP-SMTe outdoor controller has an internal transformer that reduces supply voltage from 120 VAC to 24 VAC. You will need to connect power supply wires to the transformer's three wires. (Line, Neutral, Ground).

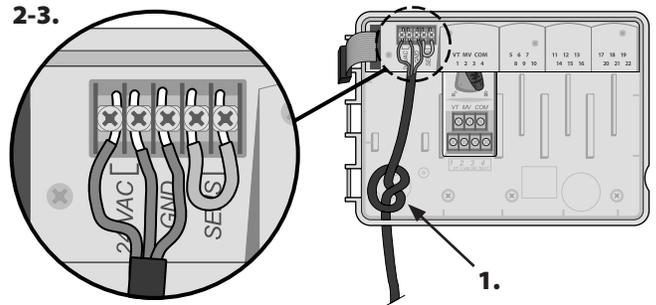⚡ **WARNING:** Electric shock can cause severe injury or death. Make sure power supply is turned OFF before connecting power wires.

⚡ **WARNING:** DO NOT turn on power until you have completed and checked all wiring connections.

⚡ **WARNING:** All electrical connections and wiring runs must comply with local building codes. Some building codes require that only a licensed or certified electrician can make the power connections. Please check with your local building code for guidance.

1. Locate the transformer wiring compartment in the lower left corner of the controller unit. Use a screwdriver to remove the cover and expose the transformer connection wires.
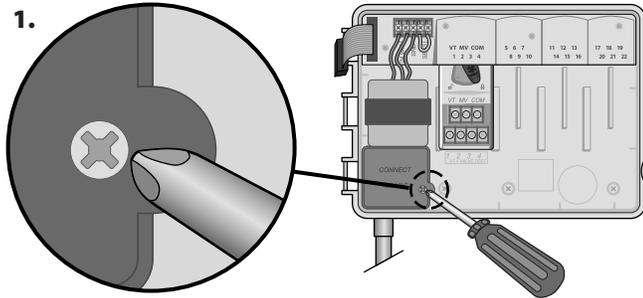
⚠ **NOTE:** Attach a 1/2 inch conduit to the unit below the transformer if desired.

2. Route the three external power source wires through the conduit opening at the bottom of the unit and into the wiring compartment.
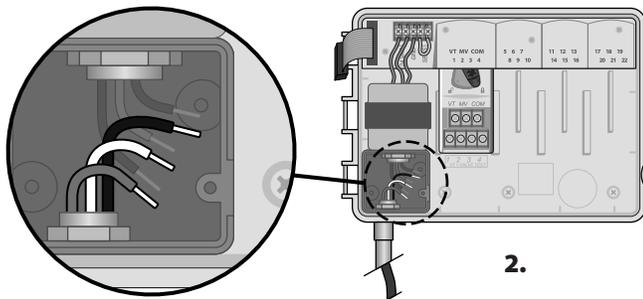
3. Using the provided wire nuts, connect the external power source wires (hot, neutral and ground) to the transformer connection wires inside the wiring compartment.

⚡ **WARNING:** Ground wire must be connected to provide electrical surge protection.
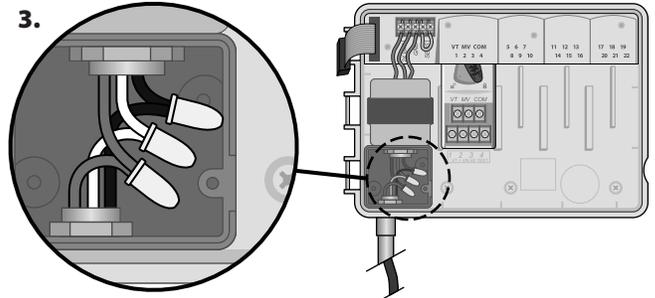
Power Wiring Connections
120 VAC (US)
Red or Black supply wire (hot) to the black transformer wire
White supply wire (neutral) to the white transformer wire
Green supply wire (ground) to the green transformer wire

4. Verify that all wiring connections are secure, then replace the wiring compartment cover and secure it with the screw.

⚡ **WARNING:** DO NOT turn on power until you have completed and checked all wiring connections and replaced the cover.

Station Expansion Modules

Optional Station Modules are installed in the empty slots to the right of the base module. Installation of 6-Station or 3-Station Modules into those slots can increase the zone capacity up to 22 zones.

Module Options

Base Module
(included)

Expansion Modules
(sold separately)

3-STATION
(ESPSM3)
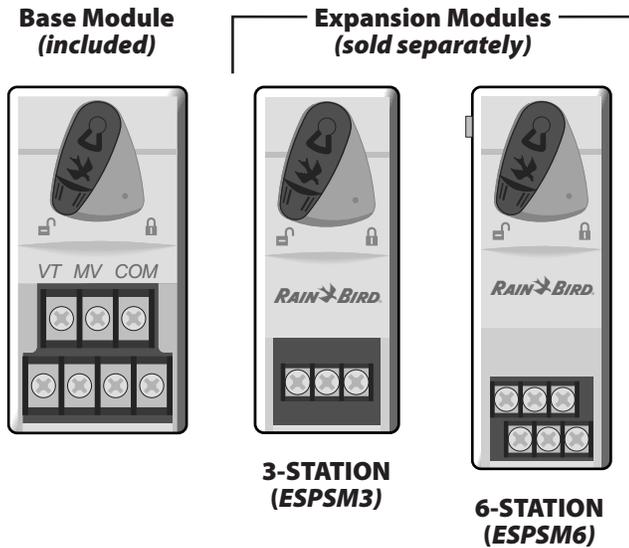
6-STATION
(ESPSM6)

! **NOTE:** For proper station sequencing, it is recommended that a 6 station module always be installed in the 1st bay. For more details see Station Numbering section.

Install Modules

1. Verify the securing lever on the module is in the unlocked position (pointing to the left).

2. Place the module under the desired slot between the plastic rails.
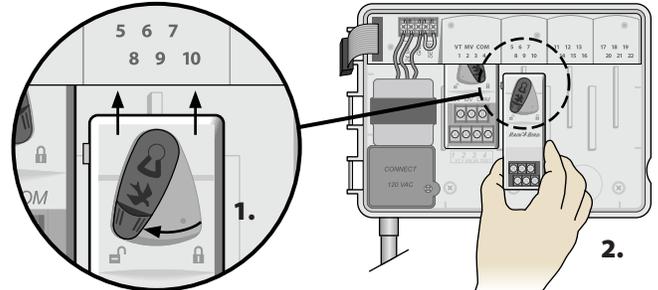
3. Push the module up into the slot until secure.

4. Slide the securing lever to the locked position (to the right).
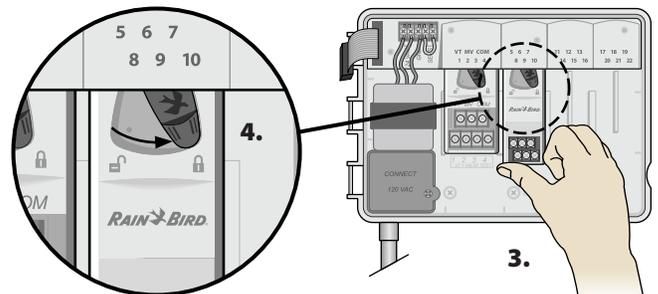
↻ **REPEAT** for additional modules.

! **NOTE:** Modules can be installed and removed with OR without AC power connected. They are "hot-swappable".

Station Numbering

Static Station Numbering Description

The controller is configured with Static Station Numbering. Each bay is set up to accept a 6 station module.

Station numbers are pre-assigned as follows:

Bay One	Bay Two	Bay Three	Bay Four
(Base Module)	5 6 7	11 12 13	17 18 19
1 2 3 4	8 9 10	14 15 16	20 21 22

It is recommended, but not required that modules be installed sequentially in the first available Bay and that a 6 station module always be installed in Bay Two, as shown in the example illustration.

Bay One   Bay Two   Bay Three   Bay Four
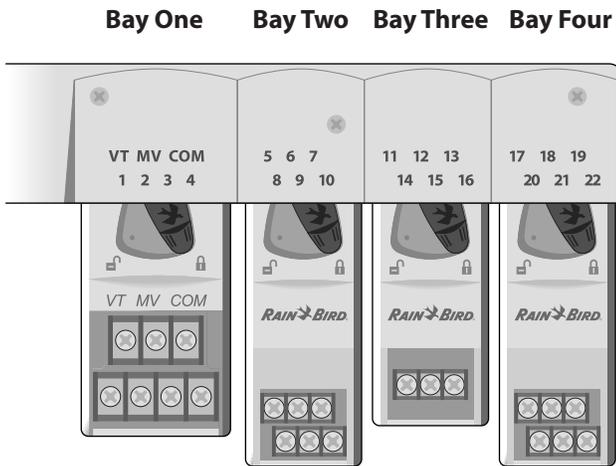
In this example:

- The Base Module is installed in Bay One and provides Zones 1 -4.

- A 6-Station Expansion Module is installed in Bay Two and provides Zones 5 - 10.

- A 3-Station Expansion Module is installed in Bay Three and provides Zones 11 - 13.

- In our example Zones 14-16 remain available and reserved for future expansion.

- A 6-Station Expansion Module is installed in Bay Four and provides Zones 17- 22.

However, if a 3 station module is installed in Bay Two, Three or Four then only the first three zone numbers assigned to that bay will be used and the unused numbers will be "reserved" for future use.

Display Indications:

For the previous example, the first screen of the Zone Setup Wizard is displayed. The "No Module" message indicates there is no module associated with Zone 14.
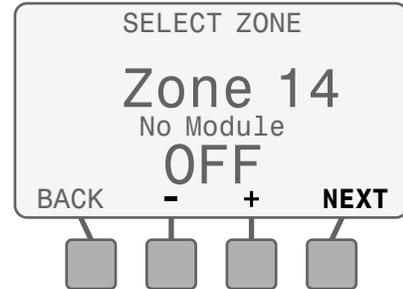
Wiring Connections

Connect the valve wires for each zone, a (optional) Master Valve or Pump Start Relay, and the ESP-SMTe Weather Sensor.

Connect Valves

1. Route the valve wires through a knock-out opening at the bottom or back of the unit.

🖐 **CAUTION:** Do not route the valve wires through the same opening as the power wiring.

2. Connect the common wire from each valve together and then to the COMMON (COM) terminal on the base module.

3. Connect the control (or valve) wire from each valve to the terminal on the base module or Station Module that corresponds to the desired zone number (1-22).
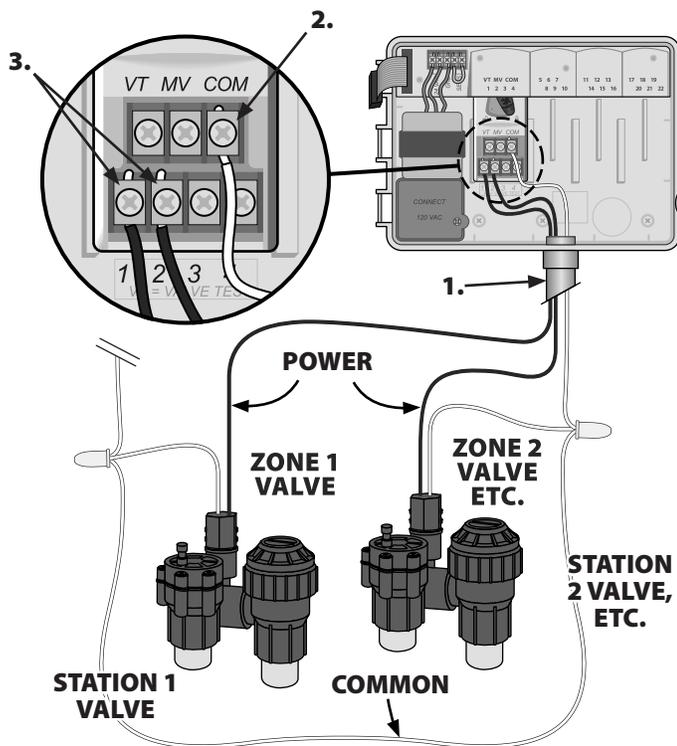
⚡ **WARNING**: You must use special precautions when valve wires (also known as station or solenoid wires) are located adjacent to or share a conduit with other wires, such as wires used for landscape lighting, other "low voltage" systems or other "high voltage" power. Be sure to separate and insulate all conductors carefully taking care not to damage wire

insulation during installation. An electrical "short" (contact) between the valve wires and another source of power can damage the controller and create a fire hazard.

Connect Master Valve

Connect an optional Master Valve to the ESP-SMTe controller.

Complete this section if you are installing a master valve (an automatic valve installed on the mainline pipe upstream from the zone valves)

1. Route the master valve wires through a knock-out opening at the bottom or back of the unit.

🖐 **CAUTION:** Do not route the master valve wires through the same opening as the power wiring.

2. Connect the power wire from the master valve to the master (MV) terminal on the base module.

3. Connect the common wire from the master valve to the COMMON (COM) terminal on the base module.

4. To perform a Valve Test- connect the common wire to the "COM" terminal and the power wire to the VT terminal. This will immediately turn the valve "ON" .

⚡ **WARNING:** The VT terminal always has power applied.
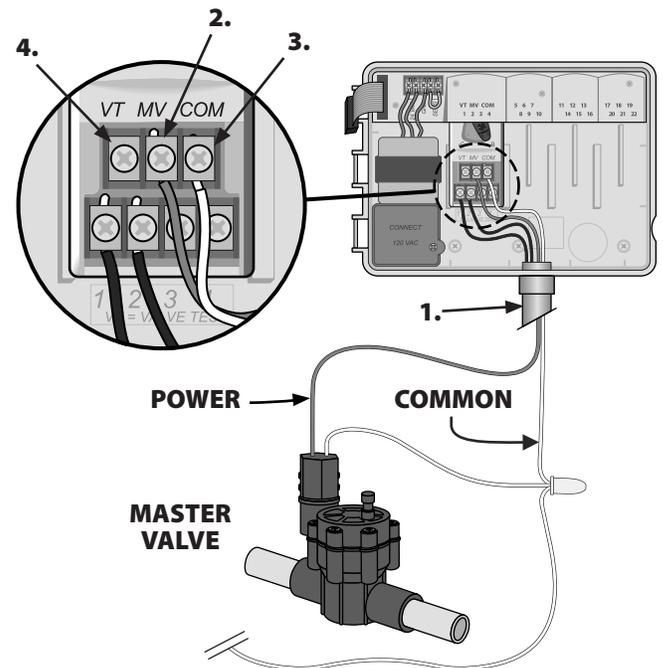
Connect Pump Start Relay

Connect an optional Pump Start Relay to the ESP-SMTe controller.

Pumps are used in some places to draw water from a well or other source. If you are activating a pump from the controller, you must install a Pump Start Relay.

A Pump Start Relay connects to the controller in the same way as a Master Valve, but connects differently at the water source.

> **NOTE:** The ESP-SMTe controller DOES NOT provide main power for a pump.

1. Route the pump start relay wires through a knock-out opening at the bottom or back of the unit.

> **CAUTION:** Do not route the pump start relay wires through the same opening as the power wiring.

2. Connect the Relay Input wire from the Pump Start Relay to the master (MV) terminal on the base module.

3. Connect the common wire from the Pump Start Relay to the COMMON (COM) terminal on the base module.
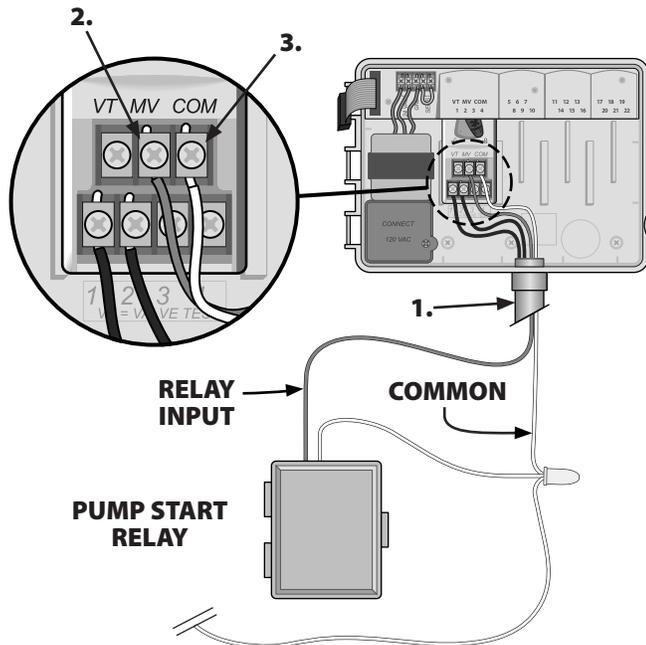
> **CAUTION:** To avoid possible pump damage when using a Pump Start Relay, connect a short jumper wire from any unused zone terminal to a terminal in use.

If unused stations are not jumpered and they are accidentally turned on, the pump may operate with no flow (dead-head). Dead-heading could cause the pump to overheat or burnout.
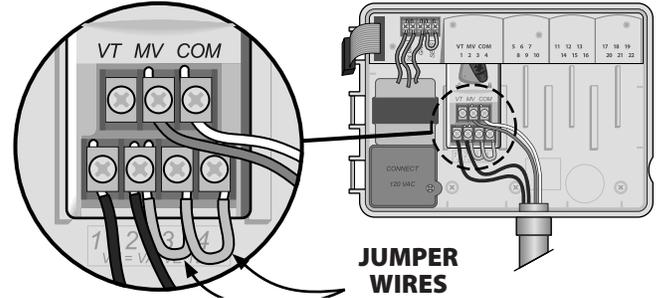
> **NOTE:** as of 1/1/2012 the following pump start relays were compatible with the ESP-SMTe:
>
> - RBSR24WG1 - Universal Pump Start Relay
>
> - RBPL24WG1 - Pump Start Relay with Pressure Switch

For the most up to date compatibility list of pump start relays, visit our website at:
www.rainbird.com/controllersupport

Complete Controller Installation

Install Front Panel

1. Reinstall the front panel by first inserting the top corner pin into the top pin-hole.

2. Then gently pull upward and slide the bottom corner pin into the lower pin-hole.

PIN-HOLE   **CORNER PIN**
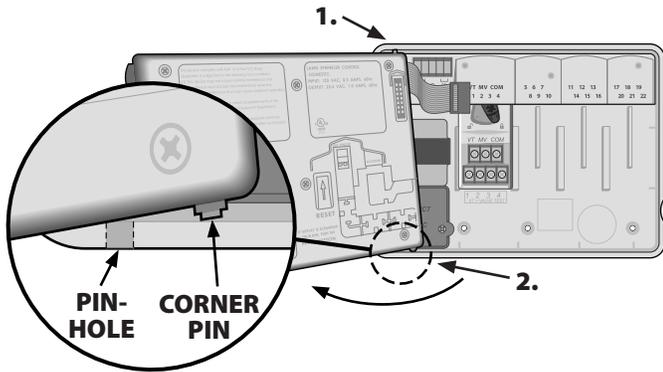
3. Reconnect the ribbon cable to the front panel by gently pushing the connector into the socket (Red line on ribbon cable towards the top).

✋ **CAUTION**: Be careful NOT to bend the socket pins.
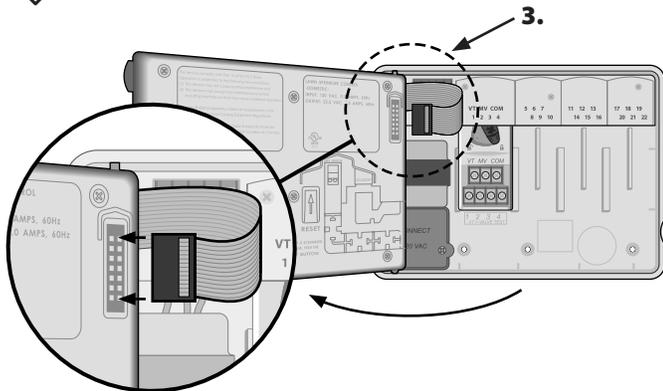
Connect Weather Sensor

Ensure you have enough (2 x #16 AWG or 2 x #18 AWG) UV rated wire to run from the controller to the sensor location (maximum of 200 feet). 25 ft. of 18-2 AWG UV rated wire is provided.

1. Strip the two communication wire leads 3/8" and route the two wires through the field-wire knockout opening.

2. Insert the leads into the green connector located on the back of the ESP-SMTe controller panel (polarity is not important).

3. Route the sensor communication wire(s) through the channel tabs on the back panel to provide "strain relief".
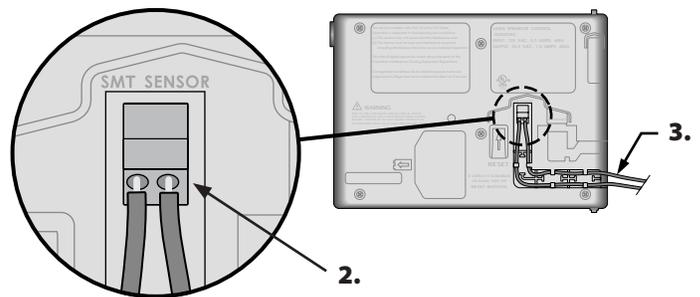
Finish Installation

1. Reinstall the outer door if necessary.

2. Apply power to the controller and test the system.

⚠ **NOTE:** The electrical connections can be checked even if water is not available. If water is available and you would like to test some or all of your stations, use the Manual Watering feature of the controller.

Install SMTe Weather Sensor

Choose Location

Select a convenient outdoor location in close proximity (wire-run distance is 200 feet maximum) to the ESP-SMTe controller. Place in an unobstructed area away from reflective heat so that the unit can provide accurate on-site temperature and rainfall measurements.

Mount the unit at least 6 feet above the ground surface to accurately measure ambient temperature. Suggested installation locations include the eave of a residence roof, a wooden fence post, etc.

The sensor mounting bracket is designed to mount on any vertical surface. Easy adjustment of the mounting arm ensures the installed sensor is level. UV rated #16AWG or #18AWG wire is recommended for the communication wires if more than 25 feet is required.
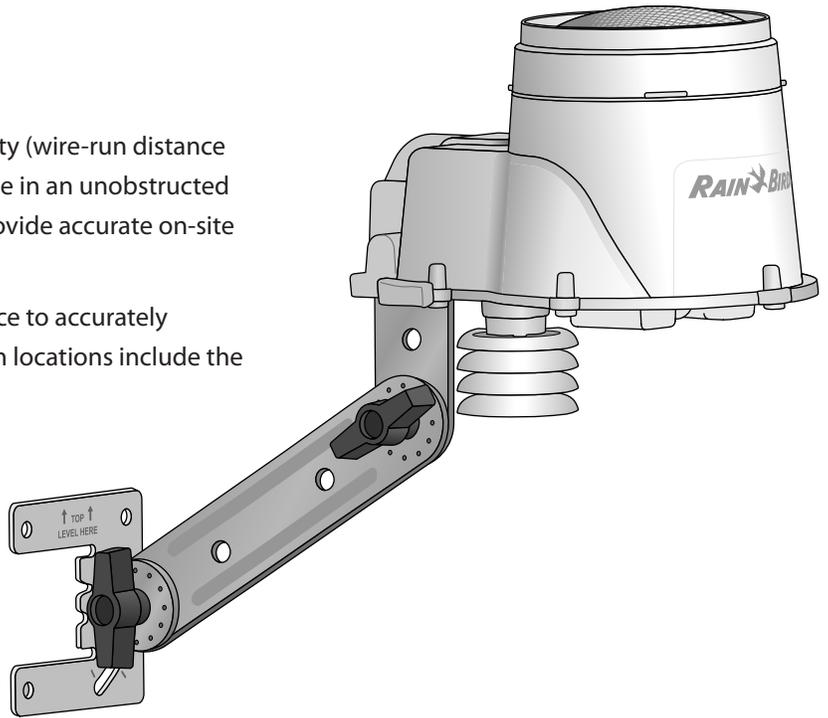
Sensor Mounting Options

Do's

- Mount weather sensor at least six feet above grade.

- Ensure that the sensor is free from obstructions to allow for collection and accurate measurement of rainfall.

- Sensor does not require direct sun to work correctly provided any shade or other obstruction does not block rainfall.

Dont's

- Do NOT install sensor in a location where spray from any sprinkler or runoff from the roof or other object will collect in the sensor funnel.

- Do NOT install the sensor where rainfall will be reduced or blocked from entering the sensor funnel.

- Do not install the sensor above an air conditioning unit or where reflected heat from a concrete slab, swimming pool, wall, or roof will cause heating of the sensor.

- Do NOT install the sensor where it will be impractical to service – the rain sensor may require cleaning depending on the amount of leaves, dust, etc that may collect in the debris screen, funnel, or tipping bucket rain sensor.
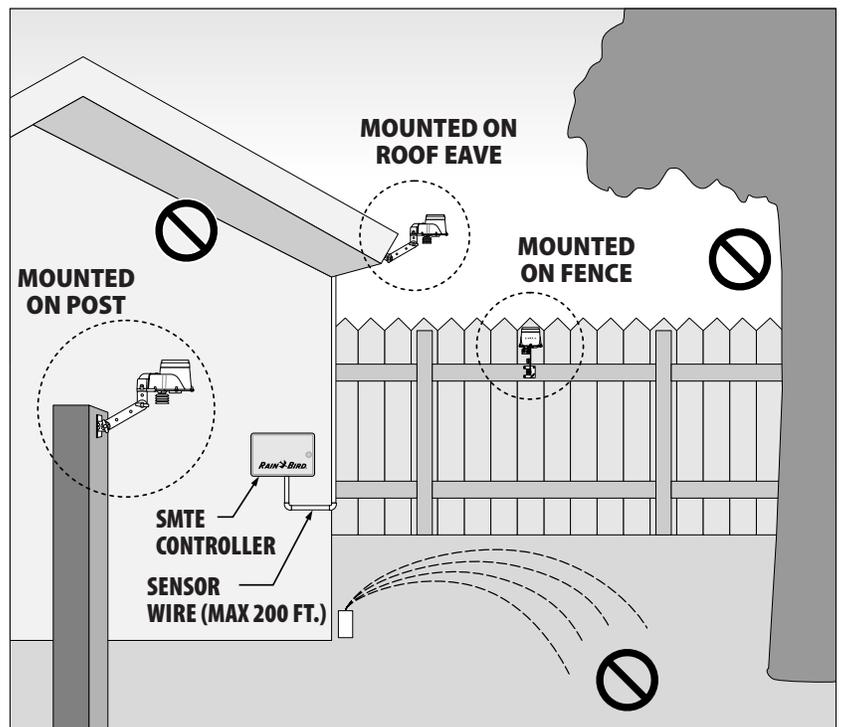
Weather Sensor Installation

Begin by running the communication wire to the location where the sensor will be mounted.

1. Place the mounting bracket base assembly against a mounting surface that permits the top of the mounting bracket to be adjusted to vertical. Drive a screw into the **upper left hole** of the base (do not tighten completely).

2. Drive a second screw into the middle area of the adjustment slot, located on the lower right corner of the mounting base.

3. Level the mounting base and hold it in place, then tighten the screw in the adjustment slot.

4. Tighten the upper left screw, then drive the two remaining screws into the mounting base, securing it to the mounting surface.
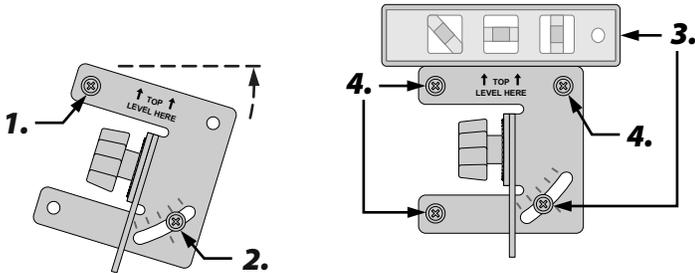
5. Feed the communication wire(s) through the three holes in the mounting arm, providing "strain-relief" for the wires. Leave enough extra wire at the top end so the sensor pod can easily be installed and removed.

6. Loosen the captured-screw of the wiring compartment cover to expose the sensor housing and green wiring connector within.

7. Strip the two wire leads 1/4" and insert into the connectors (polarity is not important).

8. If AC power is available, the green LED will blink. Once communication is established between the sensor and controller, the LED will light solid.

9. Re-attach the wiring compartment cover and route the wire through the two openings. Then re-tighten the captured screw to secure the cover.
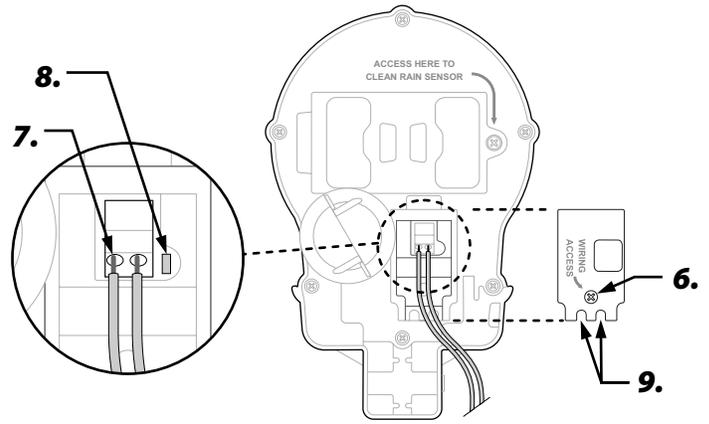
10. Mount the sensor housing assembly to the top of the mounting arm. Align the mounting hole on the bracket with the arm and tighten using the provided thumb-screw.

11. Adjust each of the mounting arms to assure that the top of the sensor is secured and level.

12. Press the sensor debris cover onto the top of the sensor.
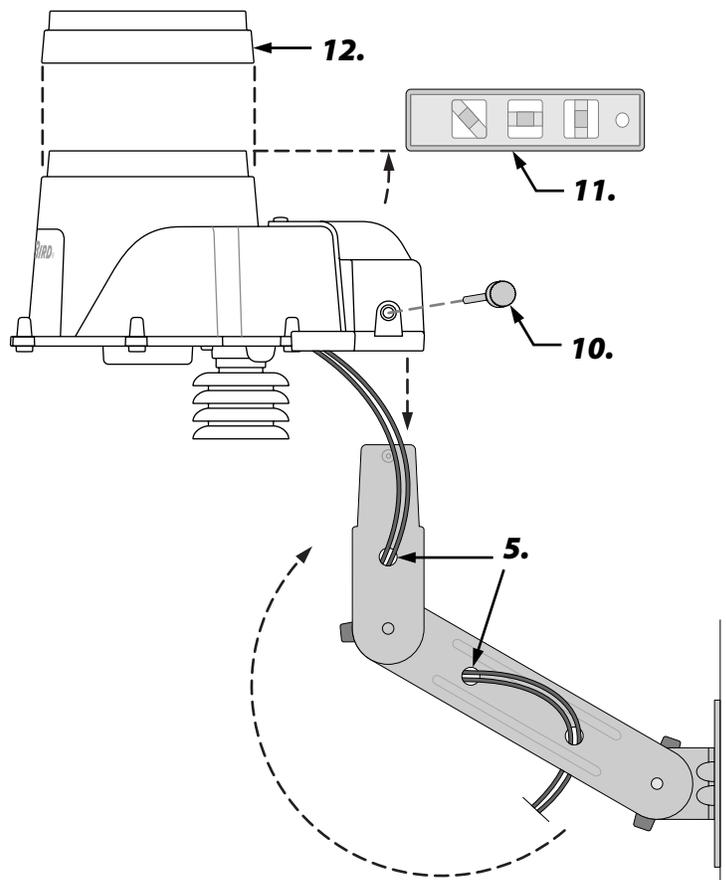
Remote Programming

Program the front panel remotely on battery power.

The front panel can be removed from the controller and programmed remotely using a 9 volt battery for power.

Controller configuration and zone information settings can be entered and saved on battery power for all zones.

> **[!]** **NOTE:** This is useful if a contractor wants to program the controller prior to installation on site.

1. Remove the front panel (refer to Remove Front Panel in the Installation section).

2. Install a 9-volt battery in the battery compartment.
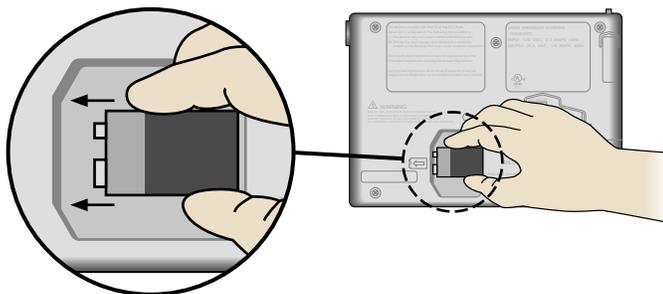
> **[!]** **NOTE:** Battery lasts only 24 hours when connected to the unit and should be detached when the unit is not in use to extend battery life.

3. Program the controller.

> **[!]** **NOTE:** Program information is stored in nonvolatile memory so it is not lost if the front panel loses power.

4. Replace the front panel (refer to the Complete Installation section).

> **[!]** **NOTE:** A battery is not required for operation of the controller. It is only for remote programming of the controller while it is not connected to the controller housing. The battery does not provide backup power for time and date settings. The time and date are provided back up power by an internal 10 year lithium battery. The lithium battery is not field replaceable.

Troubleshooting

Error Detection

The ESP-SMTe controller has built-in error detection that includes sensor pod communication errors and electrical short circuits.

Sensor Pod Communication Error

When this error is detected the Alarm LED blinks and the following message is displayed (alternates with AUTO screen):

```
    ALARM 1
  Communication With
Sensor Pod Lost Since
  Monday 04 Jul 2013
       08:30 AM
   Check Pod Wiring
       IGNORE
```
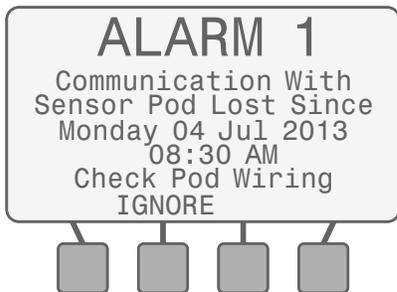
To clear the error:

1. If there are no obvious wiring or connection problems, press the Reset button located on the back of the front panel. After the front panel is reset, communication with the Sensor Pod is usually established within 15 seconds.

2. Check the status LED on the Sensor Pod by removing the wiring access cover with a screwdriver (underneath the Sensor Pod):

Condition	Description
Solid	Good communication
Blinking	No communication (reset front panel).
Off	No power (check wiring).

No Temperature Data Error

When a No Temperature Error is detected, the Alarm LED blinks and the following message is displayed (alternates with AUTO screen):

```
    ALARM 2
  Temperature Data
 Not Received Since
  Monday 04 Jul 2013
   Sensor Failure
      Possible
       IGNORE
```
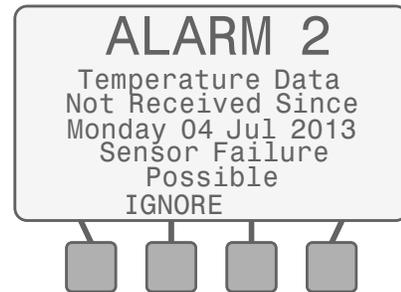
To clear the error:

1. Press the Reset button located on the back of the front panel. If the alarm does not clear, see if there is a wiring or connection problem.

2. If the alarm is unable to be cleared, the Sensor Pod may need to be replaced.

Short Circuit Error

The controller will detect an electrical short circuit or overload condition on a zone, master valve or pump start relay wiring connection. All irrigation for an affected zone is then cancelled and the next unaffected zone will water as scheduled. The controller will attempt to water the affected zone again at every scheduled watering. If watering begins successfully, the error condition associated with that zone will automatically clear.

When a Short Circuit Error is detected, the Alarm LED blinks and the following message is displayed (alternates with AUTO screen):

```
    ALARM 3
   Short Circuit
 Detected On Stations
MV  1  7

    Check Wiring
    IGNORE
```
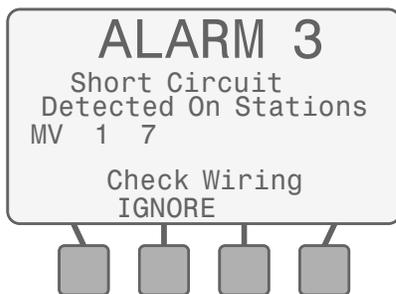
To clear the error:

1. See if there is a wiring or connection problem with the station, master valve, or pump start relay wiring.

2. Fix any wiring problem between the controller and the identified zone or valve.

   ! **NOTE:** A shorted Master Valve will prevent any zone that is activated with the Master Valve from watering. Always repair a shorted Master Valve before fixing zone wiring.

3. Sprinkler valves can also be shorted internally. Disconnect the valve from the wire to the controller and run the Short Circuit Test (turn the dial to **Special Features**) to see if the short is cleared.

Watering or Electrical Issues

The following table shows you how to troubleshoot problems with the ESP-SMTe Controller or Weather Sensor.

| Symptom	Possible Cause	Correction
Automatic irrigation is not occurring.	Dial is set to OFF.	Set the dial to AUTO.
	A NOTE or ALARM condition is active that prevents irrigation.	Turn dial to AUTO and read the screen. If an ALARM is active the message will alternate with the AUTO screen every few seconds. If no ALARMS are active then any NOTES will alternate every few seconds. There are also messages that appear on the AUTO screen on the second line. Individual ALARMS, NOTES and messages are described below.
	NOTE 1 – All Zones Are Off	Unit is new. This condition exists when the controller has been installed but has not been programmed. If you have hired someone to install the unit contact them and find out when they plan to program the controller. If you plan to program the controller yourself go the www.rainbird.com/esp-smte and download the Contractor's Manual.
	NOTE 1 – All Zones Are Off Unit has previously been irrigating	This condition exists when the controller's program has been erased. Turn the dial to SYSTEM RESTORE, select "Contractor Defaults", and press RESTORE to restore the stored program. If this doesn't restore normal operation contact the installing contractor.
	NOTE 2 – All watering days are off	This is handled the same as "All Zones Are Off" described above.
	NOTE 7 – Irrigation Suspended Due To Rain	The controller generally will not irrigate if there has been rain in the last two hours. If you want the controller to continue irrigation press "CLEAR" to erase the rain from the memory. Alternately, you can select MANUAL WATERING and irrigate the desired zones.
	NOTE 6 – Irrigation Suspended Due To Extreme Cold	For safety reasons, the controller will not irrigate when the temperature is near or below freezing. If irrigation is necessary MANUAL WATERING will override this safety feature.
	With the dial in the AUTO position the screen reads "Irrigation Suspended For xx Days" or hours or minutes.	Set the Dial to AUTO and press the RESUME button to clear the user activated Suspend feature.
	"No AC Power" appears on the second line of the AUTO screen.	The controller cannot irrigate without AC power. The front panel will operate and can be programmed using the 9 V batteries, but this will not power sprinkler valves.
	Irrigation will not occur if irrigation is not permitted or required.	The following methods can be used to determine if irrigation is permitted or required.
	Irrigation is not required based on accumulated weather data.	Turn the dial to SYSTEM REVIEW and select "Next Irrigation Estimate". Review the zone calendars to see when irrigation is scheduled. On the calendar, today is shown in reverse video. Days marked with an X are blocked by watering restrictions. Days that are blank indicate that watering is not required. Days with a number in them provides the estimated minutes of irrigation needed that day. If the landscape needs irrigation, manually water the affected zone(s).
	Today is not an "Allowed Watering Day".	The "Next Irrigation Estimate" calendars display an X for each day that watering is not allowed by the controller programming. The features that block watering are described below. If regulations permit, change the "Allowed Watering Days" by setting the dial to CONFIGURE CONTROLLER and change the Block Watering on Specific Day of Week.
	Event Day Off feature is activated.	The controller can be set to block up to 4 days in the future. This can be used to prevent irrigation for a party or other event for which wet lawn areas is undesirable. Turn the dial to SPECIAL FEATURES and select "Event Days Off" to view or change this schedule. Manual watering can be used to irrigate selected zones if desired.
	Block Day of Week feature is activated.	If the grounds are maintained on Wednesdays, that day may be set as a "Blocked Day of Week". Set the dial to CONFIGURE CONTROLLER and display the Block Watering on Specific Day of Week screen. Change the selection for Block Watering day if desired.
	Watering restrictions may be active.	The controller can be programmed to block specific days of the week, odd days of the month, even days of the month, or cyclic days (a specific number of days between each irrigations). The irrigation estimate calendars will display an X on each day that is blocked. The settings can be viewed by turning the dial to SYSTEM REVIEW and selecting the "Controller Settings" option. If local laws permit the settings can be adjusted by turning the dial to CONFIGURE CONTROLLER and stepping through the settings until the desired options are reached.
	Zone to Zone Delay is activated for an extended duration.	Set the dial to SPECIAL FEATURES. Select "Adv. Controller Setup" and change the Zone to Zone Delay feature to a shorter time value.
	An individual zone has been set in the OFF (inactive) mode.	Set the dial to INPUT ZONE INFORMATION. Select "Zone Setup Wizard" and change the Zone setting to ENABLED (active).
	AC Power has been lost and is not currently available. The screen is blank.	Reset the circuit breaker or make the necessary repairs to assure a consistent 120 VAC +/- 10% power supply.

Symptom	Possible Cause	Correction
Display is blank.	An electrical surge or lightning strike has disrupted or damaged the controller's electronics.	Push the RESET button located on the back of the controller front panel. Turn off the controller and disconnect the 9V battery if applicable. After 2-3 minutes restore AC power to the controller. If the electrical surge did no permanent damage, the controller will accept programming commands and function normally.
Temperature Reading does not match the actual temperature for an extended period of time.	Unit is absorbing reflective heat and/or from adjacent pavement.	Relocate the sensor to a more appropriate location.
Inaccurate rain fall measurement occurs on a regular basis.	Debris Screen is clogged and is not allowing rainfall to activate the tipping bucket.	Clean the debris off the Debris Screen. Remove the Tipping Rain Bucket from the sensor housing. Clean with mild soap and water. Verify that the tipping mechanism is functioning properly and reinsert the mechanism into the sensor housing.
	Sensor rain funnel is clogged.	Clear the funnel.
Individual valve does not come on.	Valve wiring problem.	Set the dial to SPECIAL FEATURES and run the Short Circuit Test to identify short conditions and repair accordingly.
Zone is too Wet.	Incorrect Zone Parameters are set such as the Sprinkler Precipitation Rate.	For ET and Drip zones set the dial to FINE TUNE WATERING and decrease watering by up to 60% in 1% increments. For Time-Based zones adjust the run time for the affected zone(s).
Zone is too Dry.	Incorrect Zone Parameters are set such as the Sprinkler Precipitation Rate.	For ET and Drip zones set the dial to FINE TUNE WATERING and increase watering by up to 60% in 1% increments. For Time-Based zones adjust the run time for the affected zone(s).
Run off is occurring on a regular basis.	Zone input information may not match actual site conditions.	Set the dial to INPUT ZONE INFORMATION and change the soil type and/or degree slope.
NOTE 3 on Display Screen.	Unusually High Temperature Reading.	Verify that the temperature sensor is not being heated by an air conditioner or reflective surface. Relocate the sensor in a different location to more accurately measure the ambient temperature of the site.
NOTE 4 on Display Screen.	Unusually High Rainfall Reading.	Verify that the Rain Gauge is not receiving runoff from the roof, trees, etc. Check the mounting bracket is secure and not swaying back and forth.
NOTE 5 on Display Screen.	Watering Not Completed During Watering Window.	If this is an occasional occurrence, the controller will finish the required irrigation during the next allowed watering day. If it is a regular occurrence, expand the Watering Window using CONFIGURE CONTROLLER. Another solution is to reduce the soak time for the affected zones.
NOTE 6 on Display Screen.	Irrigation Suspended Due to Extreme Cold.	If irrigation is desired at this temperature, set the dial to the SPECIAL FEATURES, select "Adv. Controller Setup" and change the user set value (Temp Below) to a lower threshold temperature value.
NOTE 7 on Display Screen.	Irrigation Suspended Due to Rain.	If irrigation is desired at the current rainfall amount, set the dial to SPECIAL FEATURES, select "Adv. Controller Setup" and change the user set value (When Rain Reaches) to a higher rainfall threshold.
NOTE 8 on Display Screen.	Unit is re-initializing, Please WAIT.	Unit has encountered a small problem. The controller will normally correct itself. However, it the NOTE doesn't go away after a couple minutes press the Reset button.

Reset Button

The Reset button resets the controller. Active watering is canceled, and all previously programmed configuration and zone information remains stored in memory. Irrigation will resume on the next Allowed Watering Day.

Insert a small tool into the access hole and press until the controller is reset.

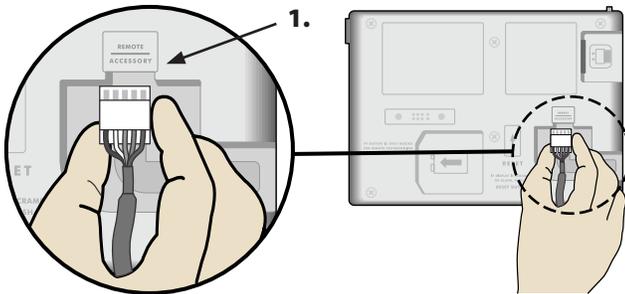> ⚠ **NOTE:** We suggest using a non-metallic object such as a pencil or pen to press the Reset button.
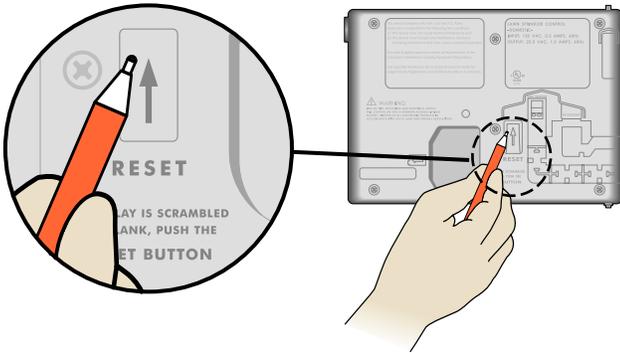
Connect Optional Accessory

> ⚠ **NOTE:** Use only Rain Bird approved devices with 5 pin accessory port. Unapproved devices may damage controller and void warranty.

1. The front panel provides a port for the use of external devices, such as the Rain Bird LIMR Remote.

Appendix

ESP-SMTe Smart Control System
Overview

Unlike a traditional time-based irrigation controller that uses fixed station run times, start times and irrigation days manually set by the user, the Rain Bird ESP-SMTe Smart Control System automatically changes irrigation schedules daily based on specific weather conditions at the site.

Weather information is measured in real-time by an on-site SMT Weather Sensor and sent to the ESP-SMTe Controller. This information is combined with historic weather information for the site and specific site and zone parameters to automatically create an optimized irrigation schedule that will promote healthy deep rooted plants while conserving water.

Based on the soil type and slope conditions, the overall irrigation requirement is split into multiple Cycle+Soak™ irrigation events, thereby eliminating problems from water run-off.

Irrigation Scheduling Method

The objective of an automated irrigation system is to augment rainfall in order to re-supply the soil with the water that plants need. The ESP-SMTe looks at the soil as a water reservoir that supplies the plant with water. The soil type, amount of available water and the rate that water is lost or used determines the amount and frequency of irrigation.

Soil Type
Soil Type Description

Different soil types vary greatly in the ability to hold water and the rate that water filters down through the soil. The ESP-SMTe accounts for soil types in each zone to help determine when plants need water.
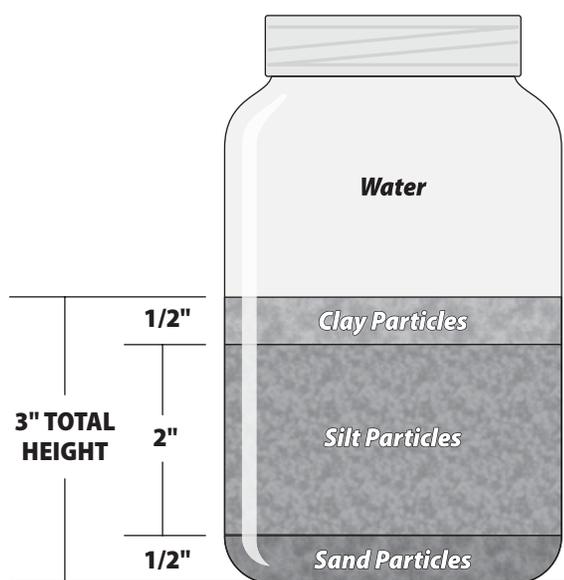
Soil Type	Description
Sand	• Loose and single grained. Each grain of sand can be easily seen and has a gritty feel. • Squeezed when dry, sands cannot form a cast and will readily fall apart when released. • Squeezed when moist, soil will form a very weak cast that will crumble if touched.
Loamy Sand	• Resembles sand as it is loose and single grained. Most individual grains can be seen. Feel is not as gritty as sand. • Squeezed when dry, soil forms a slight cast that readily falls apart when hand releases soil. • Squeezed when moist, soil is slightly cohesive. Fragile cast can be formed more than with sand.
Sandy Loam	• Some individual sand grains can be seen and felt. • Enough silt and/or clay soil particles to provide soil cohesion when moist. • When dry, casts can be formed that will not break with careful handling.
Loam Soil	• Medium textured soil. Mixture of sand, silt and clay with none dominant. • When dry, soil can form a cast that can be handled freely. • Squeezed moist, soil is fairly smooth and plastic with a gritty feel.
Clay Loam	• Fine textured soil. Even distribution of sand, silt and clay. Soil feels like it has more clay than sand or silt. • Forms clods that are firm when moist and hard when dry. • When the moist soil is squeezed between the thumb and forefinger it forms a thin ribbon that will barely sustain it's own weight.
Silty Clay	• Soil has a moderate amount of fine grains of sand and clay particles. Medium sized particles represent less than 50% of all soil particles. • When dry, soil forms very hard clods that can be broken. • When moist, a moderate size ribbon can be formed that will support it's own weight.
Clay Soil	• Very fine textured soil. • When dry, forms very hard lumps that are hard to break up. • When moist, soil is extremely sticky and plastic. • Squeezed soil will form a thin, long flexible ribbon that will not break easily.

Simple Test To Determine The Soil Type

1. Remove 1 to 2 cups of soil at the approximate root depth of the plant material you plan to irrigate.

2. Place the soil into a glass jar in which you can see the contents (a Mason jar or an empty mayonnaise jar works well).

3. Fill the balance of the glass jar with water.

4. Screw the cover onto the jar and shake vigorously until all of the soil particles are suspended in the water.

5. Set the closed jar onto a flat surface and let it sit until most of the soil particles have settled to the bottom of the jar (this can take a few hours).

> **!** **NOTE**: The settled soil will be deposited in layers with the heavier soil particles (sand) forming the bottom layer, followed by the next heaviest soil particles (silt), and finally the lightest soil particles (clay).

6. Measure the total height of all the soil layers combined.

7. Measure the height of each of the three individual soil layers (sand, silt and clay) and compare these values to the total soil height to get an approximate percentage of each soil type.

8. Apply these percentages to the Soil Classification Triangle on the next page to identify the Soil Type description.

Example: Total Soil Height = 3 inches.

The soil is comprised of the following:

- **Clay; ½ inch (0.5/3.0) = 17%**
- **Silt; 2 inches (2.0/3.0) = 66%**
- **Sand; ½ inch (0.5/3.0) = 17%**

Apply these values to the Soil Classification Triangle on the next page to determine the soil type description.
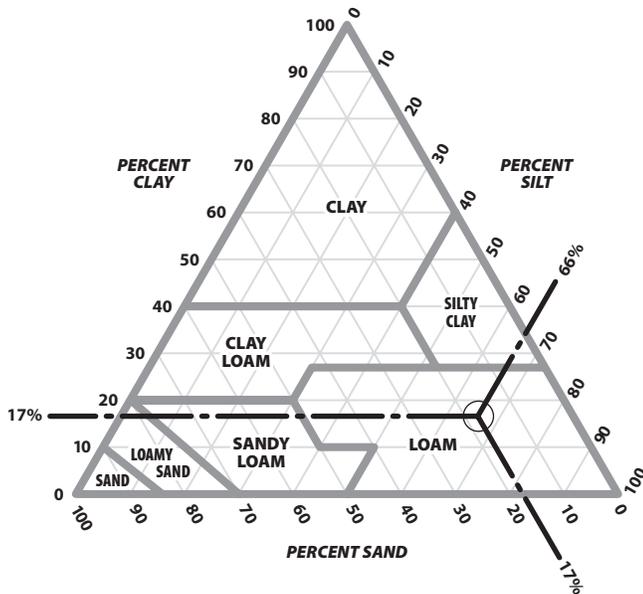
Soil Classification Triangle

This tool is used to classify the soil based on soil texture. Soil texture describes the size and shape of individual soil particles such as sand, silt, or clay. The soil texture class describes the relative amounts of sand, silt, and clay found in that particular soil.

Soil texture has a major influence on the amount of water stored (moisture holding capacity) in soil. This is used to determine how much to irrigate and how often irrigation is required.

The ability of water to enter the soil profile (infiltration rate) and the rate at which water can move through the soil (permeability) is determined by the soil texture. The infiltration rate and permeability of the soil, combined with the slope of the irrigated area will determine how long each irrigation event (cycle) should run and how much time should elapse (soak) between cycles to prevent water from running off the soil.

To determine the Soil Type (Classification) using the Soil Classification Triangle, draw a parallel line for the value of each soil particle type. The Soil Type is identified by where the three lines intersect in the Soil Classification Triangle.

The three soil particle type lines (clay, silt and sand) for the soil sample example intersect in the LOAM soil classification area.

Factors That Affect Irrigation

Evapotranspiration

The ESP-SMTe calculates water needs based on water lost from the soil surface (evaporation) and water used by the plants (transpiration). The rate that water is lost is called evapotranspiration, or ET, and is usually expressed in inches of water lost over a time period (usually on a daily basis).

This water loss is influenced by the weather conditions at the site. For example, a hot dry environment would have a much higher ET rate and require longer, more frequent watering than a cool, humid environment.

Plant Available Water

The total amount of water in the soil that is available to the plant is called Plant Available Water, or PAW. This amount varies based on the soil type and plant root depth.

For an example, lets assume that a plant has roots that are 6 inches deep, and the soil class is Loam. Referring to the following table, the amount of available water per inch of Loam soil is 0.17. The Plant Available Water (PAW) would therefore be 0.17 X 6 inch root depth = 1.02 inches of potentially available water in the soil for the plant.

Plant Available Water (PAW) By Soil Type

Soil Type or Class	Available Water (AW) (in. of water per in. of soil)
Clay	0.17
Silty Clay	0.17
Clay Loam	0.18
Loam	0.17
Sandy Loam	0.12
Loamy Sand	0.08
Sand	0.06

Effective Rainfall

Not all rainfall is usable by the plant. If the rainfall intensity is high, some water may not reach the plant root zone before running off or may infiltrate past the root zone. The amount of rain that is actually used by the plants is called Effective Rainfall.

The weather sensor measures total rainfall, and the ESP-SMTe determines how much to consider Effective Rainfall when calculating irrigation Run Times.

For an example, the table below shows a record of rainfall for a 5 day period. The weather sensor measured .46 inches of rain on Day 3, but the ESP-SMTe determined that only .16 inches will be used by the plants.

Effective Rainfall

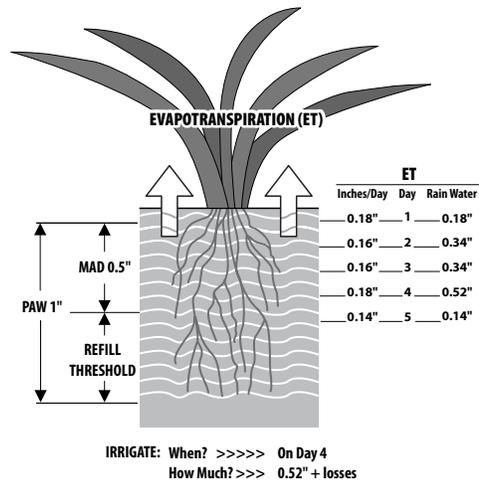| Day	Total Rain	Effective Rain
1	0.00″	0.00″
2	0.00″	0.00″
3	0.46″	0.16″
4	0.00″	0.00″
5	0.00″	0.00″
Total	**0.46**	**0.16**

Management Allowed Depletion (MAD)

When the amount of water available to the plant gets too low due to water loss through ET, then irrigation is scheduled. This level is referred to as Management Allowed Depletion, or MAD and can be adjusted if needed during programming.

The MAD level is expressed as a percentage of the total Plant Available Water (PAW) that can be lost from the soil before irrigation will be scheduled. If the amount of PAW is 1.02 inches and the MAD level is set at 50%, then the controller would schedule irrigation when the water in the soil drops to 0.51 inches.

When the controller is programmed, the "REFILL POINT" is entered. The Refill Point is 100%-MAD. Most soil is approximately 50%. The clay Refill Point is typically set to 70% (MAD value of 30%).

The following figure and table shows the water loss for a plant over a 5 day period. In our example, since PAW has been calculated to be 1.02 inches, and the MAD level is 50%, the plant will need water when 0.51 inches of water has been lost (Accumulated Water Requirement). This level is reached on Day 4.

	ET Inches/Day	Day	Rain Water
	0.18″	1	0.18″
	0.16″	2	0.34″
	0.16″	3	0.34″
	0.18″	4	0.52″
	0.14″	5	0.14″

IRRIGATE: When? >>>>> On Day 4
How Much? >>>   0.52″ + losses

Plant Water Requirements

Day	ET/ Day	Effective Rain	Net Water Req't	Accumulated Water Req't
1	0.18″	0.00″	0.18″	0.18″
2	0.16″	0.00″	0.16″	0.34″
3	0.16″	0.16″	0.00″	0.34″
4	0.18″	0.00″	0.18″	0.52″
5	0.14″	0.00″	0.14″	0.14″

The table shows how the ESP-SMTe tracks the accumulated water loss over the course of the 5 days. Since there was 0.16″ of Effective Rain on Day 3, the net water loss on that day was zero. The controller would then water on Day 4.

Efficiency

The total amount of time that each zone needs to operate is dependent on the Net Application Rate (Precipitation Rate X System Efficiency) that the sprinkler system is applying.

For example, if the precipitation rate for a rotor zone is 0.6 inches per hour and the efficiency is 85%, then the Net application Rate is 0.52 inches per hour. To replenish the soil moisture in the example above, the zone would need to have a total Run Time of 1 hour on Day 4.

Applying the Cycle+Soak™ Principle

In most soil types, if a calculated Run Time is run continuously significant water loss through runoff would occur. Based on the soil type and degree of slope for the zone, the ESP-SMTe controller will divide the required Run Time into several "cycles" with a "soak" time in between. These cycle and soak times are based on the Water Intake rate of the soil type as identified in the following table.

Basic Intake Rate for Various Soil Types

Soil Type or Class	Basic Intake Rate (inches per hour)
Sand	0.60″
Loamy Sand	0.50″
Sandy Loam	0.40″
Loam	0.35″
Clay Loam	0.20″
Silty Clay	0.15″
Clay	0.10″

For an example, the following table shows water requirements over a 12 day period. The ESP-SMTe has scheduled irrigation on Day 4 and Day 10, and will divide the calculated Run Times into several cycles.

Day 4 - 60 minutes (Cycle 1 = 30 minutes & Cycle 2 = 30 minutes)

Day 10 – 68 minutes (Cycle 1 = 30 minutes, Cycle 2 = 30 minutes, Cycle 3 = 8 minutes).

Plant Water Requirements for Cycle+Soak

Day	Daily ET	Effective Rain	Net Water Req't	Accum. Water Req't	Irrigation Event
1	0.18″	0.00″	0.18″	0.18″	---
2	0.16″	0.00″	0.16″	0.34″	---
3	0.16″	0.16″	0.00″	0.34″	---
4	0.18″	0.00″	0.18″	0.52″	0.53″
5	0.14″	0.00″	0.14″	0.13″	---
6	0.13″	0.10″	0.03″	0.16″	---
7	0.15″	0.11″	0.04″	0.20″	---
8	0.14″	0.00″	0.14″	0.34″	---
9	0.11″	0.00″	0.11″	0.45″	---
10	0.16″	0.00″	0.16″	0.61″	0.60″
11	0.12″	0.00″	0.12″	0.13″	---
12	0.12″	0.00″	0.12″	0.25″	---

NOTE: The maximum cycle time is limited to 60 minutes even if the infiltration rate of the soil will allow more time. This assures that additional zones will get irrigated during the allotted watering window.

Determine Net Application Rate

The Net Application Rate is the amount of water that is applied to the landscape in a certain period of time. In order for the controller to determine a Run Time for each zone, the Net Application Rate for your sprinkler type must be programmed appropriately. This value will determine how long the sprinklers need to water to replenish water to the plants.

Sprinkler Type Default Method

The ESP-SMTe controller provides default Net Application rates for the different sprinkler type. To use this method, refer to Input Zone Information in the Programming section.

The table below provides the Default Net Application Rate Values for common sprinkler types used by the controller.

Sprinkler Type	Net Application Rate (in/hr)
Sprays	1.60
Rotors	0.45
Rotary Nozzle	0.50
Bubblers	2.50
Drip	0.80

Total Area Covered Method

The following steps show you how to calculate the Net Application Rate based on Total Area, Precipitation Rate and an Efficiency Rating.

1. Determine the Manufacturer and Model of the sprinklers being used in the zone, making particular note of the specific nozzle being used at each sprinkler location. In our example, a Rain Bird 5004 with the following MPR nozzles are being used in Zone 1: Full Circle = MPR 30F, Half Pattern = MPR30H and Quarter Patterns = MPR30Q. See illustration in the next column.

Zone 1 - 5004 MPR Nozzle Series @ 45 psi

Model	Radius	Pattern	Flow (GPM)
30Q	30 Foot	Quarter	1.40
30H	30 Foot	Half	2.59
30F	30 Foot	Full	5.78

2. Determine the operating water pressure at the Sprinkler Nozzle. In our example, Water Pressure = 45 psi.

3. Obtain Catalog Information for Sprinkler (This information is usually found on the Manufacturer web site).

4. Determine the Total Amount of Flow (GPM) for the area being covered by the zone.

   Example: (4) 30Q's @ 1.40 GPM+ (6) 30H's @ 2.59 GPM + (2) 30F's @ 5.78. Total Zone 1 Flow = 32.7GPM

5. Determine the Total Area (square feet) covered by Zone 1.

   Example: the area is 60 feet by 90 feet = 5,400 square feet (SF)

6. Calculate the Gross Precipitation Rate (PR) using the following formula:

$$\frac{\text{Total Flow (GPM) X 96.3}}{\text{Total Area (sq. ft.)}}$$

   Example: Zone 1 PR $= \dfrac{32.7 \text{ X } 96.3}{5,400} = 0.58''$

7. Enter 0.58 inches per hour into the ESP-SMTe controller for Net Application Rate. Refer to Input Zone Information in the Programming section.
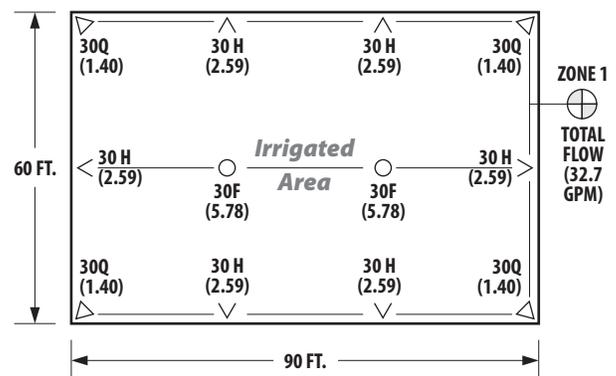
8. Determine the Efficiency Rating - choose an efficiency rating based on your visual observation of system conditions and operating pressure at the nozzle from the table below:

Approximate Efficiency Rating

Sprinkler Type	Poor	Average	Good
Sprays	50 %	60 %	70 %
Rotors	55 %	70 %	80 %
Rotary Nozzle	55 %	70 %	80 %
Bubblers	50 %	60 %	70 %
Drip	70 %	80 %	90 %

Example: Zone 1 Sprinkler Type is a Spray and the zone operating condition is average, so the sprinkler efficiency value is 60% based on information in the table above.

9. Determine the Net Application Rate - The Net Application Rate value must be entered for sprinklers during programming.

Example: Precipitation Rate = 0.44 inches per hour

Efficiency = 60%

Net Application Rate for Zone 1 is 0.26 inch/hour

(0.44 X 60%) = 0.26 inches per hour

Zone System Audit Method

Information on how to perform an Irrigation System Audit correctly is available on the Irrigation Association web site at www.irrigation.org.

1. Place a series of catchment devices (that are the same size and shape) throughout the area that the zone is irrigating.

2. Turn on the zone and run for at least 10 minutes to collect water in the catchment device.

3. The amount of water collected in each catchment device is measured and analyzed to determine the Distribution Uniformity (DU).

Drip Irrigation

Drip irrigation is a system that applies water directly to the root zone or base of a plant, using a network of small diameter tubes and emitters. This type of irrigation is more efficient and requires less water than traditional sprinkler nozzles.

The ESP-SMTe controller uses information about the installed drip system (emitter flow rate, emitter spacing and row spacing) to calculate water application rates and determine irrigation schedules.

> **!** The online Rain Bird Academy offers classes and training to learn more about drip products and applications.

Inline Grid Drip

Inline Grid Drip is used to irrigate an area of closely spaced plants with similar water needs, such as a flower bed. Evenly placed drip emitters are used with the same flow rate.

Point Source Drip

Point Source Drip is used to irrigate an area that has a variety of plant types, such as a mix of trees and bushes. Drip emitters are placed exactly where water is needed, and the flow rates can be individually adjusted for each plant.

Inline Grid Drip Irrigation

Emitters

Water Source

Point Source Drip Irrigation

Emitters

Water Source
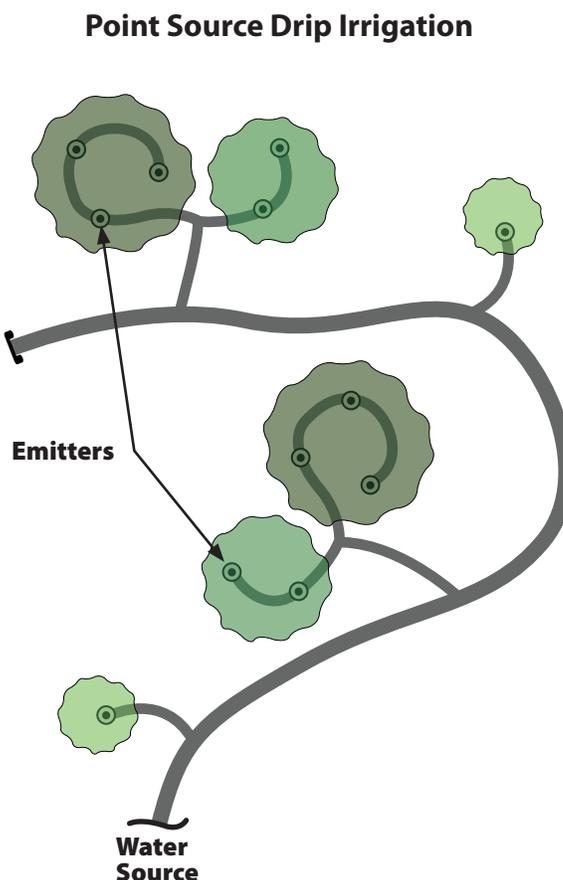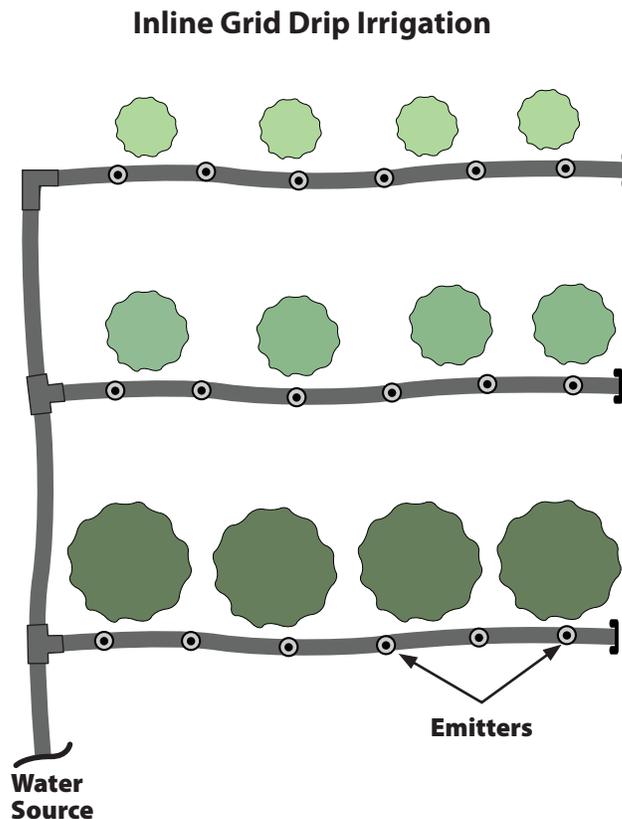
Safety Information

⚡ **WARNING:** A circuit breaker or cutoff switch is to be provided in the fixed wiring to isolate the controller. The current date and time on the controller is retained by a long-life lithium battery, which must be disposed of in accordance with local regulations.

• This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

• This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

• If the equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by the following measures:

  » Reorient or relocate the receiving antenna.

  » Increase the separation between the equipment and the receiver.

  » Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

  » Consult the dealer or an experienced radio/TV technician for help.

• Changes or modifications not expressly approved by Rain Bird Sales, Inc., could void the user's authority to operate the equipment.

• This product was FCC certified under test conditions that included the use of shielded I/O cables and connectors between system components. To be in compliance with FCC regulations, the user must use shielded cables and connectors and install them properly.

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