



Controller LinkTM

Installation and Operation
Guide

Controller LinkTM

Installation and Operation Guide

Support

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Getting Started

Overview

A Weather Reach Controller Link makes an existing controller smart. Through the Internet a Controller Link retrieves weather data from the Weather Reach Server. Irrigation schedules are managed based on your settings, current weather conditions, ET and rainfall.

A Controller Link uses a Program Start Sensor to know when an irrigation cycle begins. Within milliseconds the Controller Link will either allow or prevent the cycle from running by opening or closing the Valve Common.

Up to four programs may be managed by a Controller Link. Program start times and valve run times are managed by the host sprinkler controller. The Controller Link automatically controls the frequency of watering based on the Available Days programmed in the Controller Link.

An on-site tipping bucket rain gauge may also be connected to the Controller Link to deliver local rainfall measurements.

A flow sensor may also be connected to the Controller Link to monitor and record flow. In a high-flow condition the Controller Link will interrupt a program cycle.

To keep plants healthy, proper landscape water management will maintain soil moisture at optimum levels. Saturated soil starves the roots of essential oxygen. The soil must be allowed to dry out, not to a wilt point, but enough to get air to the roots. To promote a deep, healthy root system, best horticultural practices recommend deep, less frequent watering. Watering frequency should be managed in response to changing weather conditions and rainfall.

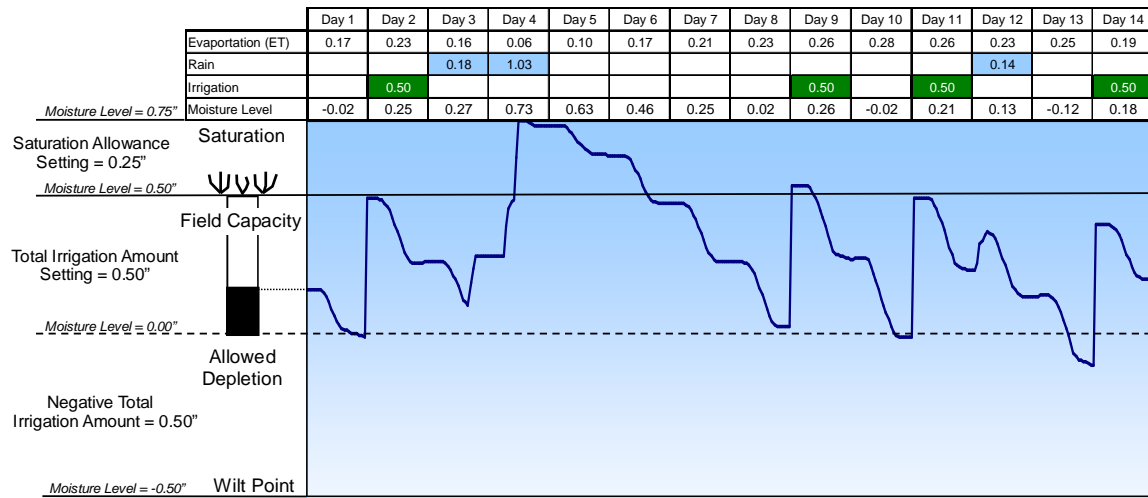
The Controller Link manages irrigation schedules by using the Moisture Balance method. A Moisture Balance represents soil moisture based on evaporation (ET), rain and irrigation. Rain and irrigation add moisture to the soil, while evaporation depletes water from the soil.

The objective of effective water management is to wait until water from the last watering cycle evaporates before watering again. If it rains, this moisture is accounted for and the Controller Link will wait for the rainfall to evaporate before watering again.

The Moisture Balance method is based on the Allowed Depletion concept; soil moisture should be depleted to an allowed level before irrigating again. Your Controller Link

automates this process. The host irrigation controller is set to water every day and put down enough water to refill the root zone. The Controller Link maintains the Moisture Balance to decide when the root zone needs to be refilled.

This diagram provides an example of how a Controller Link manages irrigation. In this example the Irrigation Amount is 0.50". The graph shows how evaporation depletes soil moisture. Once the Moisture Level reaches 0 or "Allowed Depletion" it is time to irrigate. Rainfall is also accounted for, as seen on day 3, 4 and 12.



The Controller Link displays the current Moisture Level of each program. The Moisture Level Graph may also be viewed in the Controller Link’s Irrigation Logs.

This simple, effective approach allows the Controller Link to work well with existing irrigation controllers. Valve start times and run times that should remain constant are programmed in the host irrigation controller. The Controller Link retrieves weather conditions, calculates ET, and maintains the moisture balance to control irrigation frequency.

Evaporation & Rain

Weather conditions affect how quickly the landscape dries out. To be more specific, solar energy, temperature, wind and humidity affect evaporation. Not all weather stations are the same. Weather Reach uses ET Weather Stations to assure the most complete and accurate weather data. ET Weather stations have 5 high quality sensors, measured at least hourly.

The Moisture Balance method uses measurements of evaporation, irrigation and rainfall. Of the three, rainfall varies the most. This is why the Controller Link accepts on-site rainfall measurements or rain data from local rain gauges.

Your Controller Link uses the best in evaporation measurements and has the most advanced irrigation control system in the industry.

Personal Safety Warnings

- A Controller Link must be installed in compliance with local electrical codes.
- To prevent electrical shock or damage, make sure that all supply power is OFF to the Controller Link, irrigation controller, or any equipment being connected. Electrical shock can cause severe injury or death.
- Power the Controller Link using 20 to 30 Volts AC. DO NOT connect it to 120 volts or greater.
- A ground wire MUST be connected to the Controller Link for electrical surge, equipment and personal protection.

Setup Requirements

- A Controller Link can manage the valve common of only one controller.
- Only one station may operate at a time.
- Programs cannot overlap.
- Stations within a program cycle must run consecutively with no more than a 15 minute pause between stations. (The run-time for stations without a valve must be set to zero)
- Cycle and soak should be implemented by using additional program start times. (Do not use the Cycle and Soak in a Controller)
- If a program has only one station and multiple start times, there must be at least a 1 minute delay between the end of a cycle and the beginning of the next cycle.
- Valve solenoids must be 24 volt AC on all programmed stations.

Specifications

- **Power Supply:** 20 to 30-volt AC 50 or 60Hz or 10 to 35 VDC @ 0.3 Amp max
- **Valve Common Contact Load:** 4 Amp maximum @ 30-volt AC
- **Operating Temperature Range:** 5° to 149°F (-15° to 65°C)
- **Terminal Wire Gauge:** 14 to 20 AWG
- **Sensor Wire Gauge:** 18 to 26 AWG
- **Ground Lug Wire Gauge:** 10 to 18 AWG
- **Program Start Sensor:** Input 20 to 30 volts AC
- **Operating Modes:**
 - Program Start (Typical)
 - Water Window
 - ET Pulse
 - ET Trigger
- **Rain Gauge Sensor Input:**
 - Normally Open or Normally Closed
 - 1mm or 0.01” per tip
- **Rain Gauge Sensor Voltage:** 5 VDC
- **Flow Sensor:**
 - **Type:** Variable frequency
 - **Excitation voltage:** 9 VDC
 - **Maximum sensor current:** 40 milliamp
 - **Maximum sensor frequency:** 400 Hz
 - **Minimum pulse width:** 1 millisecond
- **Ethernet:** RJ-45 10/100BASE-T, TCP/IP, DHCP
- **Wi-Fi:** 802.11 b/g Secure authentication – WEP-128, WPA-PSK (TKIP), WPA2-PSK (AES)
- **USB:** Micro AB - OTG
- **Cabinet:** Wall mount, weatherproof, UV- and impact-resistant IP55, NEMA 3R
- **Dimensions:** 5" wide x 8" high x 2" deep (12.7 x 20.3 x 5.1 cm)

Models

Part Number: CLe

Description: Weather Reach® Ethernet Controller Link

Part Number: CLw

Description: Weather Reach® Wi-Fi Controller Link

Programming the Host Irrigation Controller

A Controller Link, connected to a standard irrigation controller, automatically manages the watering schedule. Watering cycles programmed in the host irrigation controller will either water or be interrupted by the Controller Link based on user settings, evaporation and rainfall. When the Controller Link Program Start Sensor detects a cycle start the Controller Link will either enable or interrupt the valve common circuit.

The host irrigation controller is an integral part of the system. Settings in the controller must be entered based on plant water requirements, irrigation system capabilities and site use requirements.

Irrigation controllers all have four settings in common:

- **Water days** – What days will a program cycle start? (pg 5)
- **Start Times** – The time of day a program cycle will run. (pg 5)
- **Station Run Times** – The number of minutes a valve will run when a program cycle runs. (pg 6)
- **Programs** – Water days, times, and valve run times may be set in separate programs to allow selected valves to water at different times and on different days. (pg 7)

These settings must first be programmed in the host controller.

Water Days

The sprinkler controller should be programmed to water every day. The Controller Link will allow watering only when watering is needed even though the sprinkler controller is set to water every day.

Note: If you choose to program the sprinkler controller with specific days off, then the Controller Link sensor detects a no water day and will allow watering the next available day.

Start Times

Your Controller Link does NOT start a watering cycle; it “Enables” or allows the sprinkler controller to activate valves. Cycle start times should be programmed into your sprinkler controller. You may program multiple start times into your sprinkler controller.

Note: The Controller Link manages one program at a time. Most irrigation controllers “stack” the start times so they will run sequentially. If the controller overlaps (turning on more than one program at a time) program starts, then cycle start times must be set to avoid overlapping cycle starts.

Station Run Times

Station run times must be set in your sprinkler controller so the valves will apply the correct amount of water to your landscape. Your Controller Link “Enables” watering cycles to refill the plant root zone by applying the Irrigation Amount. The station run times is the time it takes for sprinklers to apply the Irrigation Amount per cycle start and is based on how fast the sprinklers apply water (precipitation rate). Table 1 can serve as a guide to determining station run times, given the precipitation rate and the Irrigation Amount.

	Precipitation Rate (inches per hour)	Irrigation Amount (inches)		
		0.35"	0.50"	0.65"
		Station Run Times (minutes)		
Typical Spray Heads {	2.00	11	15	20
	1.75	12	17	22
	1.50	14	20	26
	1.25	17	24	31
	1.00	21	30	39
Typical Rotors {	0.90	23	33	43
	0.80	26	38	49
	0.70	30	43	56
	0.60	35	50	65
	0.50	42	60	78
	0.40	53	75	98

Table 1. Minutes of Station Run Times

Note: Station run times may need to be adjusted based on the uniformity of the sprinkler system.

Note: The total station run time may need to be split into several cycles to allow the water to soak between cycles.

Programs

Stations are typically grouped in programs by plant type or watering areas. For example: turf valves would be wired to stations and assigned to program A, shrub valves on program B and flower beds on program C. Or soccer field one may be on program A and soccer field two on program B. Every site will have different needs.

Program settings should be documented before entering settings in the Controller Link. The important program settings to note are:

- **Type of plants.** The water requirement will vary based on the type of plant being irrigated.
- **Number of start times.** Often more than one start time is needed to improve water penetration and reduce run-off.
- **The first station of each program.** The Controller Link will sense the start of a program by monitoring the start of the first station in the program.
- **Available water days.** Site conditions may limit the days watering is allowed: local water restrictions, facility use, maintenance schedules and hydraulic limitations should be considered. Smart irrigation control will perform best with the least restrictions, but restrictions are a reality and must be identified when entering settings. The host irrigation controller should be programmed to water every day. Available days will be programmed in the Controller Link.

Note: The Controller Link manages four programs but only one program at a time.

No Smart Control Watering Schedules

If stations need to operate as programmed in the sprinkler controller, and NOT automatically managed by your Controller Link, use a separate program in the host controller for these stations. In the Controller Link a program can be set to No Smart Control. As another option there is an advanced Controller Link feature to allow a period of time for the sprinkler controller to water as programmed. See Daily Override in Advanced settings.

Installation

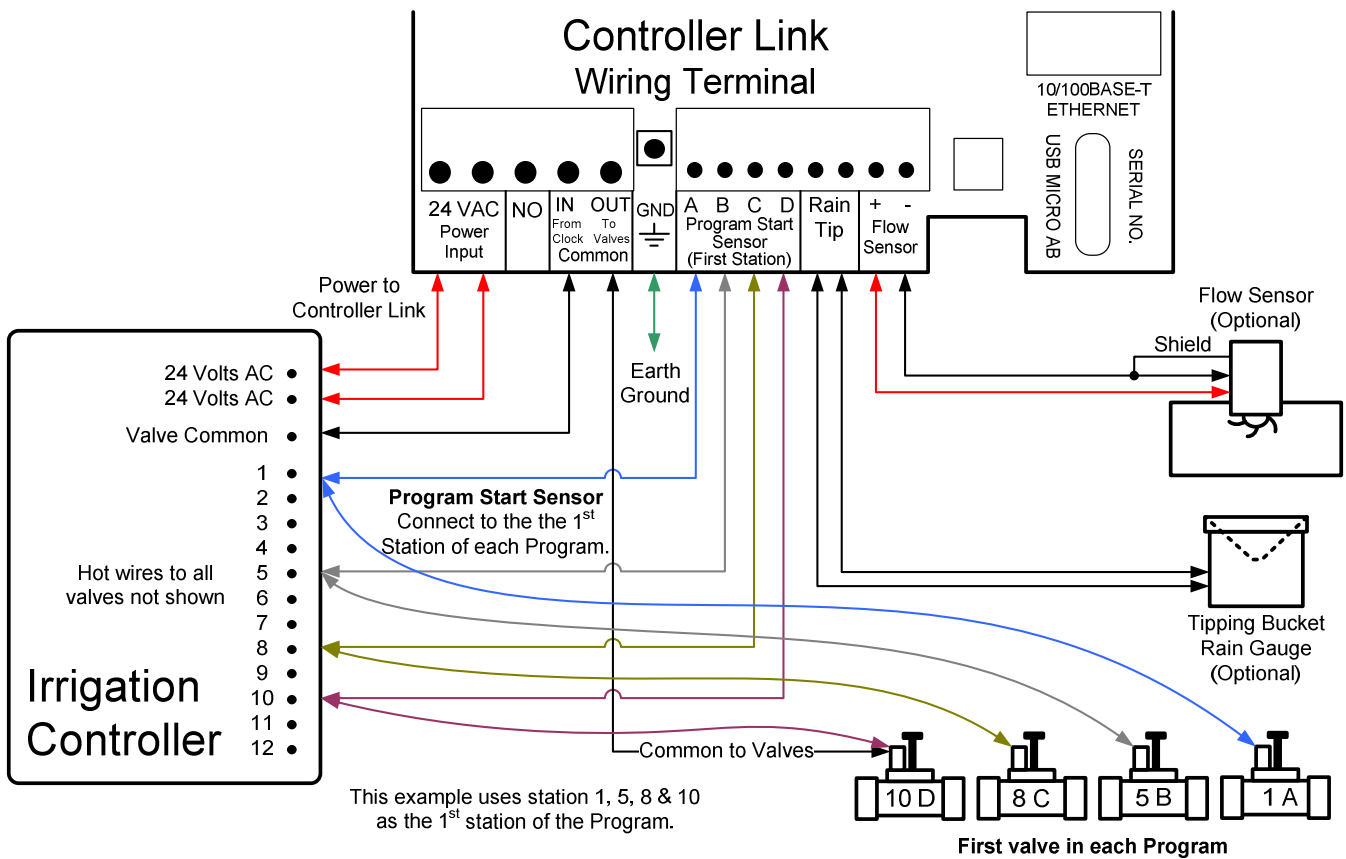
1. Mount the Controller Link
2. Make wire connections
3. Install accessories
4. Program irrigation controller
5. Program the Controller Link

Mounting

Mount the Controller Link adjacent to the irrigation controller. The cabinet should be mounted vertical with the wire entry at the bottom.

Mounting hardware is included.

Wiring



Note: A pair of 18 gauge 4 strand wire works well; one 4-strand cable for power and valve common in / out. The second 4-strand cable would be used for the Program Start Sensor. A 14 gauge green wire could be used to ground the Controller Link. (The wire entry seal will work better with 2 4-strand cables as opposed to 1 strand cable.)

Note - Master Valve Control: If a normally closed master valve has been installed as part of the irrigation system, the master valve will be controlled as long as it is connected to the same valve common controlling all other valves.

Terminals

24 VAC: Power supply input. Typical source is the host irrigation controller.

NO: Normally Open. Used for ET Pulse and Trigger Start. See advanced options.

Common IN / OUT: The valve common control connection. Connect the common from the sprinkler controller to the terminal labeled “IN” Connect the field common to the sprinkler valves to the terminal labeled “OUT”.

GND: Earth ground - essential for surge protection and proper operation.

Program Start Sensor A B C D: Identify the first station that will be activated by the host irrigation controller when a program cycle begins. Connect an 18 to 22 gauge wire to the station output terminal of the host controller. Connect the other end to the corresponding Program Sensor Start terminal (A B C or D) of the Controller Link.

It is recommended that the program assignment of the host controller correspond to the Controller Link programs.

Note: When a program cycle is started by the host irrigation controller, the first station is energized. The Controller Link detects the controller has started a program and determines if the program needs irrigation. If the program is ready to water, the valve common circuit is closed (Enabled) to allow irrigation. If watering is not needed, then the valve common circuit opens to prevent irrigation.

Rain Tip: An on-site tipping bucket rain gauge may be connected to this terminal to input local rainfall measurements.

Flow Sensor: Flow sensors have positive and negative leads, typically red + and black -. The sensor must be connected to the corresponding terminals. If the cable has a drain wire, it should be connected to the negative terminal with the negative sensor lead.

Proper grounding of the Controller Link is essential for flow sensor surge protection.

The following flow sensors may be connected to the Flow Sensor input:

Manufacturer	Model	K	Offset
BadgerMeter	735 PV ¾" S40	0.156300	0.900000
BadgerMeter	735 PV ¾" SDR 21	0.197000	-0.600000
BadgerMeter	735 PV 1" S40	0.261113	1.200000
BadgerMeter	735 PV 1" SDR21	0.321739	0.600000
BadgerMeter	228 PV15 1-1/2"	1.697000	-0.316000
BadgerMeter	228 PV20 2"	2.842900	0.143500
BadgerMeter	228 PV30 3"	8.309000	0.227000
BadgerMeter	228 PV40 4"	13.742800	0.237070
CST	FSI-T10-001 1"	0.322000	0.200000
CST	FSI-T15-001 1-1/2"	0.650000	0.750000
CST	FSI-T20-001 2"	1.192000	0.940000
Netafim	Hydrometer PHD 1-1/2"	0.319000	0.000000
Netafim	Hydrometer PHD 2"	0.513000	0.000000
Netafim	Hydrometer PHD 3"	1.232000	0.000000
Netafim	Hydrometer PHD 4"	3.335000	0.000000

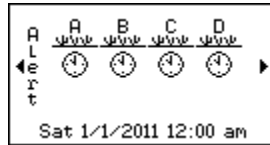
Table 2. Flow Sensor Defaults

Every flow sensor has a K value and Offset based on the pipe size. These values have been preloaded in the Controller Link. When any of the sensors in Table 2 are selected the K Value and Offset are automatically entered.

Consult with Irrisoft regarding the use of other sensors. K values and offsets may be manually programmed.

Control Test

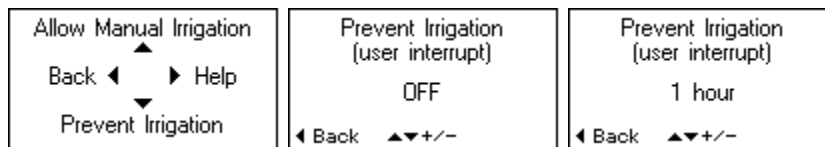
Upon initial power up the Controller Link Home screen is displayed:



Before any settings are entered, the Controller Link allows all watering started from the host irrigation controller. Before making program settings and after completing all wiring connections you should verify the Controller Link can control the valve common and interrupt watering.

There are two steps to the Valve Control Test:

1. From the host controller manually turn on a valve. Observe the valve to confirm the valve came on. Leave the valve running and go to step 2.
2. From the Controller Link press the Override button. Then press ▼ down arrow button to select Prevent Irrigation. Then press the ▲ up arrow once to prevent irrigation for 1 hour. The valve should go off. Cancel the Prevent Irrigation and the valve will come back on. Cancel the manual watering initiated at the Host Controller.



Note: If the valve fails to come ON or go OFF check the wiring.

Wire Entry Seal

After wires have been connected use a razor knife to cut a slit in the wire entry seal directly behind the desired wire location. Push the wire into the slit to improve wire retention and sealing.

Connect to the Internet

Controller Link communicates with Weather Reach Servers via the Internet using HTTP protocol. Communication is initiated by the Controller Link, eliminating the need for any special network settings.

Ethernet

Connect a standard CAT5 or CAT5e RJ-45 Patch Ethernet Network Cable between the Controller Link and a Router or Switch connected to the Internet.

Cable Guidelines

- Maximum distance 100 meters (328 feet)
- Straight through Patch cable
- Solid conductors
- Shielded cable (STP) is recommended for long runs and noisy environments.
- Cable insulation suited to the requirements of the installation.
 - UL Certifications (Fire Rating) – highest to lowest:
 - Plenum – CMP
 - Riser – CMR
 - Commercial – CMG, CM
 - Residential – CMX
 - Environmental
 - Outdoor – Water & UV
 - Direct Bury
 - Oil Resistance
- Grounding
 - Connected devices should have the same ground potential.

Note: The Ethernet Controller conforms to IEEE 802.3 specifications and fully supports 10BASE-T and 100BASE-TX standards.

Note: See “Programming - Guided Setup” chapter for IP settings (pg 15).

Wi-Fi

Once the Controller Link is powered up, it scans to find broadcasting Wi-Fi Access Points. Wi-Fi signal distance is typically no more than 300 feet. Local conditions can reduce this range.

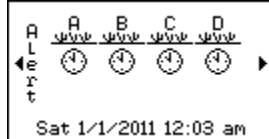
Wi-Fi Radio Specifications

Parameter	Specifications
Wi-Fi Protocols	2.4GHz IEEE 802.11b/g transceiver
Secure Wi-Fi authentication	WEP-128, WPA-PSK (TKIP), WPA2-PSK (AES)
Frequency	2402 ~ 2480MHz
Modulation	802.11b compatibility : DSSS(CCK-11, CCK-5.5, DQPSK-2, DBPSK- 1) 802.11g : OFDM (default)
Channel intervals	5MHz
Channels	1 – 14
Transmission rate (over the air)	1 – 11Mbps for 802.11b / 6 – 54Mbps for 802.11g
Receive sensitivity	-85dBm typ.
Output level (Class1)	+18dBm
Maximum RF input to U.FL connector	10 dBm
Operating Temperature Range	30° C to +85° C
Operating Relative Humidity	≤ 90%
Certifications	FCC / CE/ ICS

Note: See “Programming - Guided Setup” chapter to select an Access Point and enter a passphrase (pg 15).

Programming - Guided Setup

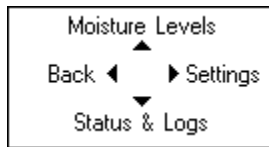
When first powered up, the Controller Link Home screen will display program status based on Factory Default settings. All programs will water based on the sprinkler controller (timer) schedule because Smart Control is turned Off.



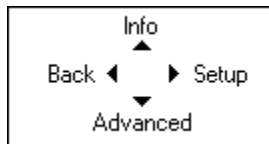
Note: The indication there is an Alert Condition is normal. If you press the ◀ left arrow you will see the Alert message. A weather station has not been setup yet so it will operate based on Historical ET.



Press the ▶ right arrow button to access the main menu.



The first step is to complete the setup by going into Settings. Press the ▶ right arrow button to access the Settings.



The easiest way to enter site specific setting in your Controller Link, is to follow the guided setup. Press the ▶ right arrow button to access the Setup screen.



Note: “Info” and “Advanced” options are discussed in the Menu Details chapter. (pg 33)

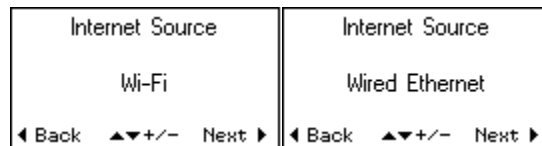
There are 6 steps to complete the guided setup:

1. Internet Setup (pg 15)
2. Weather Station (pg 17)
3. Rain Source (pg 18)
4. Irrigation Setup (pg 19)
5. Weather Interrupts (pg 28)
6. Flow Sensor (pg 30)

1. Internet Setup

Controller Link supports either Wired Ethernet or Wi-Fi. Work with the local Network Administrator to select the connection method. The Network Administrator should also provide connection settings. You should now be ready to enter the IP settings.

Press the ► right arrow button to access the Internet Setup.

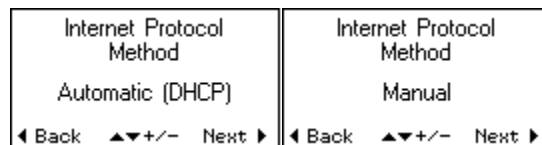


Use the ▲ up or ▼ down arrow button to choose either Wi-Fi or Wired Ethernet.

Note: Make sure the Ethernet cable is connected to the local network. If you are using Wi-Fi make sure the Controller Link is mounted within the signal range of the Wi-Fi Access Point.

Wired Ethernet

There are two options to configure Internet Access when using Wired Ethernet:



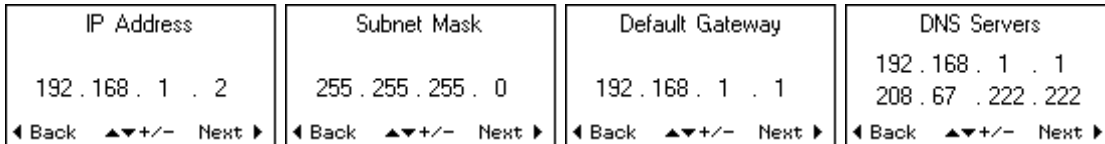
Automatic – DHCP (Dynamic Host Configuration Protocol) If the Controller Link is connected to a network that supports DHCP, the IP Address, Subnet Mask, Default Gateway, and DNS Server addresses are automatically sent to the Controller Link. Retrieving these settings should take a minute or less.

OR

Manual – If the router does not support DHCP contact the Network Administrator. You will need this information:

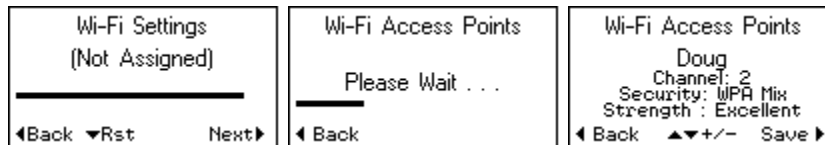
- IP Address: _____ . _____ . _____ . _____
- Subnet Mask: _____ . _____ . _____ . _____
- Default Gateway: _____ . _____ . _____ . _____
- DNS Server 1: _____ . _____ . _____ . _____
- DNS Server 2: _____ . _____ . _____ . _____

Use the ▲ up and ▼ down arrow buttons and Next (▶ right arrow button) to manually enter each of these numbers:

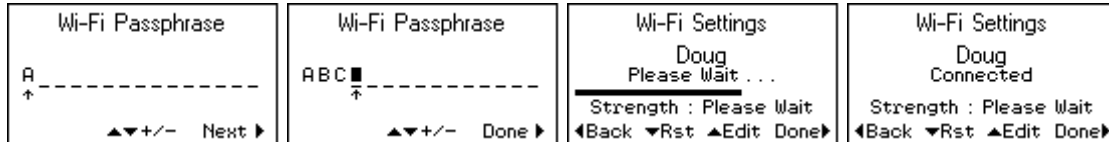


Wi-Fi

When you select Wi-Fi, the Controller Link will begin searching for “broadcasting” Access Points. This may take several minutes. When the search is complete use the ▲ up and ▼ down buttons to scroll through the list of available Access Points. The screen displays details about each Access Point.



When you press Save (► right arrow button) you will be prompted to enter the Passphrase. The Controller Link supports all the characters that may be used in a passphrase. Use the ▲ up and ▼ down buttons to scroll through and find the needed character for each position. Press Next (► right arrow button) to advance to the next character. (Long Passphrases, up to 64 ASCII characters, are accepted; press ► Next to advance to the next screen) After the last character is set, press ► Done to save the settings.

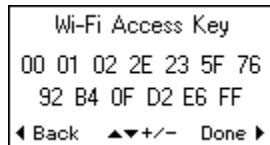


The Controller Link now establishes the connection. Once the connection to the Internet is complete press ► Done to go to the next step.

Note: Signal Strength status may take several minutes to update.

WEP Security

A 128-bit WEP key is entered as a string of 26 hexadecimal characters. The Controller Link groups these characters in pairs. The range in each field is 00 to FF.

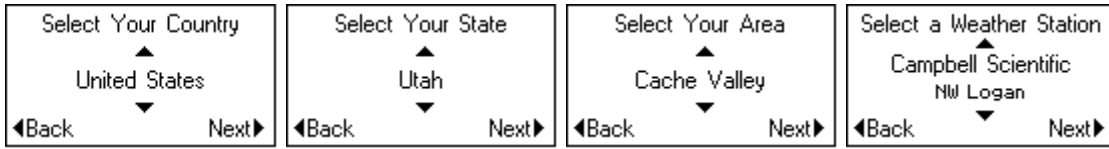


Note: WEP Security does NOT report a failed connection if the pass phrase is not entered correctly.

2. Weather Station

Once an Internet connection is established, you are ready to select a weather station. To find a weather station the Controller Link will use the Internet to access the Weather Reach Weather Station Library. All available stations can be found in the Library. The search for a weather station has four steps:

1. Country
2. State (or Province)
3. Area
4. Weather Station



At each step, scroll through the available choices and make your selection. Once you have selected the weather station, several things happen automatically:

1. The Controller Link will retrieve data from the Weather Reach Service Provider’s Server.
 - a. If a subscription is required, data is available for 7 days. The instructions you need to secure a subscription are displayed on the screen.
2. Selecting the station automatically enters these settings in the Controller Link:
 - a. IP Address of the weather station data.
 - b. Site Elevation (needed to calculate ET)
 - c. Historical ET (used as a backup when there is a problem getting data)

Note: Weather data is made available by Weather Reach Service Providers (WRSP). In some markets public weather station data is available without a subscription. In other markets commercial weather station networks offer the data with a subscription.

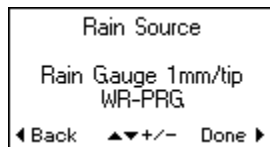
3. Rain Source

The Controller Link will use rain measurements from one of 4 sources:

- **Weather Station:** Rain measured at the selected weather station.



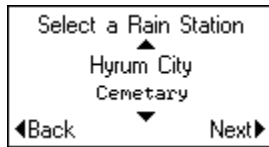
- **Rain Gauge – 1mm per tip:** An on-site tipping rain gauge connected to the Rain Tip-in terminal records rain in 1mm increments. Use model WR-PRG.



- **Rain Gauge – 0.01” per tip:** An on-site tipping rain gauge connected to the Rain Tip-in terminal records rain in 0.01” increments.



- **Rain Station:** A WRSP may support rain stations that provide only rainfall information. If a Rain Station is available in the Area it may be selected from the list.



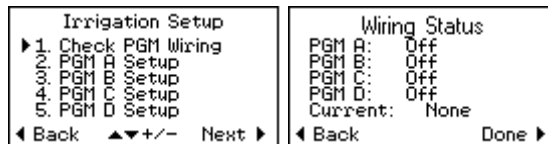
Note: Once you have selected a Rain Station, the Controller Link will retrieve rainfall data from the Weather Reach Service Provider’s Server.

Note: If a subscription is required, data is available for 7 days. The instructions you need to secure a subscription are displayed on the screen.

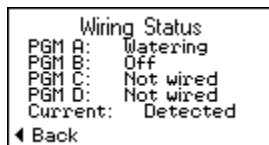
4. Irrigation Setup

The first step on the Irrigation Setup screen is to verify the Controller Link has been wired correctly to the host controller. The Controller Link must be able to correctly detect a program cycle start. This is an important test.

Press ► Next to view the status of the Wiring Status of the Program Start Sensor input.



From the host irrigation controller manually activate the first station in each program.



Compare the displayed wiring status to the state of the host irrigation controller. In the above example:

- Program A has detected the first station in the program cycle is “Watering.”
- Program B is “Off”
- Program C & D are “Not Wired” meaning there is no wire connected to a station in the controller and the Program Start Sensor terminal B or C.
Note: If a solenoid is not connected to the station, the “Not Wired” status will be displayed.
- Current is “Detected” indicating a valve has been activated.

The possible Wiring Status conditions for program A B C D include:

- **Off** – The station wired to this Program Start Sensor is Off
- **Watering** – The station wired to this Program Start Sensor is On.
- **Not Wired** – This terminal is not connected to the host irrigation controller.
- **Wiring Fault** – There is a wiring problem. Check to see if the valve common is connected to valves in the field.
- **Com. Not Wired** – Common is not wired or more than one program is on at the same time. (The Controller Link does not support more than one station running at a time)
- **Unknown** – Electrical activity detected but the input cannot be identified.

The possible status conditions for Current detection include:

- **Detected** – The sensor detects electric current is activating a valve.
- **None** – No electric current is running through the valve common.

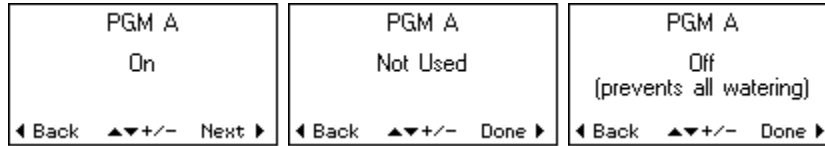
If the reported status does not agree with the manual operation of the host irrigation check the wiring.

Program Settings

There are a series of screens to prompt you through the program settings for each program. The first irrigation setup screen gives you three options:

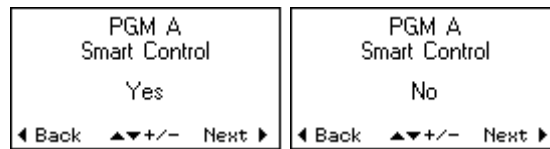
- **On** – Yes, this program is being used.
- **Not Used** – Select this option if there is no Program Start Sensor connected at the corresponding terminal.

- **Off (prevents all watering)** – This option will not allow watering of the program. If a program start is sensed the Controller Link will interrupt the valve common to prevent watering.

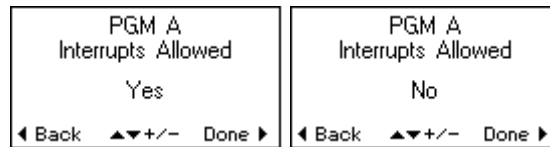


If you have selected “Not Used” or “Off” press ► Done. There are no other settings needed for the program.

If the program is on, the next screen gives you two Smart Control options:

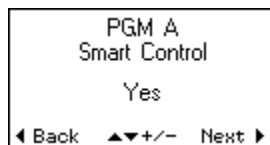


- **Yes** – With Smart Control set to “Yes” the Controller link will automatically manage the irrigation schedule.
- **No** – When Smart Control is set to “No”, the program in the host irrigation controller will water as scheduled.
- With Smart Control is set to “No”, there is one more option to be set. The Controller Link may interrupt watering based on weather Interrupt settings or high-flow conditions (see Weather Interrupts and Flow Sensor setup). When you press Next ► choose to Allow or Not Allow the Controller Link to interrupt watering if an Interrupt condition occurs.



The remainder of this section explains the setup when Smart Control has been turned On. Remember these settings are program specific; each program needs to be programmed.

Press Next ► from the Smart Control On screen.



Each program in the Controller Link needs 4 settings to manage the irrigation schedule:

- **Number of Program Cycle Starts** – How many start times are programmed in the host irrigation controller?
- **Irrigation Amount per Cycle Start** – An irrigation system applies water to the landscape. The Controller Link needs to know the amount, in inches (mm) of water applied to the landscape when a cycle runs.
- **Landscape Adjustment** - The evaporation (ET) calculation is based on a reference condition. Plant type, exposure, or other conditions may affect the rate of evaporation. Landscape Adjustment is a percentage applied to ET when it is deducted from the Moisture Level.

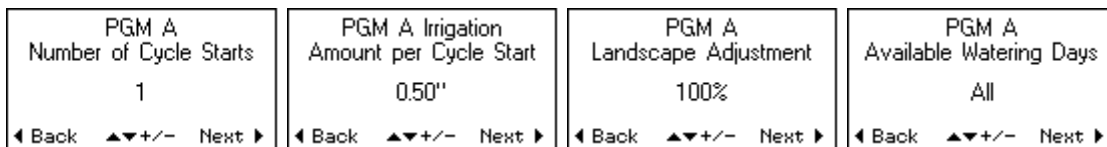
Note: The ET formula calculates the potential for evaporation and transpiration. In most cases the actual ET rate will be less. So using the Landscape Adjustment is a common method to fine tune your settings. Typical Landscape Adjustment settings will range from 60% to 90%.

- **Available Watering Days** – The Controller Link will work best when it can choose the water day. But watering restrictions, facility use, maintenance schedules, and/or hydraulic limitations may limit the available days.

Note: The Controller Link Look-Ahead feature considers the Available Watering Days to decide when to water.

The settings may be entered using one of two methods:

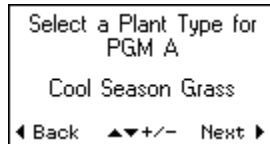
- **Peak Season Estimator** – If you are unsure of the settings, the Peak Season Estimator will recommend settings based on information you enter about the project. In this process you and the Controller Link are both making assumptions. The resulting settings will be displayed in a summary. Before finishing the program settings you may edit any of the estimated settings.
- **User Defined** – There is a screen for each of the four settings:



Peak Season Estimator

This section offers a detailed explanation of the information that needs to be entered when using the Peak Season Estimator.

Step 1. Select a Plant Type for the Program



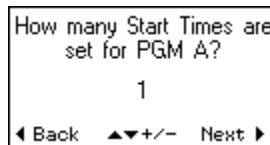
Ideally the irrigation system should have been designed and installed to group plants by program. For example program A would control turf valves and program B could water shrub areas. The type of plant affects the Landscape Adjustment. The default Landscape Adjustment percentages are show in Table 3.

Plant Type	Landscape Adjustment
Cool Season Grass	80%
Warm Season Grass	70%
Flowers	90%
Trees	50%
Shrubs	60%
Low Water Use Plants	40%

Table 3. Landscape Adjustment by Plant Type

These values are based on general averages and may be edited to meet site specific requirements.

Step 2. How many Start Times are set for Program X?



Check settings in the host irrigation controller. Determine the number of start times that have been set for the corresponding program. The Controller Link supports up to 8 start times programmed in the host irrigation controller.

Step 3. How many days per week is watering needed in the hottest month for Program X?

How many days per week
is watering needed in the
hottest month for PGM A?
3.0
◀ Back ▲▼ +/- Next ▶

Enter the number of days you have been watering in the peak of the season. It is fairly common for an irrigation schedule to accurately meet the plant water requirement during the peak of the season. If this is the case how many days per week is the landscape watered during the peak of the season? For example you water every-other-day in the hottest month, then you water 3.5 days per week.

The Peak Season Estimator will consider Historical ET (this was set when the weather station was selected), Plant Type, number of Cycle Start Times, and the Peak Season Frequency to estimate the Irrigation Amount per Cycle Start.

For example:

Historical ET: 0.28”

Plant Type: Cool Season Grass (80% Landscape Adjustment)

Number of Cycle Start Times: 2

Peak Season Frequency: 3.5 (every other day)

$0.28 \times 0.80 \times 7(\text{days per week}) / 2 / 3.5 = 0.22$ ” of water applied per cycle start

Step 4. Available Watering Days

The Controller Link picks the right day to water. Local watering restrictions, scheduled maintenance or events that require no irrigation on specific days, are not available for watering. Enter the days when irrigation can occur. In each program you may select any of the following options:

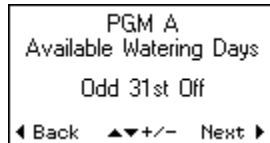
- **All** – The Controller Link can water on any day. This is the preferred method.

PGM A
Available Watering Days
All
◀ Back ▲▼ +/- Next ▶

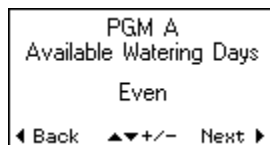
- **Odd** – Watering will start on odd days if needed.



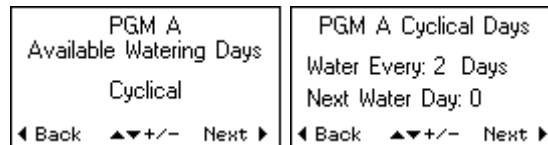
- **Odd 31st off** – This the same as Odd, but it would not allow watering to start on those months with 31 days.



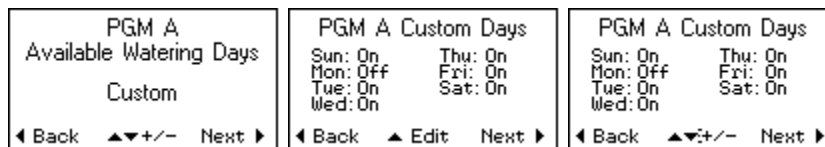
- **Even** – Watering will start on even days if needed.



- **Cyclical** – Available days are limited to water every X days with the next water day in X days.



- **Custom** – Select the days in the week watering could occur. After you select Custom by pressing Next ▶, press the up arrow ▲ to edit the Day to On or Off. In the Edit mode the Next ▶ advances through the days. Use up ▲ or down ▼ to toggle between On and Off.



- **Restricted Watering** – You may set up to three windows of time when no watering cycles may start. There are two steps to programming a Restricted Window:

1. Set the day and hour when the restricted window starts.
2. Set length, in hours, of the restricted window.

PGM A Available Watering Days Restricted Watering ◀ Back ▲▼+/- Next ▶	Restricted Window 1 Start : Fri 6:00 pm Length : 18 hour(s) End : Sat 12:00 pm ◀ Back ▲▼+/- Done ▶
--	--

Note: Irrigation controllers typically define a “day” as midnight to midnight. So when the goal is: “don’t water Friday night”, this typically means don’t water Friday night and Saturday morning. Restricted Windows allow you to set a period of time when cycle starts are not allowed. A Restricted Window period has a beginning day and time as well as a length, in hours.

Remember, set the host irrigation controller to water every day. The Controller Link picks the right day to water and may not water on every Available day.

Set the irrigation controller to water every day. The Controller Link will determine the best days to water respecting programmed off days.

◀ Back Next ▶

Advanced Option: Watering schedules on some projects may need to be split over two days; typically Odd and Even day programming is used. If this is the case the following approach is recommended:

- Host Controller Water Day settings:
 - Program X = Odd Days
 - Program Y = Even Days
- Controller Link Available Days settings:
 - Program X = Odd Days
 - Program Y = Even Days

Note: This is the only recommended exception to not programming the host controller to water every day.

Step 5. Review Settings

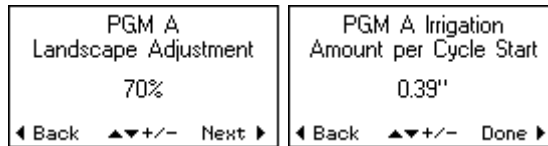
The next screen displays a summary of the estimated settings.

- Landscape Adjustment
- Cycle Starts
- Irrigation per Start
- Total Irrigation Amount

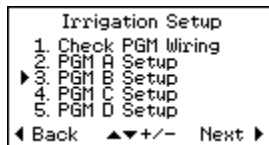
Review the settings.



If you feel any value needs to be changed, press the up arrow ▲ to adjust the settings. The adjust option allows you to go screen by screen to edit these settings.



When you press Done ► from the Review Settings screen repeat the steps for each program.

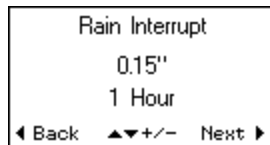


5. Weather Interrupts

Your Controller Link receives current weather information from the local weather station and rain source. The Controller Link can be programmed to interrupt watering in the event an adverse weather condition occurs. There are four “Sensor Interrupt” conditions that may be programmed:

- **Rain**

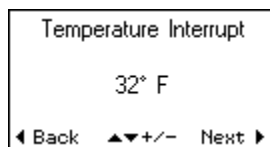
- **1-Hour** – The Controller Link will look at rainfall for the last hour. If rain accumulations reach the programmed Rain 1-Hour Interrupt setting, watering is interrupted. The Interrupt is cancelled once the total rainfall in the last hour drops below the Rain 1-Hour setting. This Interrupt will prevent watering temporarily when rainfall is received.



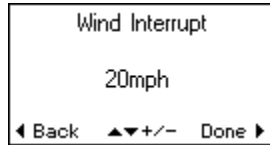
- **24-Hour** – Like the 1-Hour rain Interrupt the Controller Link will look at rainfall for the last 24 hours. If rain accumulations reach the programmed Rain 24-Hour Interrupt setting, watering is interrupted. The Interrupt is cancelled once the total rainfall in the last 24 hours drops below the Rain 24-Hour setting. This Interrupt will prevent watering when rainfall is received.



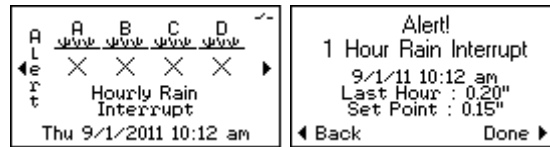
- **Low Air Temperature** – If air temperatures, received by the Controller Link, reach the temperature Interrupt setting, watering is interrupted. The Interrupt is cancelled when the Controller Link receives a temperature value above the programmed Interrupt setting. Typically this Interrupt is used to prevent watering during freezing conditions.



- High Wind** – If wind speeds received by the Controller Link reach the wind Interrupt setting, watering is interrupted. The Interrupt is cancelled when the Controller Link receives wind speed values below the programmed wind Interrupt setting. This Interrupt will prevent watering during high wind conditions.



Note: If a Weather Interrupt occurs, the cause of the Interrupt is displayed on the Home screen. Details can be seen by pressing the ◀ left arrow to view the Alert.



The date, time and cause of the last Interrupt are also recorded in the Information Log.



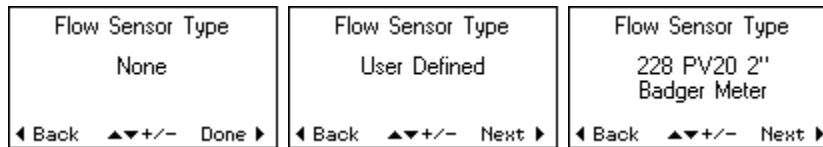
Note: Due to Metric to English unit conversions, weather Interrupts may not occur when the reported conditions match weather Interrupt settings. For example, a temperature Interrupt may be set at 30° F and the current temperature displays 30° F, but the actual temperature may be 30.5° F. In this case, once the temperature drops below 30° F, the weather Interrupt will occur.

6. Flow Sensor

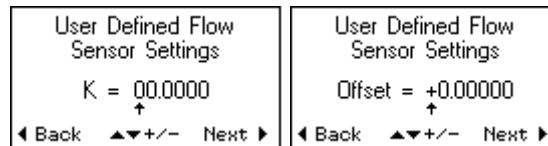
Measurements from a flow sensor may be read and logged by a Controller Link. In addition, irrigation may be interrupted in the event of a high-flow condition. A flow sensor is not required; it is an optional feature.

Step 1. Flow Sensor Type

If a flow sensor is connected, the first choice on the Flow Sensor setup is to tell the Controller Link the type of flow sensor. Select: None, User Defined or the type of sensor from the predefined list. (See Installation chapter for supported sensors pg 10)

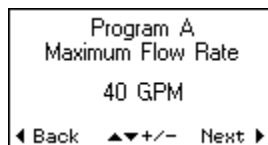


A User Defined flow sensor selection requires you to enter the K and Offset values. (These values are preset when you select a flow sensor by model number). Flow sensor manufacturers publish these settings. Use the up ▲ and down ▼ arrow buttons to edit the value and Next ► to advance to the next field.



Step 2. Maximum Flow Rate

The Controller Link monitors the flow rate in gallons per minute. Set the maximum expected flow rate for: 1) each program, 2) an Override condition (Allow Manual Irrigation) and 3) unexpected flow (this is all other times when the Controller Link is not managing irrigation).



(The beginning value for each flow rate is the maximum of 6000 GPM or 1363 m³/hr. Press the up ▲ arrow to start from the lowest maximum flow rate of 2 GPM (0.5 m³/hr))

Step 3. High-Flow Settling Time

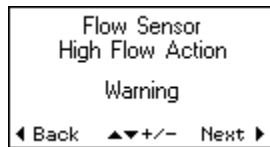
Enter the number of minutes of a high-flow condition before the Controller Link should react to the condition. Flow rates change as empty pipes are filled. Pressure fluctuations will also affect flow rates. This setting will cause the Controller Link to wait this period of time to confirm the high-flow condition. Typically larger pipe lines needs a longer settling time.



Step 4. High-Flow Action

If the Controller Link detects a flow rate that exceeds the maximum flow rate for at least the high-flow settling time then it can take one of two actions:

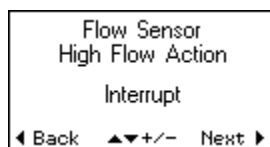
- **Warning** – An Alert message will be displayed indicating there was a high-flow condition, the date and time it occurred, the program that was running and the detected flow rate.



This is an example of a High-Flow Warning:



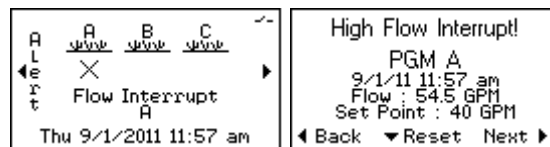
- **Interrupt** – Controller Link will interrupt watering by opening the valve common circuit. An Alert message will be displayed indicating there was a high-flow Interrupt. The date and time the interrupt occurred, the program that was running and the detected flow rate is also displayed. A high-flow Interrupt will also be recorded in the Interrupt Log.



Step 5. High Flow Reset

After a high flow condition has occurred there are two reset options:

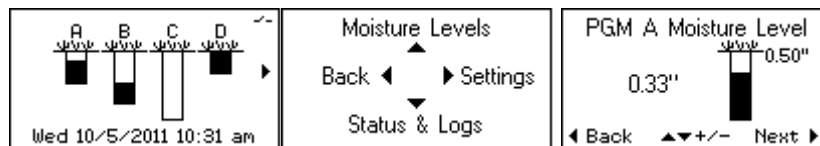
- **Automatic** – The Automatic Reset will wait 23 hours before allowing the program to water again.
- **Manual** – A manual reset will not allow the program to water again until the user manually presses the Reset ▼ on the Alert detail screen.



Last Step

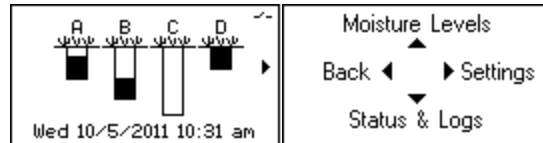
Once the settings are entered the Controller Link is ready to manage the irrigation schedule. Set the host irrigation controller as explained and set it to automatic.

The initial Moisture Level for each program is 0 so watering will occur on the next start cycle of an available day. Review the current Moisture Level for each program and change the level if needed to reflect the current soil moisture conditions. From the Home screen press the ► right arrow button to get the first menu. Then press ▲ up to select Moisture Levels. Review the current level and edit if necessary by using the up + ▲ or down – ▼ arrow buttons. Press Next ► to advance to the next program.

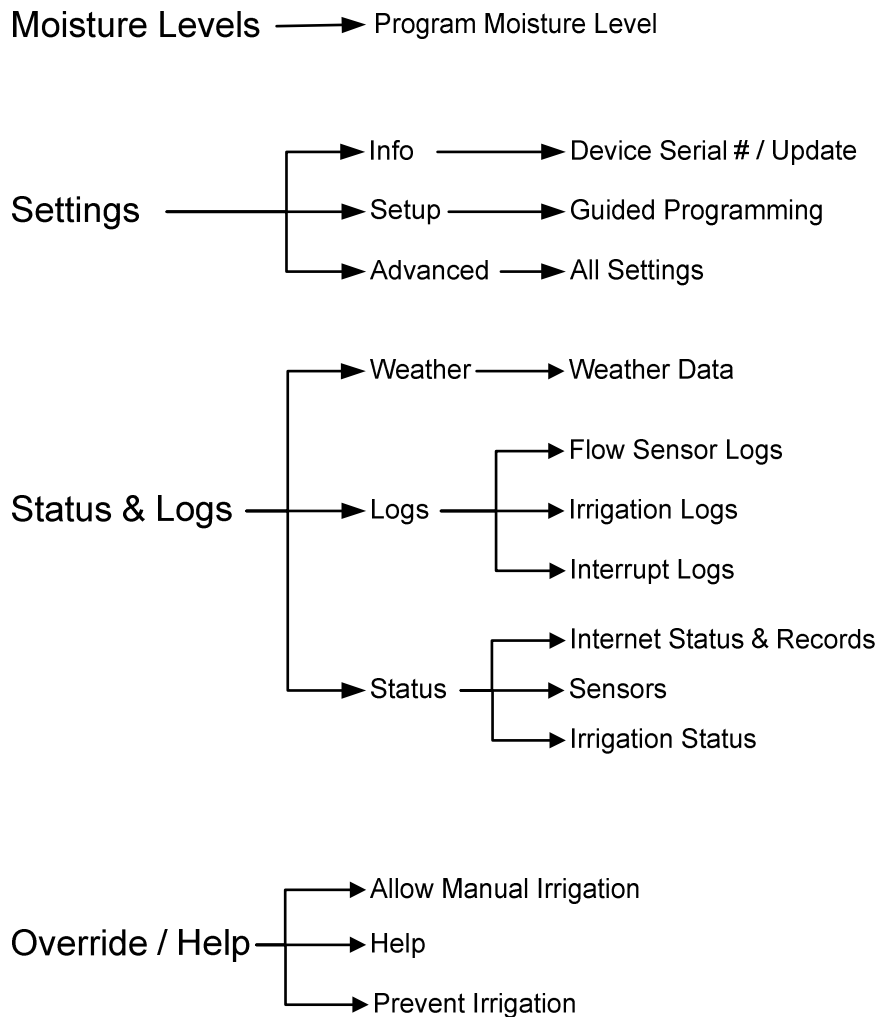


Menu Details

This chapter provides a detailed explanation of all screens that can be viewed through the menus. From the Home screen press the ► right arrow button to view the main menu.

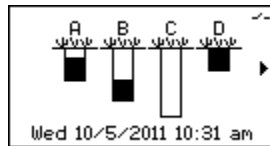


This diagram provides an overview of the options within the menu tree. This chapter is divided into these four main areas.



Moisture Levels

Moisture Levels express the current balance of the ongoing water balance calculation. Rain and irrigation increase the Moisture Level. Evaporation (ET) depletes water from the Moisture Level. The Moisture Level is an estimate of moisture in the plant’s root zone.

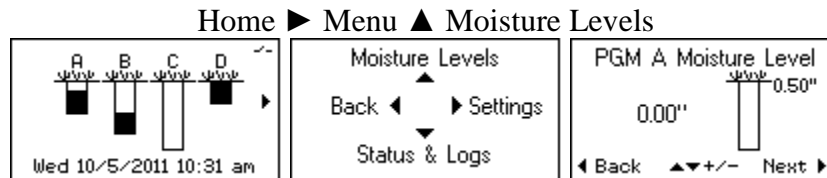


The Moisture Level graphic represents soil moisture content between Field Capacity and Allowed Depletion. This range is based on the Total Irrigation Amount. The objective of effective water management is to wait until water from the last watering cycle has evaporated before watering again. If it rains, this moisture is accounted for and the Controller Link waits for the rainfall to evaporate before watering again.

Watering is Enabled when the Moisture Level reaches “0”. If this happens early in the day, the Controller Link will continue to recognize soil moisture depletion beyond Allowed Depletion. Watering will occur at the next programmed start. When the system waters, the Irrigation Amount will be added to the Moisture Level. If watering does not occur, the Moisture Level will continue to drop; the minimum limit is equal to the Irrigation Amount. This lower limit is referred to as Wilt Point.

In a heavy rain the Saturation Allowance setting allows the Moisture Level to go above the Total Irrigation Amount. The default setting for Saturation Allowance is 50% of the Total Irrigation Amount.

The Home screen depicts the current Moisture Level. The Moisture Level may be edited and seen in more detail on the Moisture Level screen.



The program Moisture Level screen displays the current Moisture Level and a graphic representation of the current Moisture Level. The Total Irrigation Amount is also displayed. The Total Irrigation Amount sets the Moisture Level “capacity”.

You may use the up + ▲ or down – ▼ arrow button to change the current level. When the Moisture Level is at 0 the program is ready to water. Increasing the Moisture Level will delay the next irrigation.

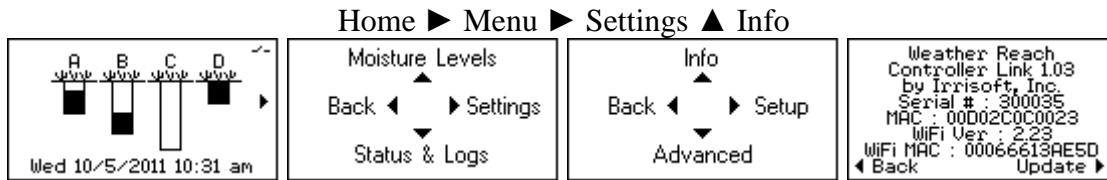
Press Next ► to advance to the next program. The Moisture Level detail is displayed for all 4 programs; A B C D.

Settings

There are three options in the Settings submenu:

- Info
- Setup – See chapter: “Programming - Guided Setup” (pg 14)
- Advanced

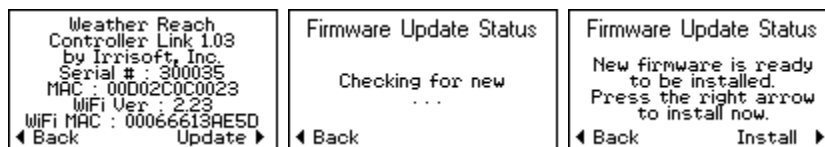
Info



The Info screen has important reference information:

- Firmware version #
- Serial Number
- MAC Address
- Wi-Fi Firmware version #
- Wi-Fi MAC Address

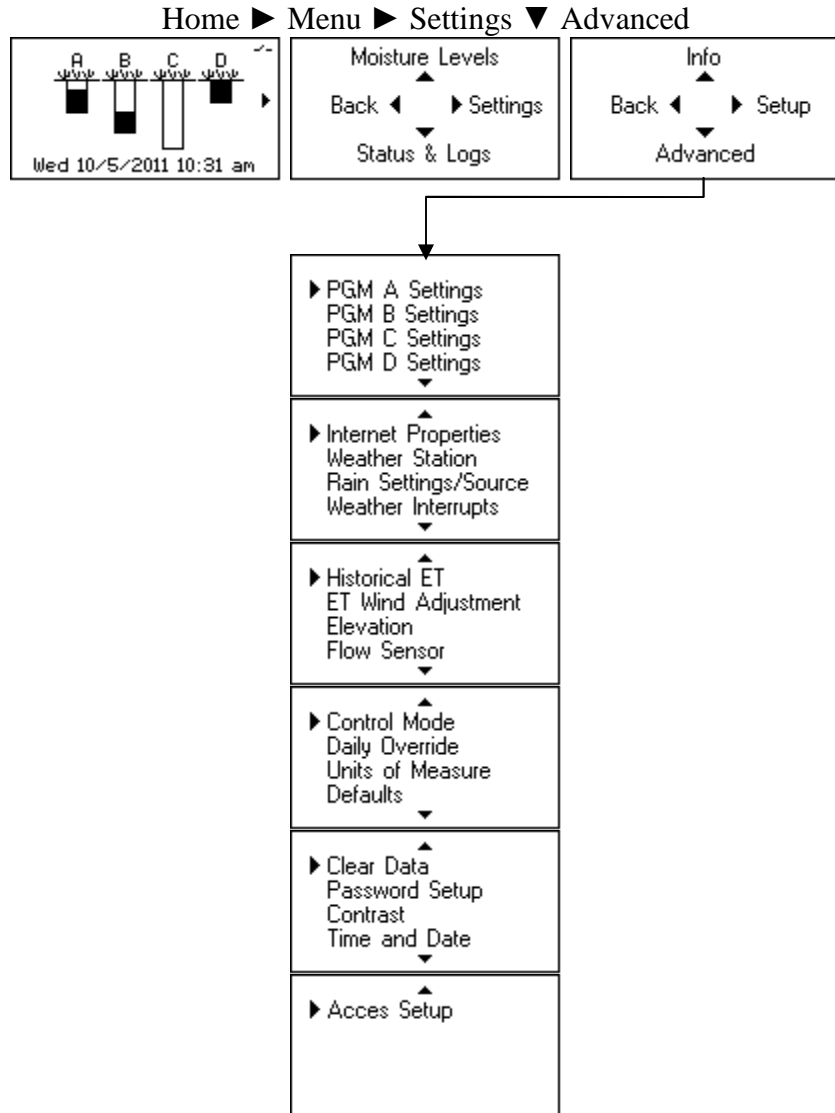
There is also an option for you to update the firmware. Press Update ► to have the Controller Link communicate with the Weather Reach Server. If a new version is available, the download process will start. The download will come in 4 sections. Once the download is complete you are prompted to Install ► the update. The update process takes less than a minute. Do NOT interrupt power to the Controller Link during the update process. Once installed, the Controller Link will resume normal operation.



Setup

The “Programming - Guided Setup” chapter covers this area. (pg 14)

Advanced



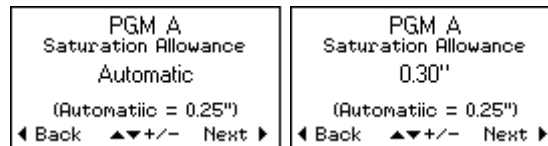
The Advanced Menu contains a list of all the settings. Scroll through the list using the up ▼ or down ▼ button. With the cursor ▶ on the selected feature press the ▶ right arrow to select and edit the setting.

Program (A B C D) Settings

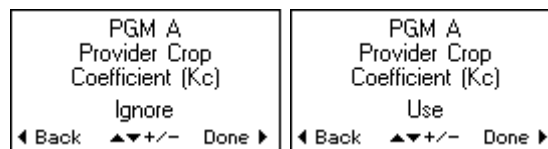
The settings here are the same as the guided setup. However there are several of advanced settings you may access in here.

- Saturation Allowance** – When it rains, the Controller Link will allow the Moisture Level to exceed Field Capacity, but only to the Saturation Allowance limit. The setting is based on the principle that irrigation should replenish soil moisture to Field Capacity, but heavy rain may saturate the soil. Water held in the soil will evaporate and be used by the plant so it should be accounted for in the Moisture Balance. When heavy rain exceeds the saturation limit of the soil water will either run-off the soil or percolate below the plant roots.

The Saturation Allowance setting defaults as an automated value of 50% of the Total Irrigation Amount. If you want to edit the value use the up ▲ button to change the Saturation Allowance Setting.



- Provider Crop Coefficient (Kc)** – As part of the service they provide, a Weather Reach Service Provider (WRSP) may include with the weather data a seasonal Crop Coefficient (Kc) value. Check with your WRSP regarding this service. You have the choice to set the Controller Link to either Use or Ignore (default) the Provider Crop Coefficient (Kc) when ET is deducted from the Moisture Balance.



Internet Properties

The Internet Properties are described in the “Programming - Guided Setup” chapter (pg 15). But there are one advanced Wi-Fi settings that may need to be set.

- **Wi-Fi Antenna** – The default setting is Internal antenna. If an external antenna has been installed, the setting needs to be changed.

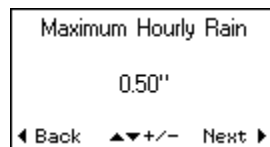


Note: Contact Irrisoft for external antenna options.

Rain Settings / Source

The Rain Source settings are described in the “Programming - Guided Setup” chapter (pg 18). But there is one advanced setting you may want to change.

- **Maximum Hourly Rain** – The default setting is 0.50” per hour. This setting limits the amount of rain added each hour to the Moisture Balance. For example, with a 0.50” Maximum Hourly Rain rate setting, if 0.75” of rain fell in an hour only 0.50” would be added in the Moisture Level. But if the same 0.75” storm fell over 2 hours, all the rain would be added to the Moisture Level.



The rain source may also be changed on the Next screen.

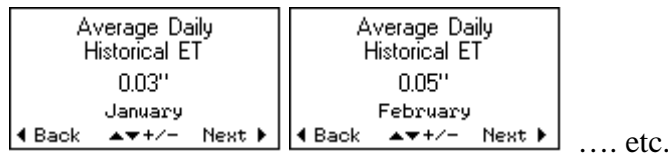
Weather Interrupts

Weather Interrupts are the same as described in “Programming - Guided Setup.” (pg 28)

Historical ET

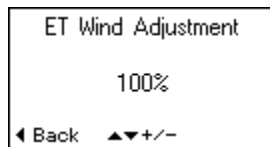
Monthly historical ET values are used as a backup when no data is available. And the Peak Season Estimator looks for the month with the highest daily average ET to estimate the Irrigation Amount.

When a weather station is selected, the monthly historical ET values are automatically set in your Controller Link. The values are provided by your Weather Reach Service Provider. You may edit the Historical ET values for each month on these screens.



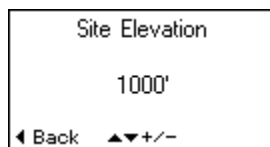
ET Wind Adjustment

The wind speed measurement included in the weather data can be scaled by a percentage to compensate for variations in prevailing conditions.



Elevation

When a weather station is selected, the elevation at the weather station is automatically set in your Controller Link. If your site has a different elevation, change the setting on the screen. The Elevation setting is needed to calculate ET.



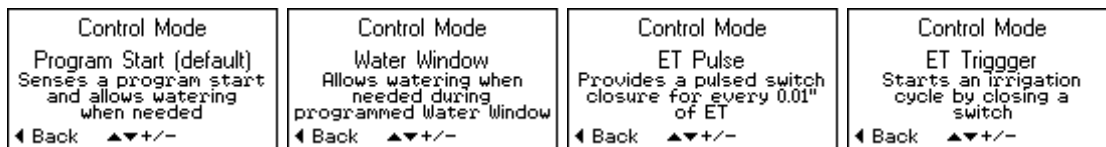
Flow Sensor

The flow sensor setup is the same as described in the “Programming - Guided Setup” chapter (pg 30).

Control Mode

The Controller Link supports four control modes:

- **Program Start** – This is the default mode used most frequently and the Operating Guide assumes this mode. If another mode is used, see the Control Mode chapter (pg 65).
- **Water Window** – Instead of using the Program Start Sensor input, the Controller Link can manage the four programs within separate time periods. For more detail see the Control Mode chapter (Pg 65).
- **ET Pulse** – The Controller Link can send an ET Pulse to compatible irrigation controllers with an ET Pulse input. For more detail see the Control Mode chapter (pg 67).
- **ET Trigger** – The Controller Link can trigger an irrigation cycle by closing the control relay. Advanced irrigation controllers may accept this input to start a watering cycle. For more detail see the Control Mode chapter (pg 69).

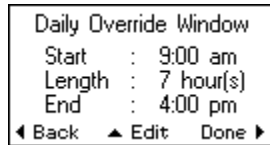


Daily Override Window

In normal operation the Controller Link will only allow watering when needed. Daily Override allows you to set a period of time when watering is Enabled (not interrupting the valve common). This feature is often used to allow manual watering during the day when the sprinkler system is being tested.

Press the up ▲ button to edit the settings then press the +/- ▲ ▼ buttons to set the time then ► Next to advance to the next setting:

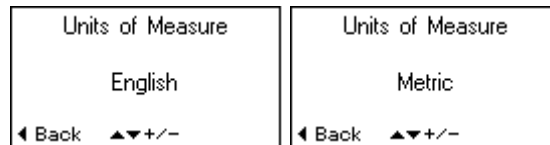
1. **Start:** Define a time when watering is allowed.
2. **Length:** The number of hours watering should be Enabled.
3. **End:** The end time is automatically calculated based on the start and length.



In this example, every day at 9:00 am the Controller Link will enable watering. The valve common will remain Enabled for 7 hours, until 4:00 PM.

Units of Measure

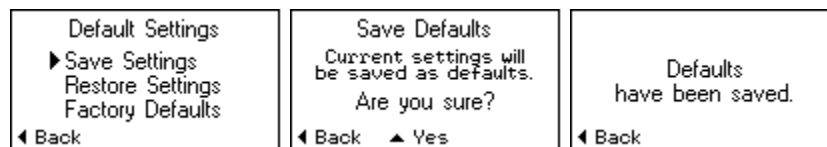
The Controller Link supports either English or Metric units.



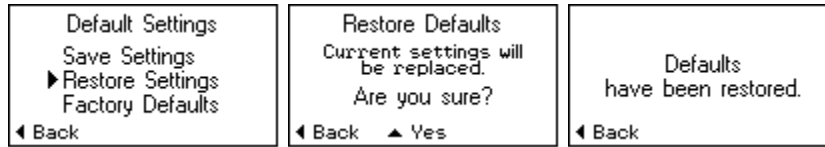
Defaults

There are three tools you may use to save or restore default settings.

- **Save Settings** – The current settings will be saved as your Defaults. After pressing the ► right arrow button you will be asked to confirm this step by pressing the ▲ up arrow if you are sure.

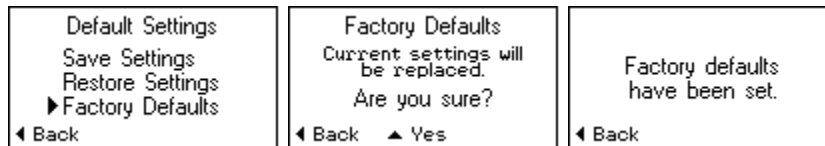


- **Restore Defaults** – If you have saved your settings, and someone changes them, you can restore the previously saved settings. After pressing the ► right arrow button you will be asked to confirm this step by pressing the ▲ up arrow if you are sure?



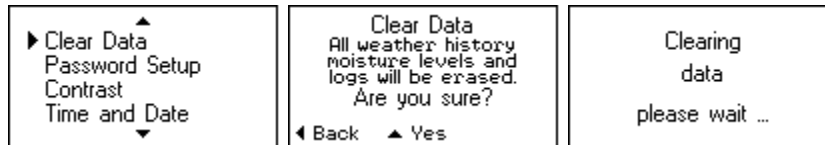
Note: If you have not previously saved your settings, this step will restore original factory default settings.

- **Factory Defaults** – This will erase all settings and set them back to original factory settings. After pressing the ► right arrow button you will be asked to confirm this step by pressing the ▲ up arrow if you are sure?



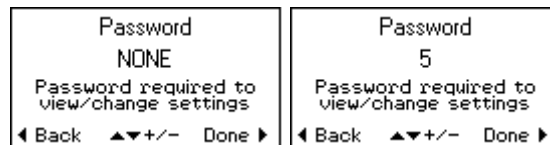
Clear Data

This option will delete all Logs, records, weather history and set the Moisture Levels to 0. Settings are NOT affected by this command. After pressing the ► right arrow button you will be asked to confirm this step by pressing the ▲ up arrow if you are sure.

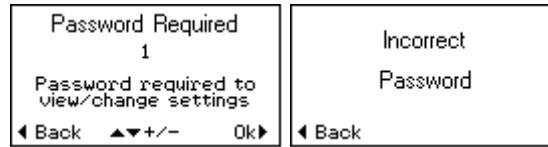


Password Setup

To restrict access to setting screens, a password may be set. Select a numeric value between 1 and 255. To set a password, press the ► right arrow button, then use the up + ▲ or down – ▼ arrow buttons to set the number. When finished press Done ►.

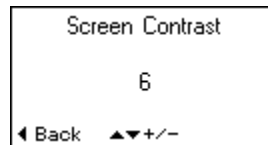


Once a password is set a user will be required to enter this number to access the settings screens.



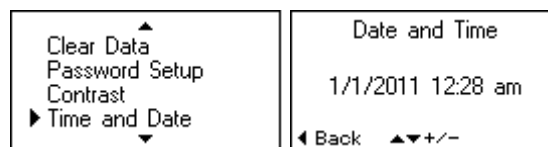
Contrast

Temperature conditions may affect the display contrast. To change the LCD contrast press the ► right arrow button, then press up + ▲ or down – ▼ arrow button buttons to adjust the contrast. The values range from 1 to 9.



Time and Date

The Controller Link will get the current date and time from the Weather Reach data server. The date and time will be based on the time zone of the selected weather station. If you choose to NOT select a weather station you will need to manually enter Historical ET values for each month; the Controller Link will operate based on historical ET conditions. In this case an on-site rain gauge should be used. If this is the setup condition, you will need to manually set the date and time. Press ► the right arrow to select time and date. Then use the +/- ▲ ▼ buttons to set the date and time.



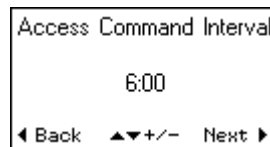
Note: By holding up or down arrow button rapid scrolling will advance from minutes to hours, then days.

Access Setup

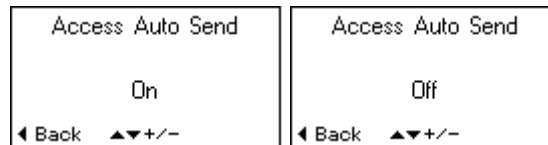
Irrisoft, Inc. offers an optional Weather Reach Access service to enable you to use an Internet browser to see your Controller Link status, Logs and settings. Changes to settings and status may also be made through the Internet. The Controller Link connects to the Weather Reach Access Server to send information and respond to commands to make a change.

There are two setup steps to use the Weather Reach Access Service:

1. Set the Controller Link to communicate with the Weather Reach Access Server.
 - a. **Access Command Interval** – Set the frequency the Controller Link connects with the Weather Reach Access Server to send information and respond to commands. The time range is every 5 minutes to once every 7 days.



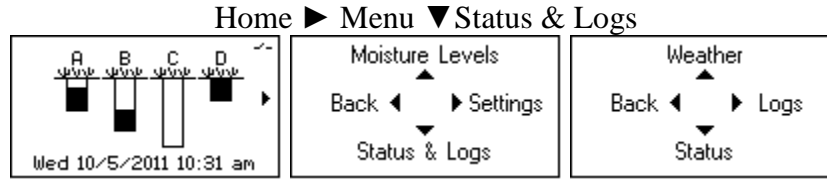
- b. **Access Auto Send** –
 - **On** – Information is sent to the Weather Reach Access Server.
 - **Off** – No information is sent to the Weather Reach Access Server



2. Setup an account with Irrisoft, Inc.
 - a. Call Irrisoft at: 435-755-0400
 - b. Email: support@irrisoft.net
 - c. Website: www.weatherreach.com

Note: The Internet address of the Weather Reach Access Server is embedded in the Controller Link. No special network requirements are needed. Controller Link uses HTTP protocol (port 80) to communicate with Weather Reach Servers.

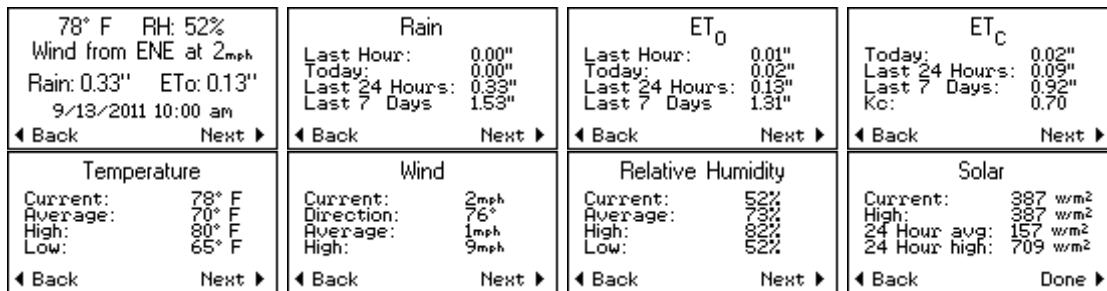
Status & Logs



There are three options on the Status & Logs menu screen:

- **Weather** – Current weather conditions of the selected weather source. (pg 45)
- **Logs** – Report of irrigation, Interrupt and flow logs. (pg 46)
- **Status** – Report of irrigation, sensor and Internet status (pg 49)

Weather

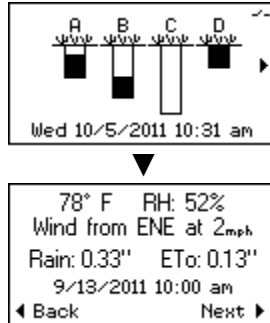


The first weather screen provides a summary of conditions last reported by the weather station. The date and time of the last observation is shown on the screen. By pressing ► Next you may advance through detailed information about each weather condition.

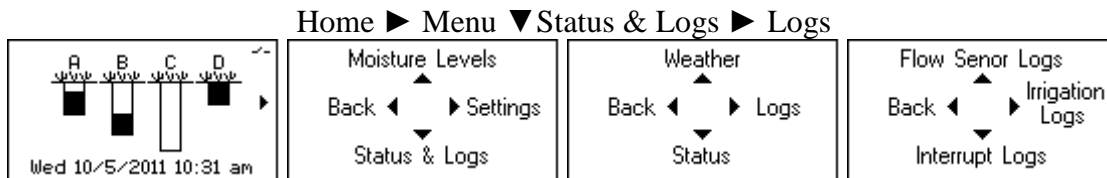
The Rain and ET screens report the last hour, today (since midnight), last 24 hours and last 7 days of history. Your Weather Reach Service Provider may include a Crop Coefficient (K_c) in the data. $ET_c = ET_o \times K_c$

Temperature, wind, relative humidity and solar radiation provide current, average, high and low conditions since midnight.

Note: There is a shortcut to access the weather screens from the Home screen. With the Home screen displayed press the ▼ down arrow button.



Logs



Logs are divided into three areas:

- Flow Sensor Logs (pg 46)
- Irrigation Logs (pg 48)
- Interrupt Logs (pg 49)

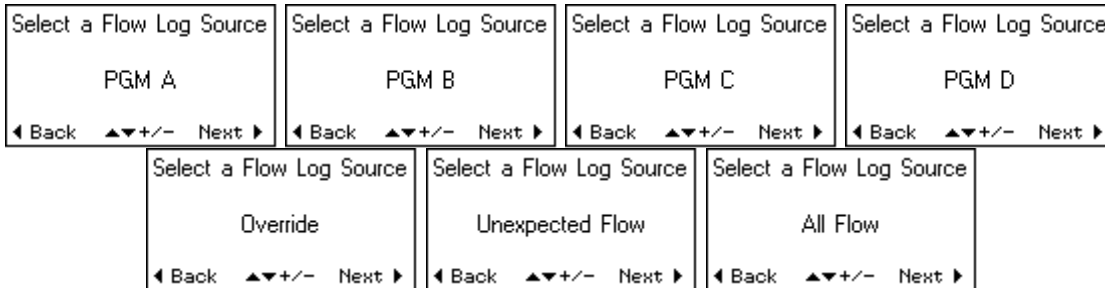
Each of these is described in more detail:

Flow Sensor Logs

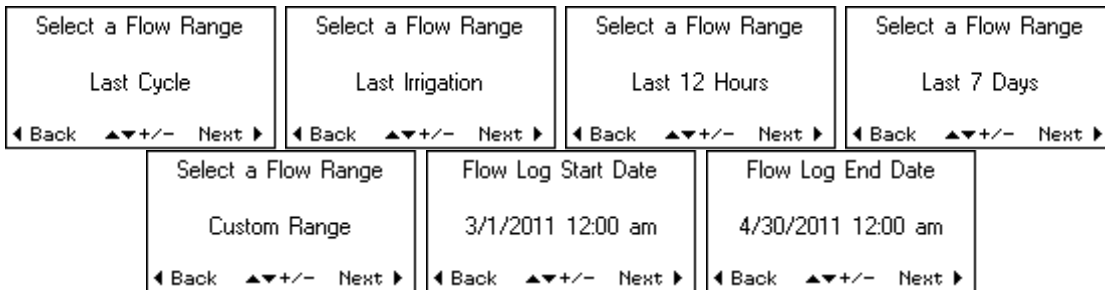
When a flow sensor has been installed, detailed records are kept of sensor measurements. When flow is recorded, the Controller Link knows what program is running and it records the time, flow rate and total gallons. When viewing the log the records are filtered based on two questions:

1. **Flow Log Source** – The options are:
 - a. **Program A, B, C, or D**
 - b. **Override** – Flow that occurred while the Controller Link was in an Override condition

- c. **Unexpected Flow** – Flow that is logged which did not occur while a program was running or during an Override.
- d. **All** – Includes all flow.

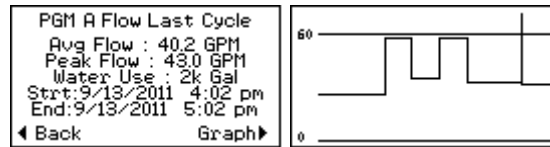


2. **Select a Flow Range** - What time period? There are several options:
 - a. **Last Cycle** – of the selected program.
 - b. **Last Irrigation** – Includes the last group of starts of the program
 - c. **Last hour, 6, 12, 24, 48 hours.**
 - d. **Last 7 or 14 days**
 - e. **Monthly** (since the beginning of the current month)
 - f. **Custom Range** – You must enter the Flow Log Start Date & Time then the Flow Log End Date & Time.



Once the Flow Log Source and time range have been set, the resulting flow log is displayed. The log includes:

- **Flow Log Source and selected range.**
- **Avg Flow:** The average flow rate during the time period.
- **Peak Flow:** The high flow rate during the period.
- **Water Use:** Total water used during the period.
- **Start:** Beginning date & time of the selected range.
- **End:** Ending date & time of the selected range.



In addition, a flow graph may be viewed by pressing the ▶ right arrow button.

Irrigation Logs

There is an Irrigation Log for each program. The log reports:

- **Last:** The last date and time a watering cycle started.
- **Days Watered:** The number of days irrigation was Enabled. If there is more than one start time per day, the log reports each start as a fractional day. For example if three start times are programmed and the Controller Link only allows two of the three starts to run, .66 water days will be logged.
- **Total Water:** The total amount of water applied is recorded.
- **Total Time:** The length of time each program cycle runs is logged and accumulates in this log.
- **Since:** Each of these events is recorded since this date and time.

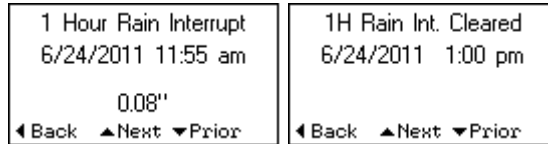
There are four other options on this screen:

- **Back** ◀ - Press the ◀ left arrow button to go back one screen.
- **Clr** ▲ - Press the ▲ up arrow to clear the log. This will also reset the Since date and time.
- **Graph** ▼ - Press the ▼ down arrow to view a graph of the Moisture Level over the last 7 days. With the flow graph displayed, press the up arrow to view the flow graph of the prior week.
- **Next** ▶ - Press the ▶ right arrow button to advance to the next program log.



Interrupt Logs

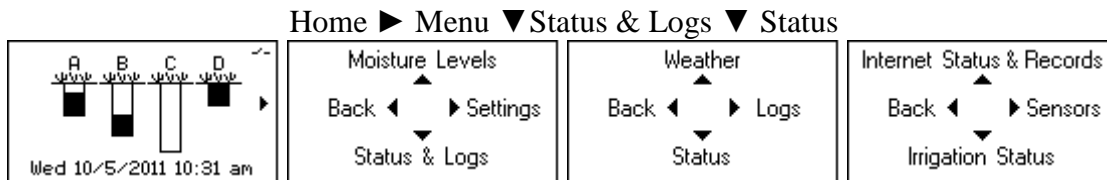
Irrigation may be interrupted when conditions reach the Interrupt setting limit. Interrupts are recorded and may be viewed in the Interrupt Log. Two screens display each Interrupt. When an interrupt occurs the date, time and cause is logged. When the interrupt is cleared, the time is also recorded.



There are several conditions that may trigger an Interrupt:

- **1-Hour Rain** – When rainfall in 1 hour reaches a limit watering is interrupted for 1 hour.
- **24-Hour Rain** – When rainfall over 24 hours reaches a limit watering is interrupted for 24 hours.
- **Low Temperature** – When the temperature drops below the set point watering is interrupted until the temperature rises above the set point.
- **High-Wind** – When the average wind speed exceeds the set point watering is interrupted until the average wind speed drops below the set point.
- **High-Flow** – When the flow rate exceeds the set point for the duration of the settling time and the action is set to Interrupt, watering will be interrupted until the reset condition is met; either a manual reset or after 23 hours.
- **User Interrupt** – If you use the Prevent Irrigation feature the Interrupt is logged.

Status

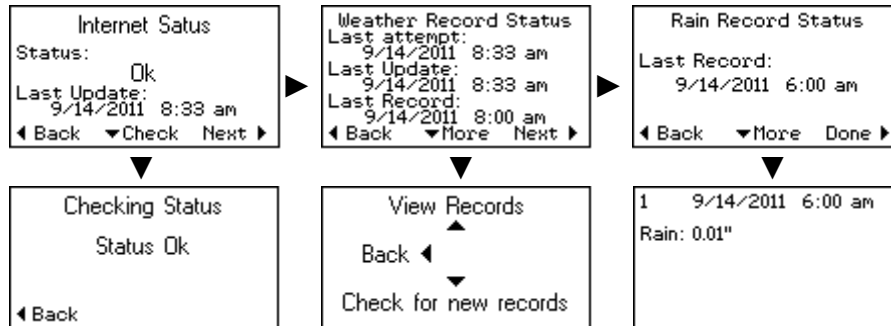


Status is divided into three areas:

- Internet Status & Records (pg 50)
- Sensors (pg 50)
- Irrigation Status (pg 51)

Internet Status & Records

These screens are provided for diagnostic purposes. If you suspect an issue with Internet access, the first screen provides a quick status report regarding your Internet connection. The remaining screens provide detail that may be helpful in troubleshooting communication problems with the Weather Reach data server.

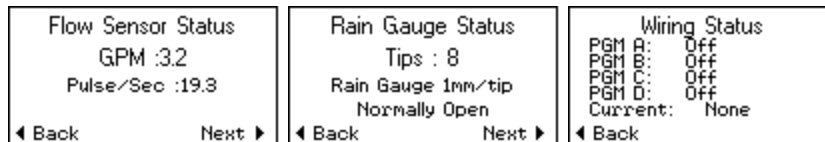


Possible Internet Status conditions are:

- OK
- Failure! No Ethernet Cable
- Waiting for Configuration
- Fail! Retries Exceeded – unable to connect to Weather Reach Data Server.
- Marginal – Check settings or router.
- Authorization Failure – Check Wi-Fi settings or router.

Sensors

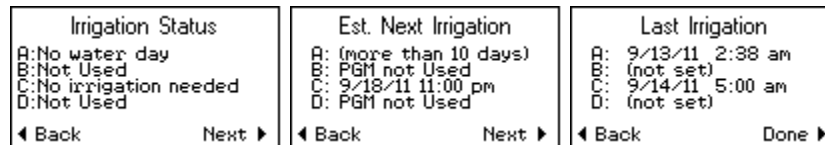
In addition to local weather data, the Controller Link uses on-site sensors to manage irrigation. The status of each sensor input can be reviewed:



- **Flow Sensor Status** – If a flow sensor has been configured this screen can be seen to report:
 - Current flow rate
 - Pulse / Second – A flow sensor sends a pulse. The pulse rate is converted to flow based on the K value and offset defined in the flow sensor setup.
- **Rain Gauge Status** – If a tipping rain gauge is connected and properly configured the status of the rain gauge is displayed.
 - Tips: The number of tips is displayed. The Controller Link converts a tip into a rainfall measurement based on the selected rain gauge, either 1mm per tip or 0.01” per tip.
 - Normally Open or Normally Closed – When the Controller Link is powered up it determines the type of switch in the rain gauge. The Controller Link will support either normally open or normally closed tipping bucket rain gauge.
- **Wiring Status** – This screen is also part of the guided setup described in the “Programming - Guided Setup” chapter (pg 19).

Irrigation Status

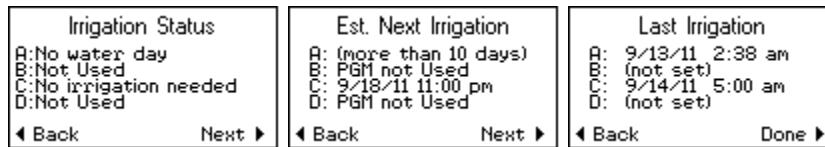
Three screens provide helpful information regarding irrigation management.



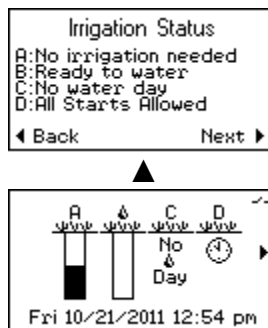
- **Irrigation Status** – These are the possible status conditions that may be displayed for each program:
 - **All Starts Allowed** – The watering schedule is NOT controlled by Controller Link. The Controller Link program is set to Smart Control = “No”. When Controller Link detects a program start, Controller Link will allow the program cycle to water. This mode is used when the irrigation schedule needs to run as programmed in the host controller and not be managed by the Controller Link.
 - **Daily Override** – When the Daily Override window opens, the Daily Override status message is displayed. During this period of time the valve common circuit is enabled to allow any irrigation by the host controller.

- **Interrupt** – Watering is interrupted. The Controller Link can interrupt watering if: 1) a programmed weather Interrupt condition occurs, 2) the flow rate detected by the flow sensor is too high, 3) the WRSP sends an Interrupt command, 4) a user has set the Controller Link to “Prevent” irrigation. The interrupt will be cancelled once the condition changes or the required time has elapsed. During an interrupt the valve common circuit will be open to prevent irrigation.
- **Manual Override** - Watering is Enabled because a user turned Allow Manual Irrigation - On. During this period of time the valve common circuit is enabled to allow any irrigation by the host controller.
- **No Irrigation Needed** – Next program start will NOT water. The program Moisture Level indicates there is enough remaining moisture, so there is no need to irrigate.
- **No Water Day** – The current day is not available for watering.
- **Not Used** – Program is set to Not Used. The Moisture Level is not displayed on the Home screen.
- **Off** – The program will not water. The program setting is set to - Off. When the Controller Link detects a program start the Controller Link will NOT allow the program cycle to water.
- **Ready to Water** – Next programmed start will water. When Controller Link detects a program start, it will allow the program cycle to water by enabling the valve common circuit.
- **Waiting for Group Start** – Multiple start times are grouped. This function is supported when multiple start times are programmed in the host controller. Controller Link optimizes watering by grouping cycle start times. When this message appears, watering is needed, but the Controller Link will enable watering at the optimum time.
- **Waiting for Next Start** – This message appears because there is more than one cycle start time, the first cycle has watered and Controller Link is waiting for the next cycle to start. Controller Link will allow the remaining cycles to water.

- **Waiting for Window** – Only used in Water Window Control Mode. This message is displayed when the program is ready to water but the Water Window has not opened.
- **Waiting to end PGM** – Waits for 15 minutes to confirm a cycle has finished.
- **Watering** – When watering is needed and a Program Start has been detected, the valve common circuit is enabled and the host controller can energize a valve. A current sensor in the Controller Link confirms a valve solenoid is being activated. When all these conditions are met the Controller Link reports the system is “watering.”
- **Estimated Next Irrigation** – The date and time of the next watering cycle is estimated based on the current Moisture Level, ET rate of the last 7 days, and user settings.
- **Last Irrigation** – The start date and time of the last irrigation cycle of each program is displayed on this screen.



Note: There is a shortcut to access the Status screens from the Home screen. With the Home screen displayed press the ▲ up arrow button.



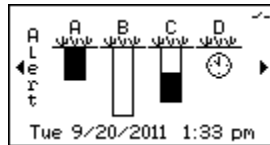
Operating Guide

Once your Controller Link is installed and programmed, it will manage the irrigation schedule based on the weather conditions and settings you have entered. Controller Link is one component within a system including; sprinkler heads, valves, wiring, sprinkler controller, Internet communications and weather data servers. The purpose of the system is to meet the water requirements of the landscape. The best indicator of the system is to watch the landscape. When you see a problem with the landscape, look for the root cause of the problem, then take what ever steps are needed to fix the problem.

You should also monitor the Controller Link Logs and respond to any Alert messages that may be displayed (see Alert Messages later in this chapter pg 59)


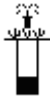


When reviewing the operating status there are several screens you may want to review.






Home Screen



The Home Screen displays a significant amount of information.

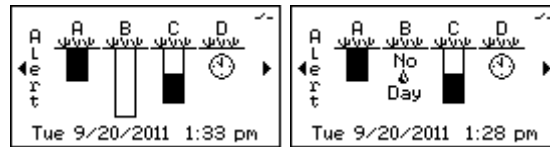
- Each program has a Moisture Level graphic.
- Current date and time.
- Possible Alert conditions.
- Various icons provide an indication of program status:

	Ready to Water
	Watering
	Program is OFF. Watering will be prevented,
	Moisture Level is full. Watering is not needed.

	Moisture Level is partially full. Watering is not needed yet.
	Smart Control is OFF. The sprinkler timer will water as programmed.
	No water day. The Available days setting does not allow watering today.
	Watering has been interrupted.
	The Valve Common circuit is open preventing watering.

Here are several examples of Home screen conditions and the meaning associated with the graphics:

Example 1

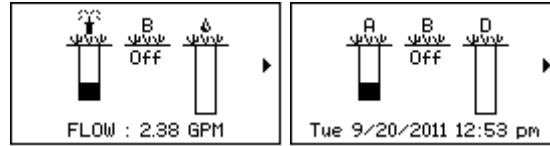


These two screens are alternating.

In the above example the following conditions exist:

- There is an Alert condition - Press the ◀ left arrow button to review the message and, if needed, take the steps that may be needed to correct the issue.
- The current date and time is displayed at the bottom of the screen.
- Program A Moisture Level is full.
- Program B Moisture Level is empty so watering is needed but Available water days are set to Odd days only. Today is an even day so the No Water Day message is toggling back and forth with the empty Moisture Level. Watering will occur tomorrow.
- Program C Moisture Level indicates the soil has adequate moisture, so no watering is needed.
- Program D has been set to No Smart Control so watering will occur based on the sprinkler timer settings.
- The icon in the upper right corner indicates the Valve Common circuit is open, interrupting any watering cycles.

Example 2

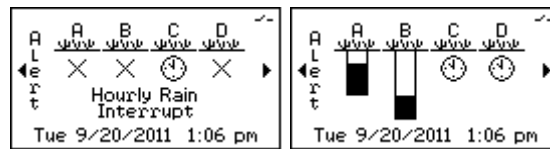


These two screens are alternating.

In the above example the following conditions exist:

- Program A is watering. Only a portion of the water requirement has been met, but there are several start times yet to run.
- The flow sensor is detecting flow. The flow rate and current date and time alternate at the bottom of the screen.
- Program B is set to Off. The Controller Link will prevent watering.
- Program C is set to Not Used. There is no status condition displayed.
- Program D is ready to water, waiting for the cycle to start.

Example 3



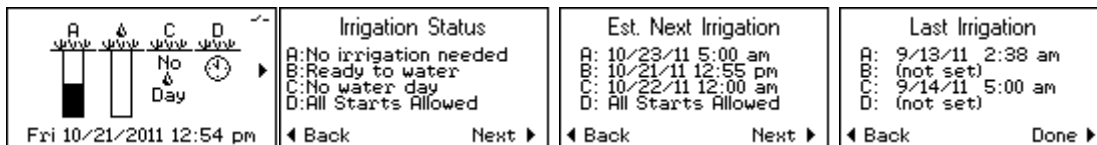
These two screens are alternating.

In the above example the following conditions exist:

- An Hourly Rain Interrupt has occurred preventing watering on program A B & D
- Program C is set to No Smart Control with No Interrupts allowed. Watering will occur based on the host controller settings.
- Program D is set to No Smart Control with Interrupts allowed, so the Hourly Rain Interrupt prevents any watering on program D.

Irrigation Status

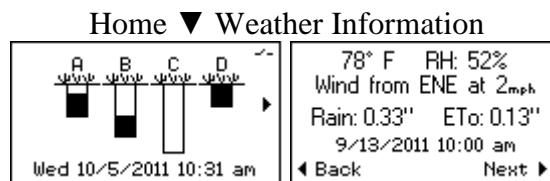
Home ▲ Status



There is a shortcut to the Irrigation Status screen. From the Home screen press the ▲ up arrow button. There is a series of three screens to provide information regarding irrigation management.

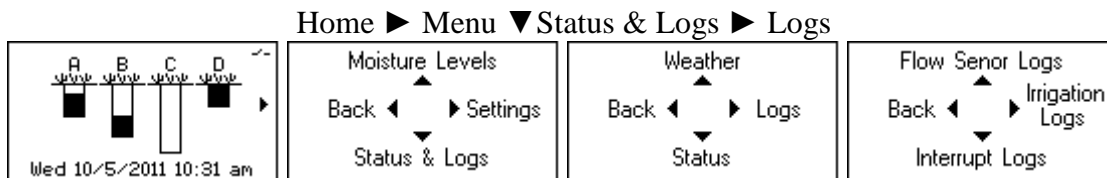
- **Irrigation Status** –The possible status conditions are listed in the Menu Details chapter (pg 51).
- **Estimated Next Irrigation** – The date and time of the next watering cycle is estimated based on the current Moisture Level, ET rate of the last 7 days and user settings.
- **Last Irrigation** – The start date and time of the last irrigation cycle or each program is displayed on this screen.

Weather Information



There is a shortcut to the Weather Information screen. From the Home screen press the ▼ down arrow button. The first Weather screen provides a summary of conditions last reported by the weather station. The date and time of the last observation is shown on the screen. By pressing ► Next you may advance through detailed information about each weather condition. More detail on the weather screens can be found in the Menu Detail chapter (pg 45).

Logs



Logs are divided into three areas:

- Flow Sensor Logs (pg 46)
- Irrigation Logs (pg 48)
- Interrupt Logs (pg 49)

Weather Reach Access

Your Controller Link is a smart irrigation control device. As a Controller Link receives weather data it will automatically manage your irrigation schedules. Internet communication gives Irrisoft, Inc. the opportunity to offer additional tools that may be of value to you.

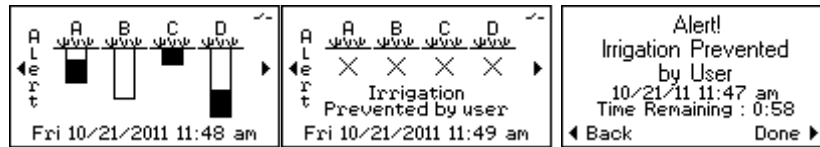
Weather Reach Access is a subscription service available through Irrisoft, Inc. An Internet browser and a Weather Reach Access account will allow you to view the activity of your Controller Link and make changes. Your Controller Link reports to the Weather Reach Access server and checks for changes. When you logon to your account you can view the information. You will have access to:

- **Controller Link Settings** – Some of these settings can be changed through your Weather Reach Access account.
- **Current Moisture Levels** – Moisture Levels may also be changed as needed.
- **Status** – The same information you can see on your Controller Link:
 - Current watering status
 - Estimated Next Irrigation
 - Last Irrigation
 - Last weather data update
- **Irrigation Logs** – Detailed information is available for each program:
 - Last watering
 - Days watered
 - Total water used
 - Total irrigation time
 - Irrigation history
- **Flow Logs** – Flow records are available for all programs
- **Override Control** - Prevent or Allow irrigation. From your browser you can prevent the next watering or allow watering as needed.

Contact Irrisoft, Inc. for more information regarding Weather Reach Access.

Alert Messages

If there is a condition you should be aware of it will be displayed on the home screen. Press the ◀ left arrow button to review the Alert Message in more detail.



These are the possible Alert messages:

- **1-hour Rain Interrupt** – Rainfall within the last hour has reached the 1-hour Rain Interrupt setting. Current watering is prevented by interrupting the valve common. Controller Link displays the date, time, set point and amount of rain that triggered the Interrupt.
- **24-hour Rain Interrupt** – Rainfall within the last 24 hours has reached the 24-hour Rain Interrupt setting. Current watering is prevented by interrupting the valve common. Controller Link displays the date, time, set point and amount of rain that triggered the Interrupt.
- **Flow Interrupt + (A, B, C, D or Override)** – The flow sensor is reporting a flow rate that exceeds the Interrupt setting. Watering of the respective program is prevented by interrupting the valve common. Controller Link displays the date, time, set point and flow that triggered the Interrupt.
- **Flow Warning + (A, B, C, D, Override or Unexpected Flow)** – The flow sensor is reporting a flow rate that exceeds the flow limit for the respective program. Controller Link displays the date, time, set point and flow rate that triggered the warning.
- **Irrigation Prevented by User** – The date and time irrigation was prevented by the user and the remaining time of the Interrupt is displayed.
- **No Historical ET** – Controller Link uses historical ET (evapotranspiration) as a backup source of ET. When a weather station is selected monthly historical ET values are set. Without weather data or historical ET the Controller Link will not function properly. Verify a weather station has been selected. If this message is displayed and you are not selecting a weather station, you will need to manually enter the average daily historical ET values for each month.

- **No Internet Connection** - This message will be displayed after several hours of no Internet access.
- **No Weather Data in the Last 24 Hours** – Check the Internet connection. You may need to check with the Weather Reach Service Provider (WRSP).
- **PGM + (A, B, C, or D) Water Window Error** – If you are using the Water Window Control method check the Water Window settings.
- **Provider Interrupt** – As part of the service provided by a WRSP a command to interrupt watering may be sent to Controller Links. Check with your WRSP regarding this service. If the command is sent watering is interrupted for the time period included in the command.
- **Rain Station Not Activated** – This message will be displayed if service has been terminated for a rain station that requires a subscription, check with the WRSP or change the rain source.
- **Rain Station Not Setup** – Check the Rain Source.
- **Rain Station Subscription Warning** – If the rain station requires a subscription this warning is displayed until a subscription is established with the WRSP.
- **Rain Tip Failure** – A failed rain gauge or bad wiring may trigger this failure. Rain measurements are NOT recorded when this Alert occurs.
- **Serial Flash Error** – Disconnect power to the Controller Link for 1 minute to reset the electronics. If the error persists contact Irrisoft, Inc.
- **Temperature Interrupt** - The date, time, set point and temperature that triggered the Interrupt is displayed.
- **Weather Station NOT Activated** - This message will be displayed if service has been terminated for a weather station that requires a subscription, check with the WRSP. Irrigation will be managed using historical ET.
- **Weather Station Not Setup** – This warning is displayed until you select a weather station.
- **Weather Station Subscription Warning** - If the weather station requires a subscription this warning is displayed until a subscription is established with the WRSP.

- **Wilting Point A B C or D** – This message is displayed when the Moisture Level reaches wilt point. There are several possible causes:
 - The host irrigation controller is off or not correctly programmed.
 - The Irrigation Amount may be set too low.
 - There may not be enough available days to apply the needed water.
- **Wind Interrupt** - The date, time, set point and wind speed that triggered the Interrupt is displayed.

Water Management Troubleshooting

How often should my sprinklers come on?

Your Controller Link uses real-time weather information to determine when watering is needed. Your sprinkler system may water more frequently in the summer months, and less frequently in the spring and fall months; watering is now based on weather conditions (which affects how much water evaporates from your soil). Your Controller Link automatically adjusts throughout the year to keep the Moisture Levels in your soil reservoir at an optimum level for the health of your plants.

Evaluate your landscape

Before making any adjustments to the settings of either your Controller Link or your automatic sprinkler controller, make sure that the entire sprinkler system is in good working order. It is important to be certain that there are no broken sprinkler heads or broken pipes affecting the performance of your system. Landscapes and automated sprinkler systems are subject to imperfections that can be corrected. You may need to contact your landscape installer or sprinkler professional.

1. Perform a walk through evaluation inspecting your sprinkler system while each zone is running.
2. If problems in the sprinkler system are detected, please fix the problems or call sprinkler professionals to assist you.

Are there dry or wet spots in your landscape?

When plant health within an area of station (zone) is not uniform, these “spots” may be either too dry or too wet. Dry spots and wet spots are often caused by problems with your sprinkler system.

1. Check the sprinkler heads near the spot that is dry or wet. It is possible that a broken head or nozzle, or a clogged nozzle needs to be replaced.
2. Check the layout of your sprinkler design. Proper sprinkler designs should ensure head to head coverage. Changing a nozzle size, or adding or moving a head may improve distribution coverage.
3. If steps 1 and 2 do not solve the problem, check the run times on your sprinkler controller. Changing the run time of the station where the spot appears may compensate for minor sprinkler system inefficiencies.

Specific stations are too dry or too wet.

Stations are the distinct areas in your landscape watered by one valve. Dry or wet stations are often caused by a run time problem programmed in your sprinkler controller. Check the run time on your sprinkler controller for this station. The dry or wet station can be caused by too little or too much watering time for that station.

Most stations within the entire program are too dry or too wet.

There are two possible causes of all the stations within entire program being too dry or too wet:

- The Irrigation Amounts were not correctly programmed.
- A run time problem programmed in your sprinkler controller.

If your program is overly dry, water the program by following the steps outlined in “You want your sprinkler system to water on the next cycle”.

Then follow these steps:

1. Check the run times on your sprinkler controller. The dry or wet program can be caused by too little or too much run time for each station in the program.
2. Adjust the run time using small intervals of time. This will help determine what run time is optimal to prevent dry or wet stations.
3. If steps 1 and 2 do not fix this problem, you should increase or decrease the Irrigation Amount in the Controller Link.

Note: If the entire area of a program is too wet, *increasing* the Irrigation Amount setting in the Controller Link will *decrease* the frequency of watering.

If the entire area of a program is too dry, *decreasing* the Irrigation Amount setting will *increase* the frequency of watering.

The site is watering every day.

There are three possible causes of why the site is watering everyday:

- The Irrigation Amounts are programmed too low.
- The Controller Link was not properly installed.
- Smart control is set to Off.

You want your sprinkler system to water on the next cycle.

There may be occasions when the sprinklers should water the next programmed watering cycle. When the program Moisture Level is empty and the Irrigation Status indicates “Ready to Water”, then watering will be allowed during the next scheduled cycle. If the Status indicates “No Watering Needed,” then adjust the program Moisture Level to 0. If the Status indicates “No Water Day” then the Available Days setting will not allow watering today. .

After a rainstorm my sprinkler system resumes watering too soon.

1. Verify the rain gauge is measuring rain correctly.
2. Check the Rain Source to verify the Controller Link is programmed to the correct source.
 - a. The weather station rainfall data may not correctly represent rainfall at your site. Connect an optional rain gauge.
3. The Saturation Allowance may be too low. Change the Saturation Allowance to a higher amount to allow the Controller Link to accept more rainfall in the Moisture Levels.
4. The Maximum Hourly Rain setting may be limiting the amount of rainfall applied to the Moisture Levels. Change the Maximum Hourly Rain to a higher amount to allow the Controller Link to accept more rainfall in the Moisture Levels.

After a rainstorm my sprinkler system does not resume watering soon enough.

1. Verify the rain gauge is measuring rain correctly.
2. Check the Rain Source to verify the Controller Link is programmed to the correct source.
 - a. The weather station rainfall data may not correctly represent rainfall at your site. Connect an optional rain gauge.
3. The Saturation Allowance may be too high. Decrease the program Saturation Allowance settings. The Saturation Allowances create a limit to the amount of rain that can accumulate in the Moisture Levels. The Controller Link uses this

- amount to limit the total amount of rain that can accumulate in the Moisture Level.
4. Decrease the Maximum Hourly Rain setting. The Maximum Hourly Rain setting may be limiting the amount of rainfall applied to the Moisture Levels.

It was raining and the sprinklers were running.

1. Check the Weather Info for the last hour of rain to verify rain data is being reported by your Controller Link.
2. Check the Rain Source to verify that the Controller Link is programmed to the correct source to ensure the rain data is correct.
3. Check the 1-Hour Rain Interrupt setting.

Note: Remember that small amounts of rainfall may not be enough to warrant a 1-Hour or 24-Hour Rain Interrupt.

Control Modes – Advanced Options

Program Start

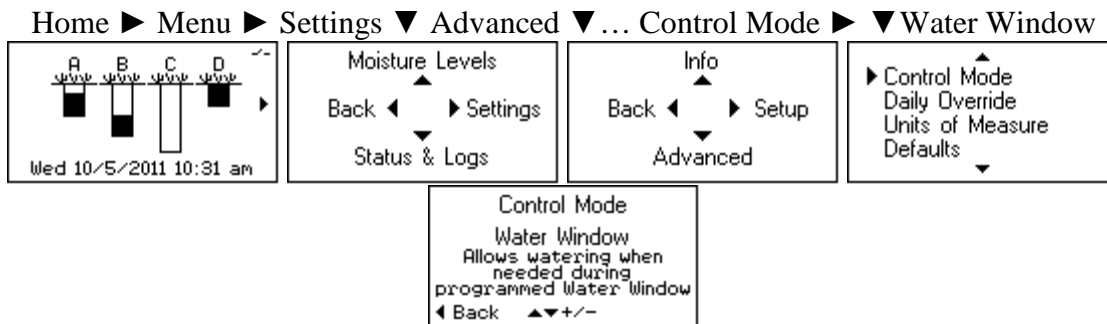
This is the standard default operating mode defined in this manual.

Water Window

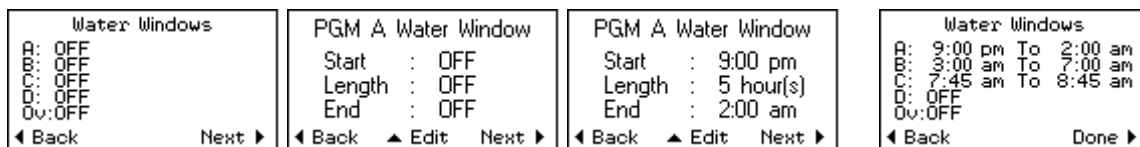
There is one major difference between the Water Window mode and the Program Start mode; The Water Window splits the programs into allotted time windows instead of using the Program Start Sensor input. The Program Start Sensor input is ignored when the Controller Link is set to Water Window Mode.

With one exception all the settings are the same as the Program Start Control Mode. The Wiring Status screen is replaced by the Water Window Settings.

To setup a Controller Link to the Water Window mode you must first set the Control Mode to “Water Window.”



The Water Window settings screen requires you to set the start time and length of the window for each program. Initially the windows are all Off. Press ►Next then ►Edit to set the Start time and Length of the Window. This must be repeated for all programs and the Daily Override. If a Program is not used, the Water Window may be left Off. When finished a summary of each of the Water Window periods is displayed.



The host irrigation controller must be programmed so that cycle start times and valve run times fall within the period of the corresponding Water Window.

In normal operation the Controller Link will consider the Moisture Level and user settings to decide to Enable valve common or Interrupt the common when the Window Opens. Program cycles during that period will either water or not.

Note: Program windows cannot overlap. Make sure the controller is set to operate the corresponding program within the same time frame.

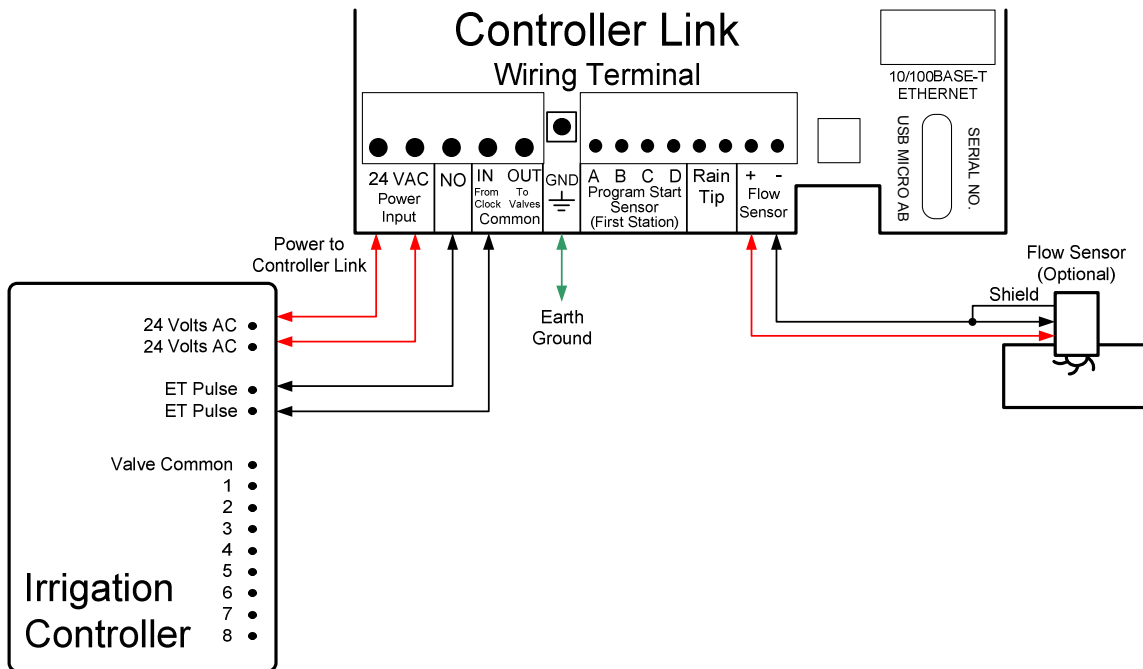
All other settings and operations are the same as the Program Start mode.

ET Pulse

Some advanced ET-based controllers accept a pulse input as an ET source; a momentary switch closure for each 0.01" of ET. The sprinkler controller uses these values to automatically adjust watering schedules. There are compatible advanced ET-based sprinkler controllers that can use a Controller Link as an ET source.

Note: When using this mode, all scheduling decisions including days of operation are made by the sprinkler controller. The Controller Link only outputs ET to the sprinkler controller.

ET Pulse Wiring Diagram



24 VAC: Power supply input. Typical source is the host irrigation controller.

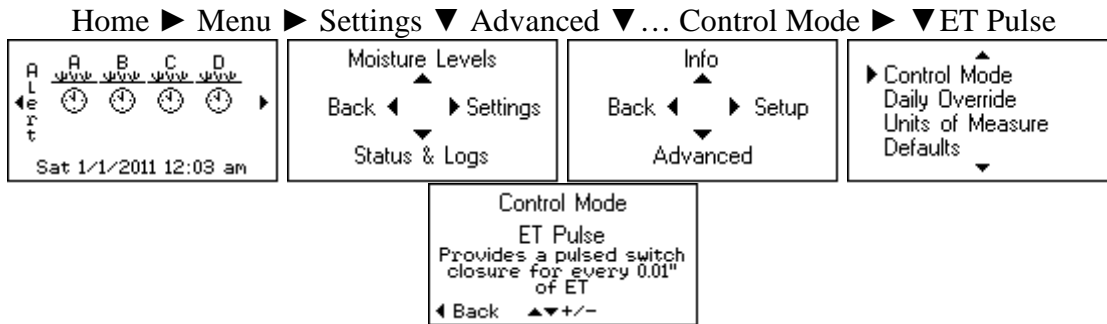
NO: Normally Open - Connect to the host irrigation controller ET Pulse terminal.

Common IN: Connect to the host irrigation controller ET Pulse terminal.

Flow Sensor: This is optional. A flow sensor may be connected to log the flow. A High Flow shut-off is not supported in this mode.

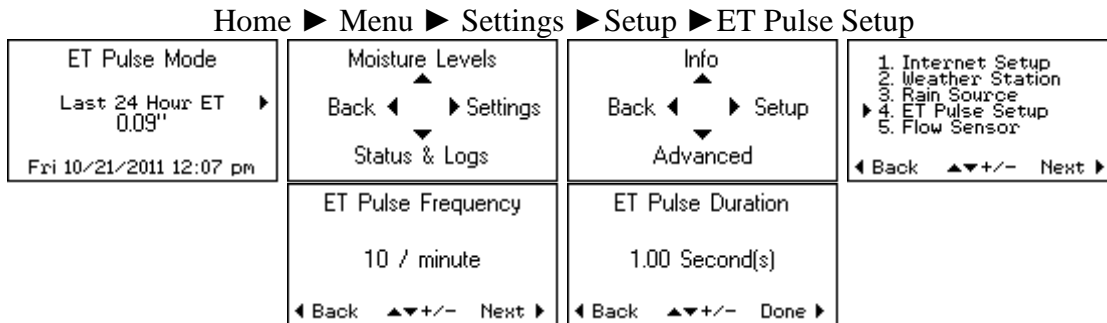
Program Settings

Step 1: Set Control Mode to ET Pulse



Step 2: Follow the guided setup. The process is the same as described in the “Programming - Guided Setup” chapter:

1. Internet Setup (pg 15)
2. Weather Station (pg 17)
3. Rain Source – This will only record rain from the selected source. (pg 18)
4. ET Pulse Settings:
 - a. **ET Pulse Frequency** – This controls how often a pulse is sent. There are two options: 10 or 1 pulse per minute
 - b. **ET Pulse Duration** – This controls how long the switch remains closed for each pulse. The range is 0.02 seconds to 5 seconds.



All other operations are the same.

ET Trigger

The ET Trigger mode signals an irrigation control system that watering is needed by closing the control relay. The host irrigation controller responds to the switch closure by starting a watering cycle. ET Trigger mode operates in a similar fashion as Program Start Sensor and uses many of the same settings, but there are a few major differences.

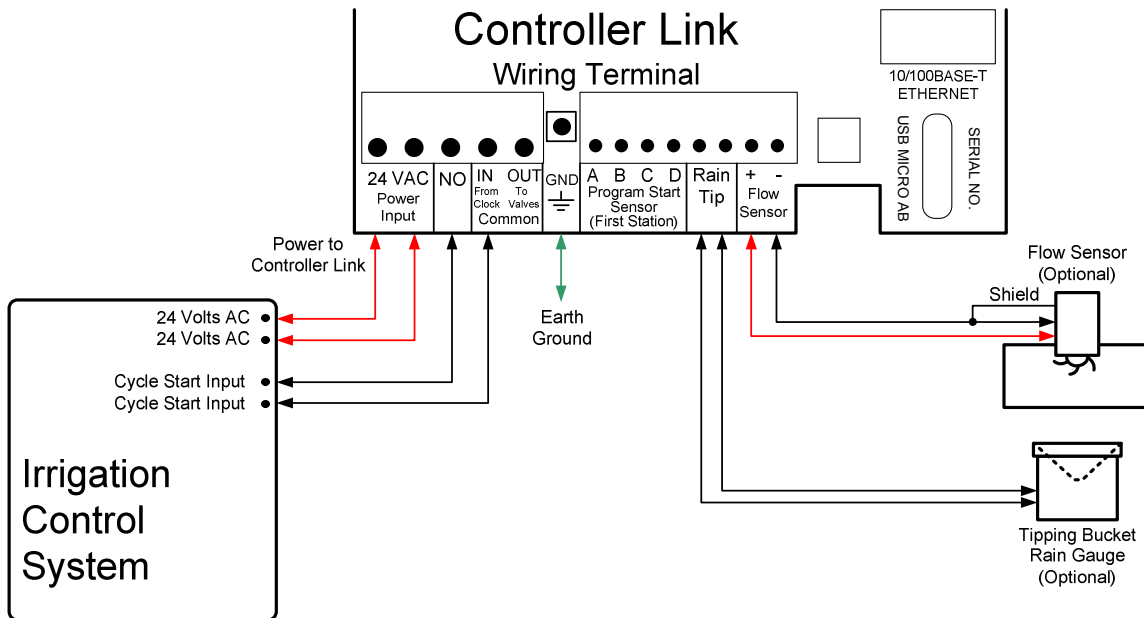
- Output Mode set to ET Trigger.
- One program.
- There is a window of time the Trigger can send the start signal.
- The duration of the switch closure is programmable.

Applications

There are various applications a Controller Link in the Trigger mode could support:

- Center pivot systems
- Irrigation gate control
- Single valve applications
- Trigger the start of a semi-automatic control system

ET Trigger Wiring Diagram



24 VAC: Power supply input. Typical source is the host irrigation control system.

NO: Normally Open - Connect to the Irrigation Control System Cycle Start Input.

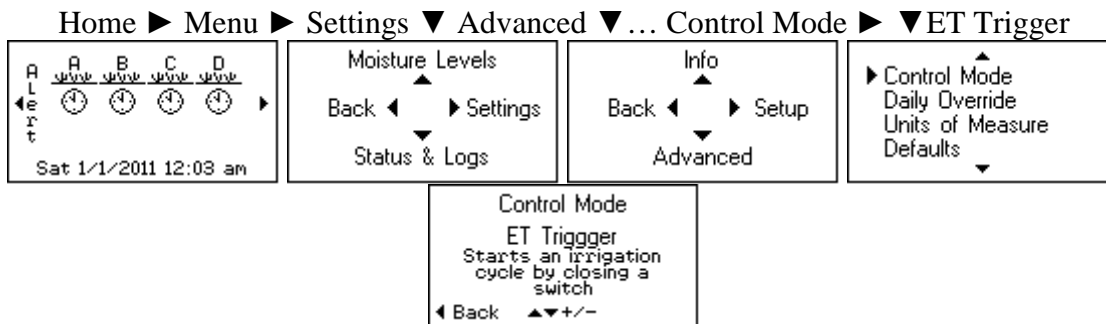
Common IN: Connect to the Irrigation Control System Cycle Start Input.

Flow Sensor: This is optional. A flow sensor may be connected to log the flow. A High Flow shut-off is not supported in this mode.

Rain Tip: An on-site tipping bucket rain gauge may be connected to this terminal to input local rainfall measurements.

Programming

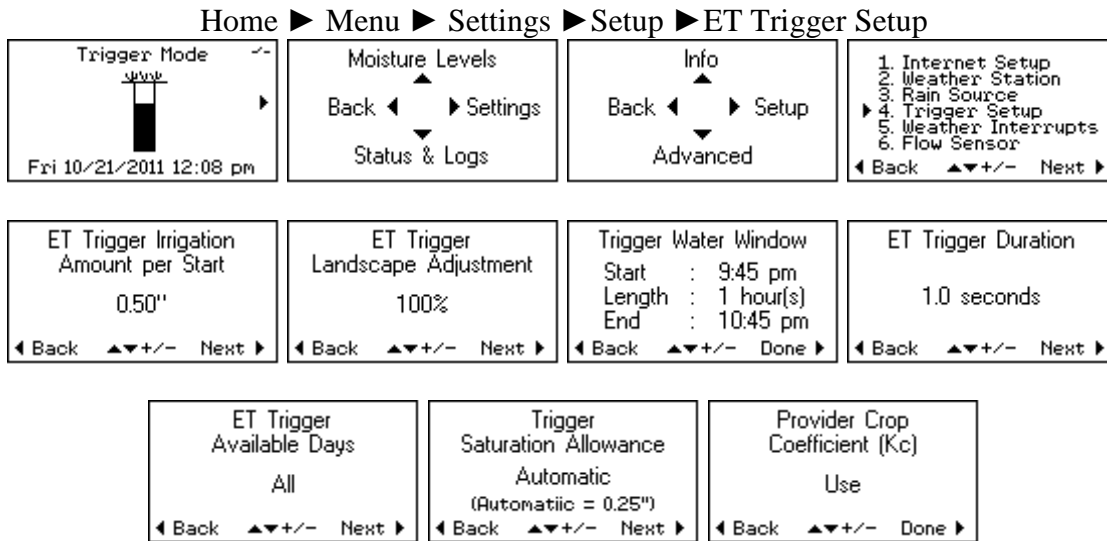
Step 1: Set Control Mode to ET Trigger



Step 2: Follow the guided setup. The process is the same as described in the “Programming - Guided Setup” chapter:

1. Internet Setup (pg 15)
2. Weather Station (pg 17)
3. Rain Source (pg 18)
5. Trigger Setup
 - a. **Irrigation Amount** – How much water is applied as a result of starting an irrigation cycle?
 - b. **Landscape Adjustment** – Or crop coefficient.
 - c. **Trigger Water Window** What time range could a start occur?
 - i. **Start** – Set the beginning time of the range.
 - ii. **Length** – The range option is from 1 hour to 23 hours. The length of the range may be limited by the availability of water or facility use.

- d. **Trigger Duration** – How long does the switch remain closed? The range on this setting is:
 - i. 0.1 to 2.0 seconds in 0.10 second increments.
 - ii. 2 to 59 seconds in 1 second increments.
 - iii. 1 to 600 minutes (10 hours) in 1 minute increments.
- e. **Available Days** – Choose the days watering can occur.
 - i. All
 - ii. Odd
 - iii. Odd 31st off
 - iv. Even
 - v. Cyclical - Water Every X days - Next Water Day X
 - vi. Custom - Sunday thru Saturday On/Off
- f. **Saturation Allowance** – The amount of rain that will be included in the Moisture Level beyond Field Capacity.
 - i. Automatic = 50% of the Irrigation Amount.
 - ii. User entered value
- g. **Provider Crop Coefficient** – Use or Ignore the Kc value from the WRSP when calculating ETc.



- 6. **Weather Interrupts** – This will open the control contacts when the condition is met.
 - a. 1-Hour
 - b. 24-Hour
 - c. Low Temperature
 - d. High Wind
- 7. **Flow Sensor** – Flow recorded by the flow sensor is logged.

All other features are the same as described in the other chapters.

Appendix

I. Internet Access

Your Controller Link needs to be connected to the Internet. There are no special configuration requirements because the Controller Link uses standard HTTP protocol to request weather data and instructions from Weather Reach HTTP Servers. There is no need for a static IP address.

There are two Internet connection options:

- **Ethernet:** RJ-45 10/100BASE-T, TCP/IP, DHCP
- **Wi-Fi:** 802.11 b/g Secure authentication – WEP-128, WPA-PSK (TKIP), WPA2-PSK (AES)

Ethernet

Internet protocol (TCP/IP) settings may be entered one of two ways:

- **DHCP** – IP settings are automatically assigned. Your network must support this capability.
- **Manual** – Talk to your network administrator who will assign the appropriate IP settings:
 - IP address
 - Subnet mask
 - Default gateway
 - DNS server addresses (preferred and alternate)

Wi-Fi

Wi-Fi Internet access must be available at the installed location. Wi-Fi Access Points broadcast their identity with a name (SSID - Service Set Identifier). The owner / operator of the Access Point provides the SSID name and Passphrase (Network Key). When configuring the Internet setup in the Controller Link it will present the names of all Access points in the area. Select the desired Access Point and enter the Passphrase.

Connection Options

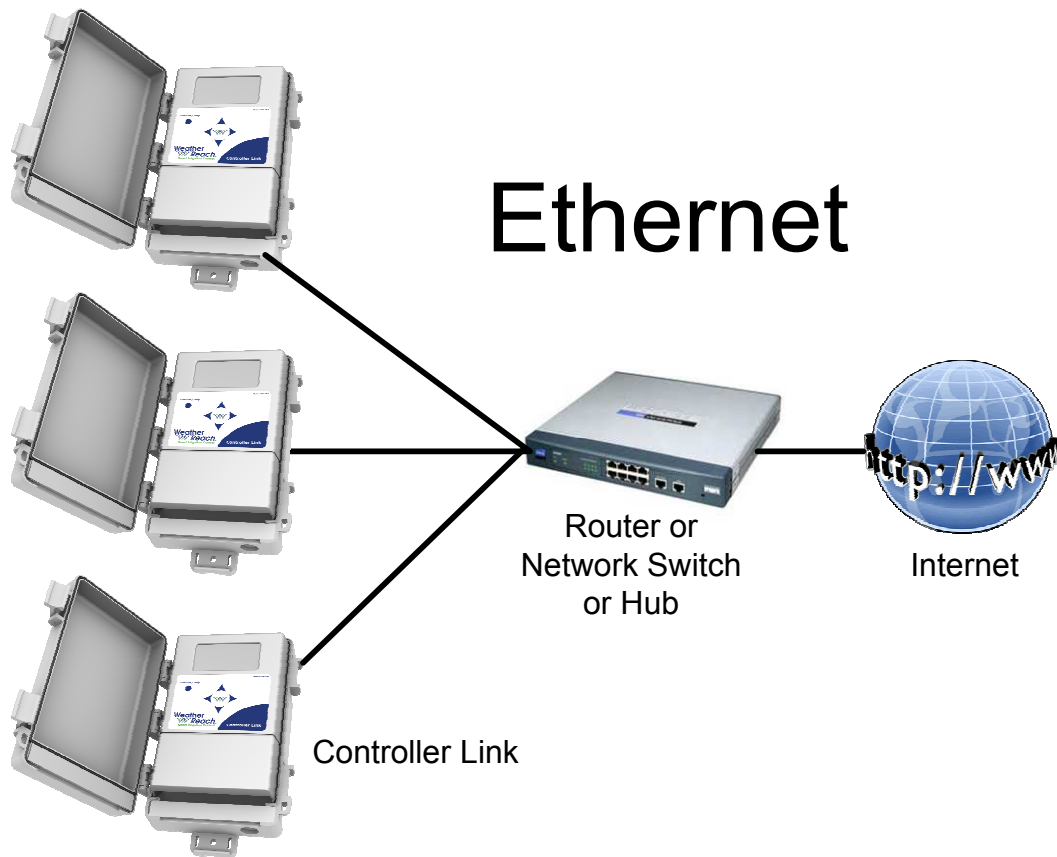
There are many ways to establish a connection to the Internet. Installation conditions will vary. There may be applications that require IT professionals to help establish the connection. Here are examples of approaches that may be utilized:

- Ethernet
- Wi-Fi
- Wi-Fi Range Extender
- Ethernet over Power Line
- Ethernet Switch
- Cellular Wi-Fi
- Cellular Ethernet
- Wireless Ethernet Bridge

These are just a few examples. Some application may be a combination of these approaches.

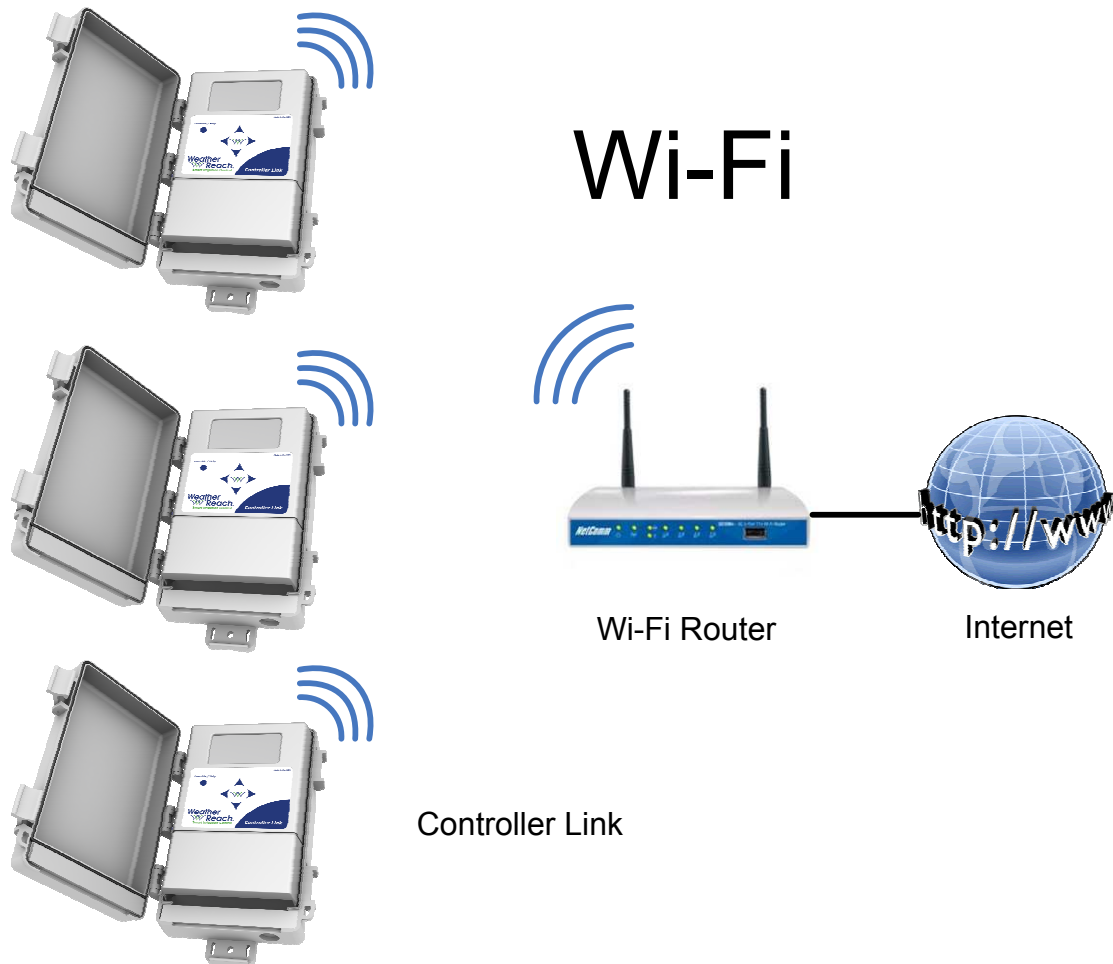
Ethernet

An Internet Service Provider (ISP) brings Internet service to property. Devices requiring Internet access are connected to a Router, Network Switch or Hub. A Controller Link can be connected directly to the Router, Network Switch or Hub with an Ethernet cable.



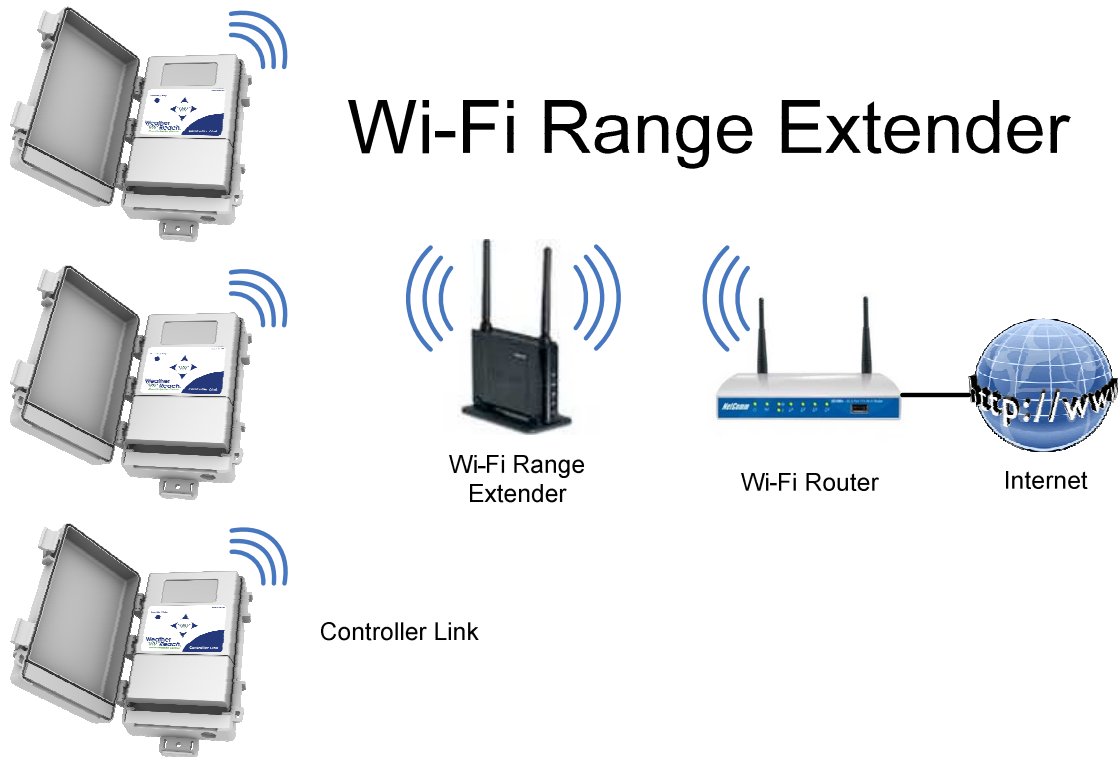
Wi-Fi

A Wireless Router, connected to the Internet, creates a Wireless Access Point. The maximum distance you can expect with Wi-Fi is about 300’.



Wi-Fi Range Extender

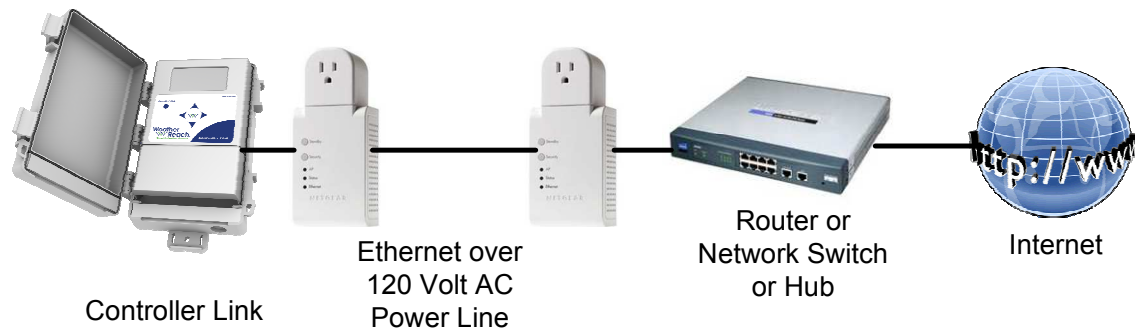
If a Controller Link is installed beyond the range of a Wireless Access Point, a Wi-Fi Range Extender may be sufficient to establish communication.



Ethernet over Power Line

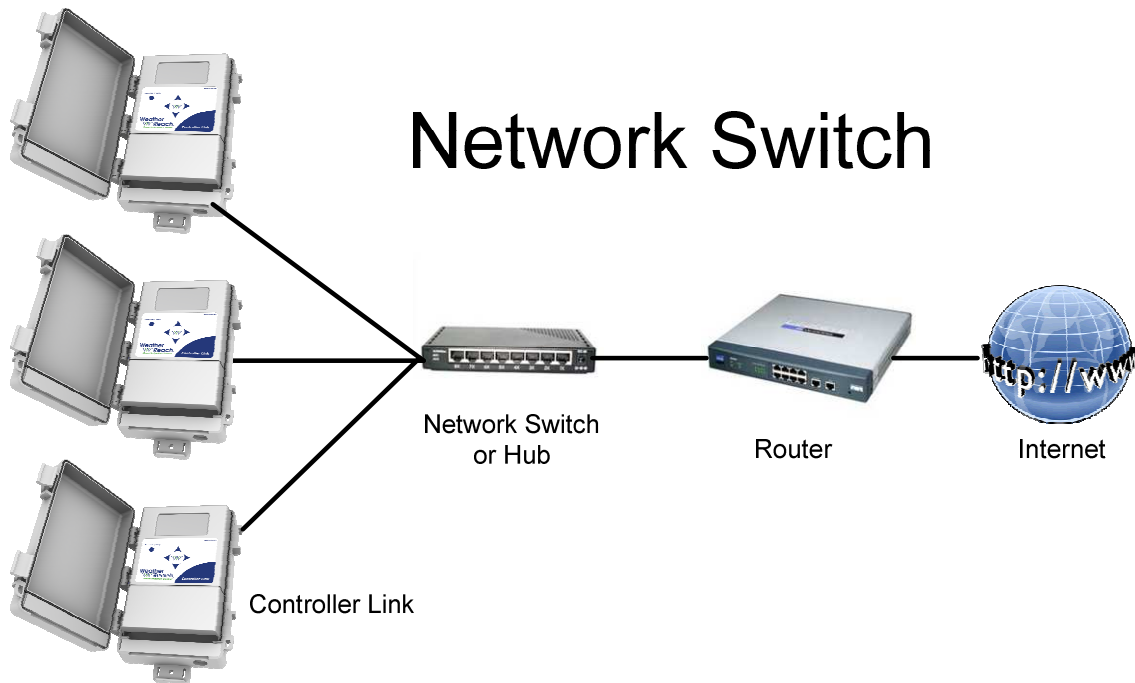
Instead of running Ethernet cable through a building, a pair of Ethernet Over Power Line devices can use existing 120 VAC power lines to extend an Internet connection.

Ethernet Over Power Line



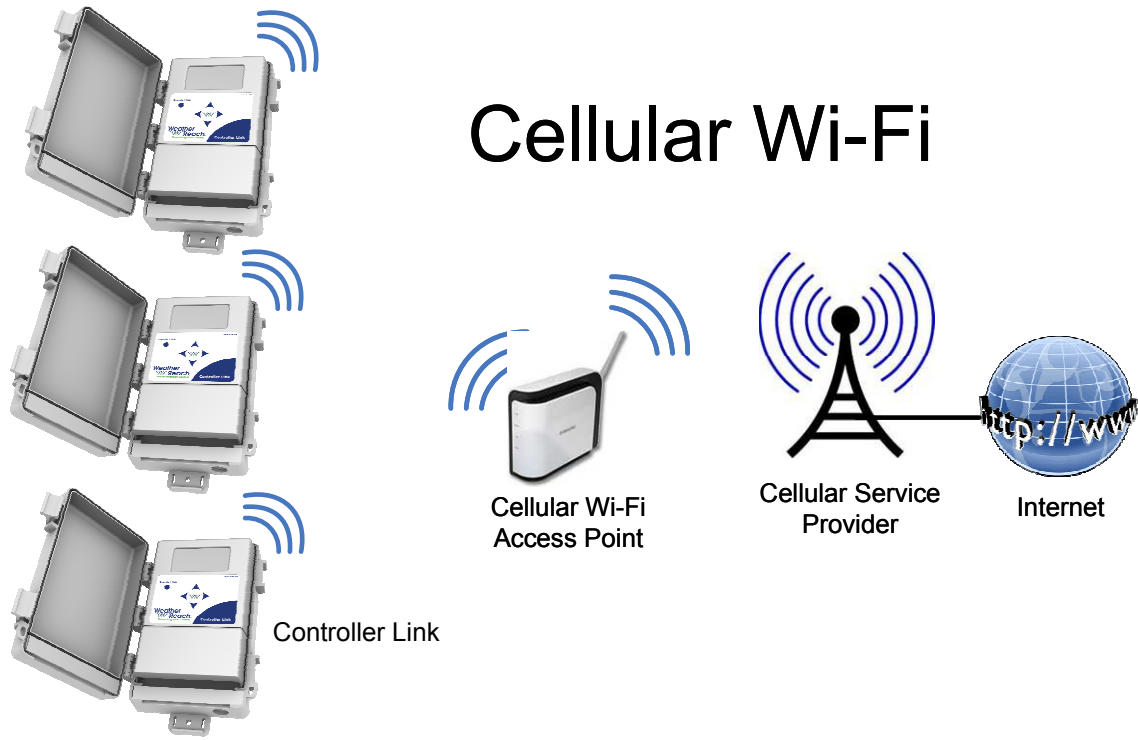
Ethernet Network Switch

Larger networks may include Network Switches in the system to increase the number of connections to the Internet.



Cellular Wi-Fi

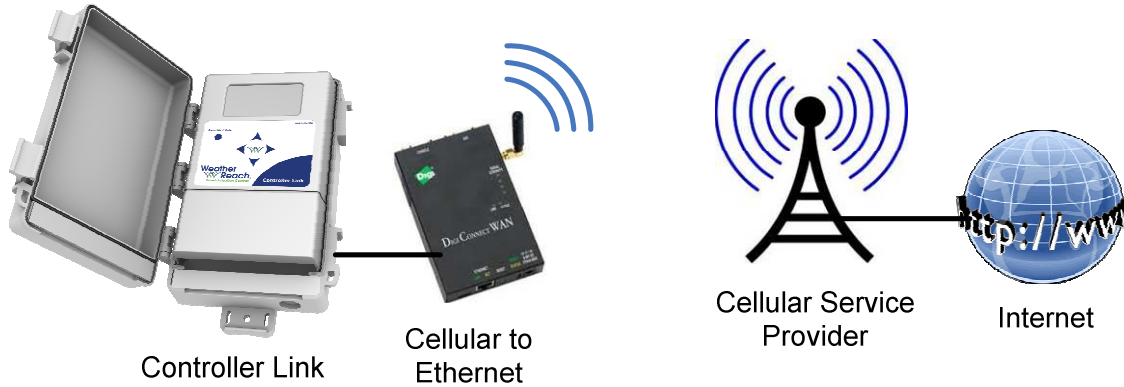
Cellular Service Providers offer data service to Cellular Wi-Fi Routers.



Cellular Ethernet

Another cellular option provides an Ethernet connection to a Controller Link.

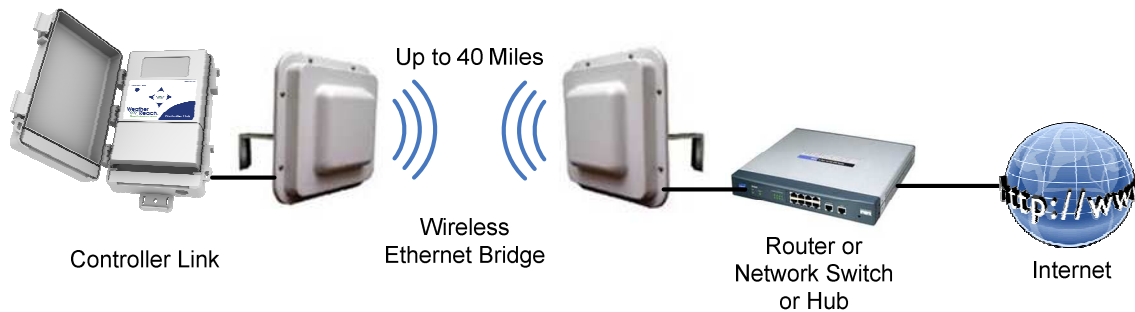
Cellular Ethernet



Wireless Ethernet Bridge

An alternative to cellular or wired Ethernet is a wireless Ethernet Bridge. Ethernet Bridges may be configured as Point-to-Point or Point-to-Multi-Pont. The distance capabilities will vary base on equipment, frequencies, antennas and site conditions.

Wireless Ethernet Bridge

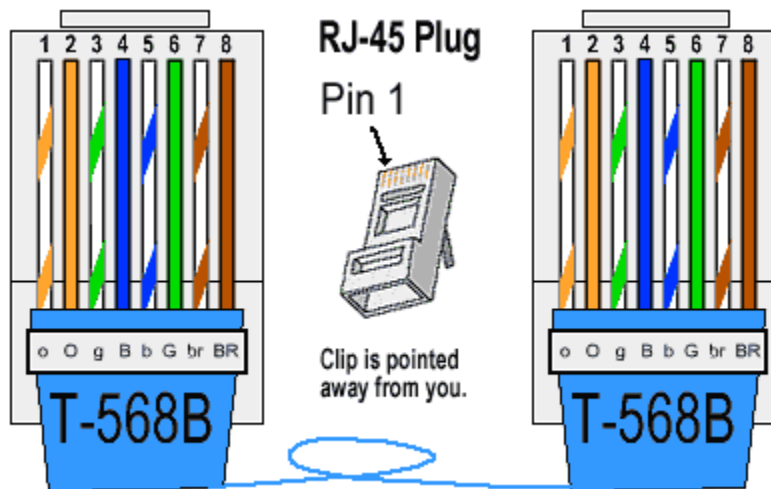


Tools

Ethernet Cable Kit to make RJ-45 Patch Cables

- Cable Stripper
- RJ-45 Crimper
- Cable Tester
- RJ-45 Connectors

Ethernet Patch Cable pin out:



Glossary

Available Watering Days: A Controller Link setting, by program, that limits when watering can occur. Local watering restrictions or site activities may limit the days watering is allowed. The Controller Link decides the right day to water while respecting Available Watering Days. Setting Available Watering Days to All allows the Controller Link the most flexibility. (see also: Look-Ahead, Restricted Watering, All, Odd, Custom.)

Allow Manual Irrigation: When valves need to be activated manually using the host controller, press the Override button to force the Controller Link to allow watering. On the Override screen select Allow Manual Irrigation then select the amount of time (in hours) to allow manual watering. When the Controller Link is in this Override condition, irrigation is NOT accounted for in the Moisture Levels. Once the Override time has elapsed, your Controller Link will resume Smart Control.

Clear Data: Controller Link stores weather conditions, Moisture Levels, irrigation events, flow data etc. Clear Data will erase all of the stored records. Clearing Data will also reset Moisture Levels to zero, but when weather data is retrieved it will receive the last 24 hours of weather conditions. ET and rain from the last 24 hours will be applied to the Moisture Level. Check the current Moisture Level once the data has been retrieved. Clearing Data will not change any settings.

Control Mode: To accommodate a variety of applications, the Controller Link has four Control Modes: 1) Program Start (this is the default mode) 2) Water Window 3) ET Pulse 4) ET Trigger. The mode may be changed by going to Menu ► Settings ► Advanced and scrolling down to Control Mode.

Crop Coefficients (Kc): A factor percentage to modify ET_0 based on a specific plant type. It is used to adjust an ET value to meet the specific needs of a plant, $ET_0 \times KC = ET_c$. There are both local and seasonal variations in KC values. (see also: Landscape Adjustment, Provider Crop Coefficient)

Cursor: The “►” symbol indicates the current cursor location.

Daily Override Window: Controller Link may be set to enable daily watering during a time window. In normal operation the Controller Link interrupts the Valve Common to prevent watering only when needed. If a Daily Override Window is set, programmed or manual watering is allowed. A Daily Override Window may be set by going to Menu ► Settings ► Advanced and scrolling ▼ down to ► Daily Window. The setting is made by selecting a Start and Length of the period.

Defaults: Settings may be saved or restored from the Default Settings screen.

Effective Rain Settings: When rainfall amounts and intensities are extreme rains may run-off or percolate below the roots. Three Controller Link settings will limit the amount of Effective Rain: Maximum Hourly Rate, Saturation Allowance and Irrigation Amount.

Elevation: A Controller Link setting used when calculating ET. The default elevation above sea level is set when a weather station is selected and represents the elevation at the weather station. This setting may be changed if the site elevation is significantly different from the elevation at the weather station.

Enable: Controller Link Enables or allows irrigation by closing the Valve Common circuit from the irrigation controller.

ET: An abbreviation for evapotranspiration (see evapotranspiration).

ET Pulse Mode: A Controller Link advanced Output Method to deliver ET values to a compatible sprinkler controller. A dry contact switch closure represents 0.01 inches of ET. Compatible sprinkler controllers then use the ET value to make watering scheduling decisions.

ET_c: Evapotranspiration calculated to include a crop coefficient. ($ET_O \times K_C = ET_C$)

ET_o: A calculation of the potential for evaporation and transpiration based on climate conditions used as a reference to estimate plant water use. Using the ASCE Standardized Evapotranspiration formula the Controller Link applies hourly solar radiation, temperature, wind and humidity measurements to calculate ET_o.

Evapotranspiration (ET): A measurement of the water that evaporates from the soil and transpires from a plant. ET represents the total moisture loss from the root zone.

Exposure: Environmental exposures, such as sun exposure, high winds, or shade, can increase or decrease the rate of evaporation. The Landscape Adjustment setting or station run-times may be adjusted to compensate for the difference between conditions at the site and weather station location.

Flow Sensor Logs: Controller Link stores and displays information stored in flow sensor records. Average Flow, Peak Flow and Water Use information are displayed on the screen.

Historical ET: A Controller Link setting used in the event real-time data is not available. Historical ET is a monthly average of daily ET based on many years of recorded data. When a user selects a weather station in a Controller Link, the Historical ET values from the weather station area are automatically set. If needed, these settings may be changed.

Humidity: Relative humidity is measured at the weather station and is included in the weather data to calculate ET.

Interrupt Logs: The Last Interrupt displays the cause, date, and time of the last weather Interrupt. Weather Interrupts can be programmed for temperature, wind, or rain conditions. Interrupts can also come from the Weather Reach Service Provider. If a user sets a Controller Link to Prevent Irrigation for a given period of time, it is logged as an Interrupt.

Irrigation Amount: The amount of water, in inches applied to the landscape from each watering cycle(s). The Total Irrigation Amount is equal to, the number of Program Cycle Starts, times, the Irrigation Amount per Cycle Start.

Irrigation Logs: The Controller Link logs and reports irrigation information including: the time of the last watering, total number of irrigation days, how much water has been applied, and the total irrigation run time.

Irrigation Status: The current watering status for each program can be viewed on the Irrigation Status screen. See the Menu Details chapter (pg 51) for status options.

Landscape Adjustment: A Landscape Adjustment may be set for each program to modify ET for site-specific landscape conditions such as plant type, exposure, etc. ET times the Landscape Adjustment percentage is deducted from the program Moisture Level.

LCD Display: The graphical display is used to view current operating conditions, monitor status, view settings, and make programming changes. The display contrast may be adjusted by going to Menu ► Settings ► Advanced, then scroll down to Contrast. Press the ► right button to select Screen Contrast, then use the ▲▼ up or down button to adjust the setting.

Local Rain Gauge Input Failure: A “Rain Tip Input Failure” Alert appears on the Home screen if there a problem with the wiring of the on-site rain gauge. Check the wiring for shorts. Also check the rain gauge switch. Once the problem is corrected, reset the Rain Tip input by resetting power to the Controller link.

Logs: A Controller Links displays log information. See Irrigation Logs, Interrupt Logs and Flow Sensor Logs.

Look-Ahead: If Available Days have been restricted, the Controller Link looks ahead each to determine next available water day. Based on the current Moisture Level, ET rate and next available water day, Controller Link may allow watering even though the Moisture Level has not reached zero.

Maximum Hourly Rain: The Maximum Hourly Rain is the maximum amount of rain that will be accepted each hour in the soil Moisture Level, see Effective Rain.

Menu Path: Menu paths are found throughout the manual to show which items within the menu and submenus need to be selected to access key information or to adjust settings. Example of a Menu path: Home ► Menu ► Settings ► Status & Logs ► Logs ► Irrigation Logs.

Moisture Level: The Controller Link calculates and displays the current estimated soil Moisture Level. Moisture is depleted from the soil due to evaporation. Rain and water from the irrigation system replaces this water. The Controller Link computes the current Moisture Levels for program A B C & D in real time based on ET, rain, irrigation and user settings. When the Moisture Level reaches 0, watering is Enabled and the sprinkler controller is allowed to water.

No Historical ET Data: This Alert message will be displayed if the Historical ET values have been cleared from the Controller Link settings. The Controller Link uses a historical ET database as a backup in the event weather data is not available. If this Alert message is displayed enter the monthly Historical ET values based on local conditions.

No Water Day: Watering will be prevented for the specific program. The current day is not available for watering. Available Watering Days can be programmed in your Controller Link. When the current day has been set to “Off,” watering will not be enabled regardless of the current Moisture Levels. The No Water Day status message indicates that the current day has been set to “Off.”

No Watering Detected: This Alert message is displayed when the program Moisture Level reaches Wilt Point. A Controller Link may not detect watering if it has not been properly wired to the sprinkler controller or the controller has not been properly programmed.

No Weather Data: If the Controller Link has not received weather data for more than 24 hours this Alert message will be displayed on the Home screen.

Override: The Override button offers two options to override automatic control. 1) Allow Manual Irrigation 2) Prevent Irrigation.

Password: Access to the Controller Link settings can be protected by an optional user defined numeric password (from 1 to 255, or “none”).

Plant Type: Different plant types (turf grass types, shrubs, trees, and groundcover) use water at different rates, requiring different Irrigation Amounts and Landscape Adjustment percentages.

Precipitation Rate: The rate at which water is applied to the landscape by the irrigation system, typically measured in inches per hour.

Prevent Irrigation: To suspend watering for a selected period of time press Override and select Prevent Irrigation to enter the number of hours or days the Controller Link should prevent irrigation. **Note:** If a program is set to “No Smart Control” and “Interrupts Not Allowed” the Prevent Irrigation function will NOT prevent irrigation for the program.

Program Start Mode: The default Control Mode for the Controller Link. When wires are connected from the 1st station of each program in the host controller and the Program Start Sensor the Controller Link can either allow or prevent a program water cycle to activate valves by interrupting the valve common circuit.

Provider Crop Coefficient (Kc): Crop coefficients are used to modify ET to meet the specific needs of the landscape. The Weather Reach Service Provider (WRSP) may include a crop coefficient value in the weather data. In the Advanced Settings, for each program, you can choose to “Use” or “Ignore” this value to adjust ET as it is subtracted from the Moisture Level. The default setting for this option is to Ignore the Kc.

Provider Interrupt: The Weather Reach Service Provider (WRSP) can send a command to interrupt watering. This may be necessary during an emergency condition in the community requiring watering to be suspended to limit the demand on the community water system. As a service, your WRSP may also watch weather forecasts and choose to interrupt watering.

Rain Interrupt 24-Hours: Rainfall over the last 24 hours that is at or above the Rain Interrupt 24-Hour setting will cause a Weather Interrupt. The weather Interrupt is cancelled once the total rainfall in the last 24 hours drops below the Rain 24-Hour setting.

Rain Interrupt 1-Hour: Rainfall over the last hour that is at or above the Rain Interrupt 1-Hour setting will cause a rain Interrupt. The weather Interrupt is cancelled once the total rainfall in the last hour drops below the Rain 1-Hour setting.

Rain Station: A Rain Station measures rainfall. In addition to supporting a weather station network, your Weather Reach Service Provider (WRSP) may access local rain stations. When selecting a Rain Source if there is a Rain Station in your area you may select it from the list of available Rain Stations.

Rain Source: The rain source is the source of rainfall measurements used by the Controller Link. Rain measurements may come from the weather station, an optional on-site rain gauge, or from a rain station.

Restore Settings: Previously saved settings may be restored. See Defaults.

Root Depth: The soil reservoir capacity is directly related to plant root depth. Deeper roots increase the amount of water available to the plants. To promote a deep healthy root system, best horticultural practices recommend less frequent, deep watering. Use a shovel or soil probe to determine root depth.

Saturation Allowance: The amount of rain it takes to saturate the soil after the soil Moisture Level has reached Field Capacity. Saturation Allowance settings may be entered for each program. The default Saturation Allowance setting is “Automatic,” which is 50% of the Total Irrigation Amount.

Save Default Settings: The current settings can be saved. Once saved, if settings have been changed incorrectly, you can restore saved settings.

Serial Number: The serial number is located on sticker under the terminal cover on the right side of PCB next to the Ethernet port. The serial number is also displayed on the Info screen. Home ► Menu ► Settings ▲ Info

Site Assessment: A site assessment should be completed to determine site-specific conditions which affect programmable settings in your Controller Link and sprinkler controller.

Smart Control: Your Controller Link automatically controls the watering schedule based on ET, rainfall and user settings. This is referred to as Smart Control.

Soil: Soil is a habitat for soil organisms and plant roots. It functions as a storehouse for nutrients and a water reservoir. It contains and supplies water, oxygen, nutrients, and provides mechanical support for plant growth.

Sprinkler Controller: A sprinkler controller is an electronic timer that activates automatic sprinkler control valves within a sprinkler system.

Sprinkler System: A sprinkler system delivers water to a landscape and consists of piping, sprinkler valves, sprinkler heads, and a sprinkler controller. Rain and water from the sprinkler system replaces water used in the landscape.

Station: Stations on a sprinkler controller are connected to specific valves as part of an irrigation system. Stations are assigned to programs in the Sprinkler Controller. Stations should be assigned to programs that water plants with similar water requirements. Stations are also referred to as “zones.”

Temperature Interrupt: If the hourly weather data contains air temperatures that reach the Temperature Interrupt setting, watering is interrupted. The weather Interrupt is cancelled once the air temperature rises above the programmed Interrupt setting received in the hourly weather data.

Terminal Cover: The Terminal Cover protects the wire terminal connections on your Controller Link. Remove the Terminal Cover to access the wire terminals by pulling outward from the bottom of the Terminal Cover.

Total Irrigation Amount: See Irrigation Amount.

Tipping Rain Gauge (Model WR-PRG): An optional on-site tipping rain gauge (1mm/tip) with 30' cable can be connected to the Controller Link to provide accurate on-site rain measurements.

Trigger Mode: A Controller Link can generate a start signal to a compatible control system. See Advanced Options.

Units: The Controller Link can calculate and display values in either English or Metric units.

Water Window Mode: An alternate control mode that may be used instead of Program Start Mode. Program Water Windows must be synchronized with the watering times set in your sprinkler controller. Based on the current Moisture Level, the Controller Link will either allow or prevent watering during the program's Water Window.

Weather Info: You can view detailed weather information of the current weather conditions.

Weather Reach Service Provider (WRSP): The role of your Weather Reach Service Provider (WRSP) is to manage a network of ET weather stations. This includes retrieving weather information and makes the data available to your Controller Link, via the Internet.

Weather Reach Water Management System: The Weather Reach Water Management System automates commercial and residential sprinkler schedules using real-time weather conditions which are delivered to Weather Reach Receivers via your local Weather Reach Service Provider (WRSP).

Weather Station: Weather stations record weather conditions. To calculate ET using accepted industry standards, a weather station should record hourly measurements of solar energy, temperature, wind and humidity. Rainfall is also recorded. A Weather Reach Service Provider (WRSP) retrieves weather information from local ET weather stations and uses the Internet to make the data accessible to your Controller Link.

Wind Adjust: Average hourly wind speed at the ET Weather station is included in the weather data. The ET calculation includes wind speed. The Wind Adjust setting allows you to compensate for local conditions by entering an adjustment percentage. The adjusted wind speed will be used in the ET calculation. The default setting of 100% makes no adjustment to the average hourly wind speed.

Wind Interrupt: If the hourly weather data contains wind speeds that reach the Wind Interrupt setting, watering is interrupted. The Weather Interrupt is cancelled once the wind speed decreases below the programmed Wind Interrupt setting.

WRSP: An abbreviation for Weather Reach Service Provider.

