



WeatherTRAK 2-Wire Controller Design Guide

Featuring H2O Technology

Included in Guide:

- 2-Wire System Overview
- 2-Wire Path Layout
- Grounding
- Specifications

Questions? Contact Customer Support at support@hydropoint.com

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Overview

WeatherTRAK 2-wire products provide the simplicity of 2-wire control with the proven water savings, automation and central visibility and control you expect from commercial WeatherTRAK solutions.

WeatherTRAK utilizes HydroPoint's powerful 2-wire technology platform, H2O. The H2O 2-wire technology is compatible with both the ET Pro3 controller and the OptiFlow XR controller. This design guide provides recommendations and features for the H2O 2-wire technology.

This design guide is only for WeatherTRAK 2-wire systems that are using the H2O Platform. For help in designing a legacy Tucor-based system, look for the design guide on our website.

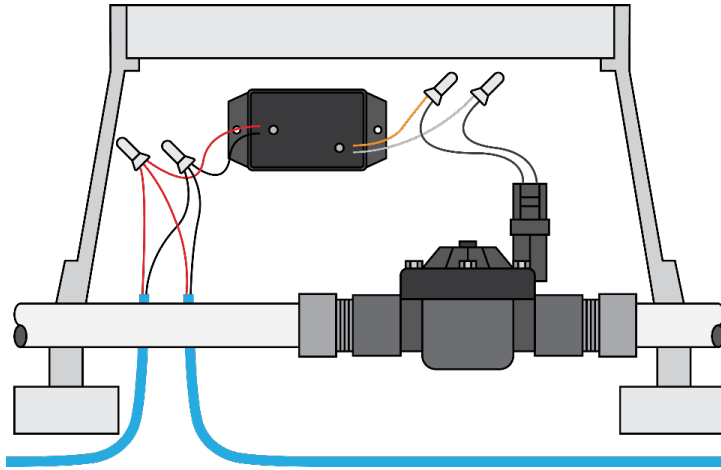
How do WeatherTRAK 2-Wire Products Work?

WeatherTRAK 2-wire products provide the same programming and WeatherTRAK Central benefits as a traditionally controlled WeatherTRAK controller, the difference is that it communicates and powers the control valves using shared two-conductor wire paths and individual valve decoders. The WeatherTRAK 2-wire system provides irrigation control utilizing constant low-voltage on one or more two-conductor wire paths, the 2-wire path. The 2-wire path is connected from the controller to one or more WeatherTRAK 2-wire valve decoders. The WeatherTRAK 2-wire enabled controller then uses the 2-wire path for communication as well as to power all of the valves in an irrigation system on that path. All valves are connected to valve decoders, so the need for a control wire per valve back to the controller is eliminated.

The WeatherTRAK 2-wire controller turns on specific valves by sending messages over the 2-wire path addressed to a specific valve decoder. Decoders are addressed and assigned to stations before installation on the 2-wire path. The station decoders can be addressed at the controller or pre-addressed from HydroPoint. The WeatherTRAK 2-wire system is also capable of sending messages from a decoder, such as the WeatherTRAK 2-wire flow decoder, to the WeatherTRAK 2-wire controller. This allows flow sensors and master valves to be installed using the 2-wire path.

Valve Decoders

Each irrigation control valve must be connected to a WeatherTRAK 2-wire Valve Decoder. Each valve decoder is programmed with a station number. The valve decoder must be connected to the 2-wire path and the solenoid using the included 3M DBR/Y-6 splice kits. The decoder and splice kits should be based in a valve box for easier troubleshooting and diagnostics. We also recommend 24-36" of extra 2-wire at each splice to allow for future repairs and easier troubleshooting.



Notes:

WeatherTRAK 2-wire systems are **NOT** compatible with the following solenoids:

- DC latching solenoids
- Toro Spike-Guard™ solenoids
- Netafim Aquative Plus® solenoids

Rain Bird DV Series valve solenoids are NOT recommended for use with the WeatherTRAK 2-wire system due to their high current draw.

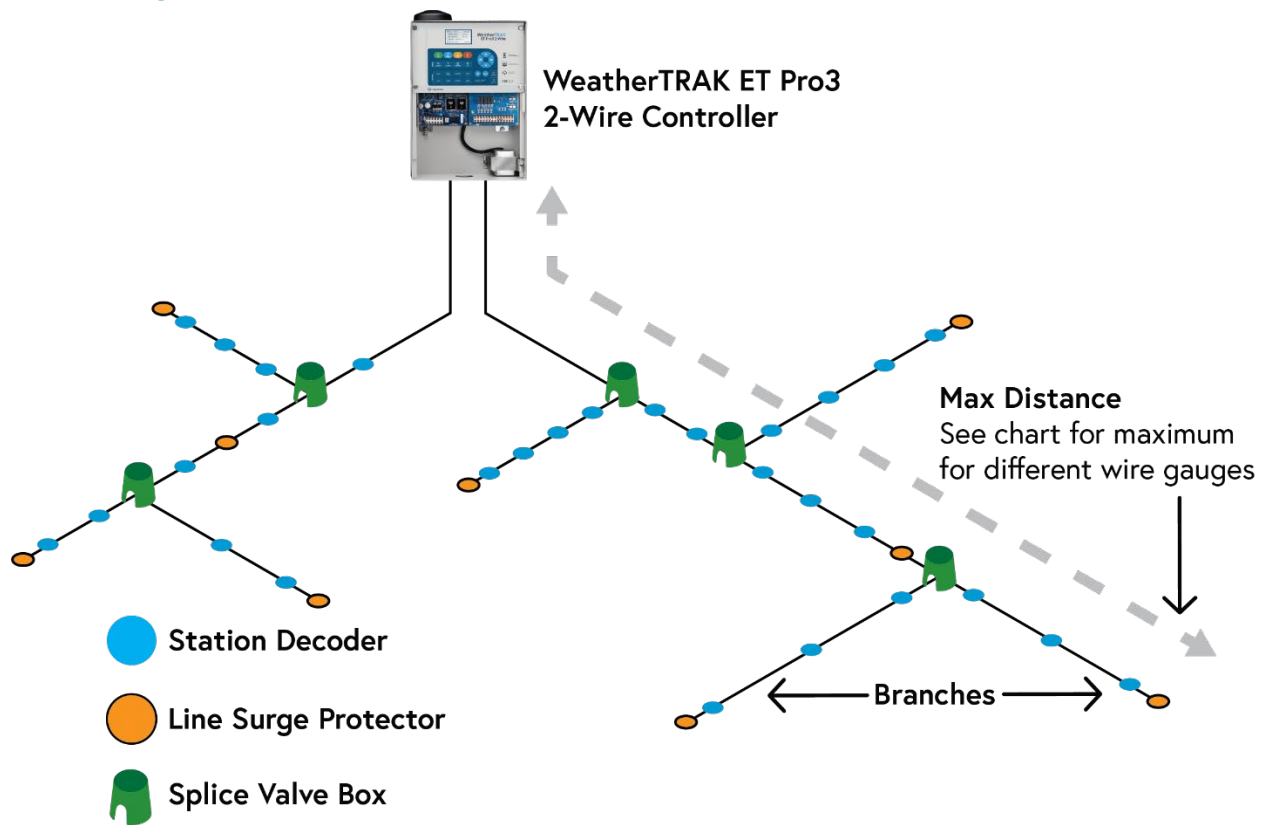
Design Considerations

When designing a decoder based system, including the WeatherTRAK 2-wire system, the designer must ensure there is enough power and voltage along the entire 2-wire path, by considering the 2-wire path lengths, layouts and grounding. When properly designed, these factors ensure that the overall system has enough power to communicate to all the 2-wire decoders and activate the station valves.

Layout of the 2-Wire Path

The recommended 2-wire path layout is a star configuration. The star configuration is easy to troubleshoot if there are issues in the field. An illustration of the star configuration follows.

Star Configuration



WeatherTRAK 2-Wire Devices

WeatherTRAK 2-wire controllers can communicate with the following 2-wire devices:

- Single and dual valve decoders
- Flow sensor decoders
- Master valve decoders
- Pump start decoders

Total Supported Devices and Limits

The following table lists the total numbers of devices by type that can be connected to a WeatherTRAK 2-wire controller.

The WeatherTRAK 2-wire controller can support up to 110 device loads on the 2-wire path within the layout and length limits as described. A device load indicates the amount of electricity required to sufficiently power the decoder.

Note: The device load requirements change between decoder types.

The load value/rating for each 2-wire device is shown in the table below.

Two-Wire Device Type	Total	Device Loads
Valve decoder (one and two valve)	96	½ per decoder
Master valve decoder	4	½ per decoder
Flow sensor decoder	4	3
Pump start decoder	4	½ per decoder

Limits for Release 7.10.x and 8.6.x for the WeatherTRAK 2-wire controller:

- 96 Stations
- Total of 4 Master Valves (mix of 2-wire and Direct Connect)
- Total of 4 Flow Sensors (mix of 2-wire and Direct Connect)
- 4 Pump Start Decoders (each pump start decoder reduces maximum number of stations by 1)

NOTE: Unused ports or serial numbers on decoders that do not occupy a station address do not count towards the maximum station count.

Maximum Concurrent Valves

The maximum number of concurrently operating valves is shown in the two tables below. The number of concurrent valves varies based on the total load count and wire length to the farthest device:

Decoder and Sensor Load Count		Maximum Concurrent Valves -#12 Wire					
		Wire Length (ft)					
		1000-3000	4000	5000	6000	7000	8000
100	15	14	13	8	6	4	
90	15	15	14	9	7	5	
80	15	15	15	10	8	6	
70	15	15	15	11	9	7	
60	15	15	15	12	10	8	
50	15	15	15	13	11	9	
40	15	15	15	14	12	10	
30	15	15	15	15	13	11	
20	15	15	15	15	14	12	
10	15	15	15	15	15	13	

Decoder and Sensor Load Count		Maximum Concurrent Valves -#14 Wire				
		Wire Length (ft)				
		1000	2000	3000	4000	5000
100	13	11	8	4	2	
90	14	12	9	5	3	
80	15	12	10	6	4	
70	15	13	11	7	5	
60	15	14	12	8	6	
50	15	15	13	9	7	
40	15	15	14	10	8	
30	15	15	15	11	9	
20	15	15	15	12	10	
10	15	15	15	13	11	

Wire Specifications

Use the following recommended wire.

Wire Size: 12 or 14 AWG

Construction: Special irrigation control wire

Conductor: 2 same gauge solid core conductors conforming to ASTM B-33, B-3, or B-8

Insulation: Polyvinyl Chloride (PVC) conforming to UL-493 or UL-719 for thermo-plastic-insulated style UF (underground feeder)

Outer Jacket: Low density, high molecular weight polyethylene (PE) with a thickness of 0.045”

Temperature: 60°C (140°F)

Voltage: 600 volts RMS max

Example of approved wire:

Coleman Cable #51452

Paige P7072D, P7296D, P7350D, and P7354D

Regency 14/2 and 12/2 Maxi Cable, Toro Decoder Cable, and Hunter Decoder Jacketed Service Wire DEC12/2BE and DEC14/2BE.

Wire Splices

Use only 3M DBR/Y-6 splice kits for all electrical wiring connections to the 2-wire path. Improper wiring on the 2-wire path can cause serious damage to your controller or 2-wire irrigation system.

Grounding

The WeatherTRAK 2-wire controller and 2-wire path must be properly surge protected and grounded. Failure to properly ground and surge protect the controller and 2-wire path can result in failure of your controller and 2-wire system and voiding the warranty.

To comply with proper installation specifications, the following components should be grounded:

Product	Maximum ground resistance [Ohms]
WeatherTRAK 2-wire Controller	25*
WT2W-H2O-SA Surge Arrestor	25
WT2W-FD Flow Decoder	25

* WeatherTRAK strongly recommends getting the controller to below 10 ohms but will accept less than 25 ohms.

Each installed grounding system shall maintain a maximum ground resistance defined above.

A UL listed copper clad ground rod should be used to achieve the maximum ground resistance requirement. A 5/8" x 96" ground rod is the smallest recommended size.

The WeatherTRAK 2-Wire controller should be protected through an AC surge protector on the primary incoming power to the controller.

The WeatherTRAK 2-Wire controller provides a ground lug on the bottom front of the terminal board that accepts a #6 AWG bare copper wire that should be connected to a grounding system.

Using the WT2W-H2O-SA Line Surge Arrestor

The WeatherTRAK WT2W-H2O-SA surge arrestor provides protection for the WeatherTRAK 2-wire controller and 2-wire path. The WT2W-H2O-SA should be properly connected to a ground rod or ground plate for it to be effective at protecting the 2-wire system against surge events.

The WT2W- H2O-SA should be installed in each of the following scenarios:

- **Near the WeatherTRAK 2-wire controller**

The WT2W H2O-SA should be spliced into each 2-wire path within 25 feet of the controller. This provides surge protection for the WeatherTRAK 2-wire controller.

- **Along the 2-wire path**

The WT2W- H2O-SA should be spliced into the 2-wire path every 600 feet.

- **At the end of the 2-wire path**

The WT2W- H2O-SA should be installed at the end of each 2-wire path branch 50 feet or longer when using a star configuration.

- **Every 300 feet in lightening prone areas**

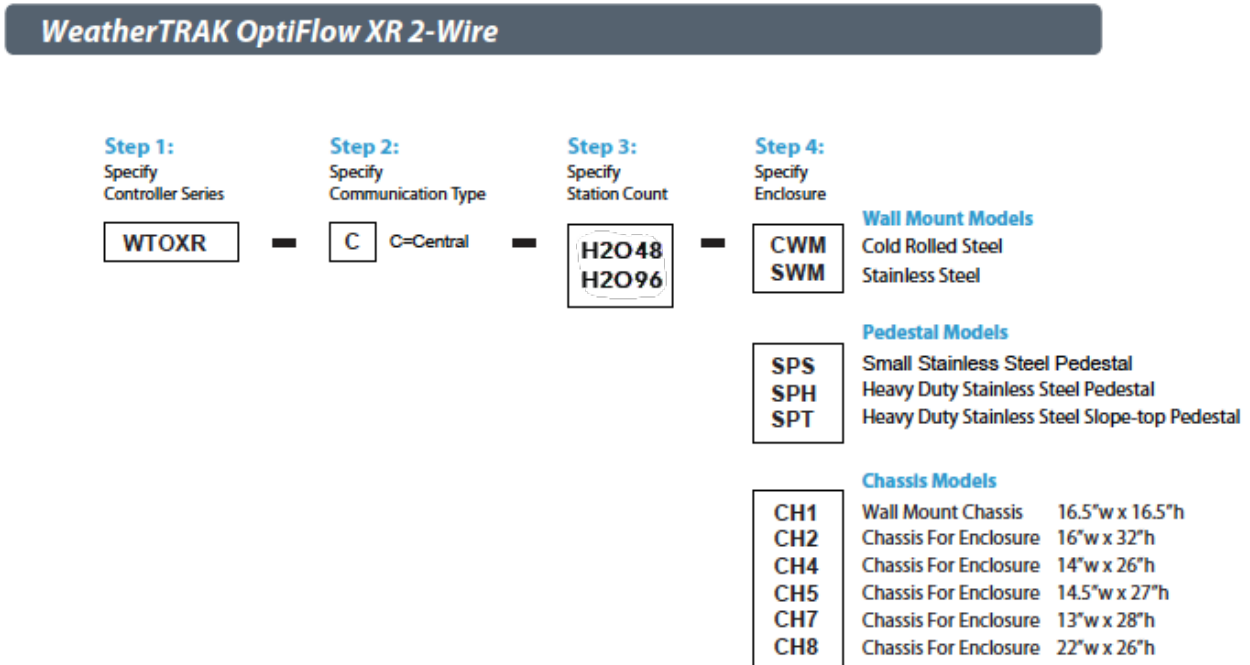
In lightning prone areas, install a surge arrestor every 300 feet on the 2-wire path and at the end of any 2-wire branch longer than 50 feet.

- **At the beginning and end of a long run without 2-Wire Devices**

For long runs of wire without any 2-wire devices, place a surge arrestor at the beginning of the run and at the end of the run. Do not splice the wire run in order to install a new surge arrestor if there are not devices. Example: valve box 1 is 2,400 feet from valve box 2. There is nothing in between the valve boxes. Install a surge arrestor after valve box 1 and then just before valve box 2. Do not install any surge arrestors in-between.

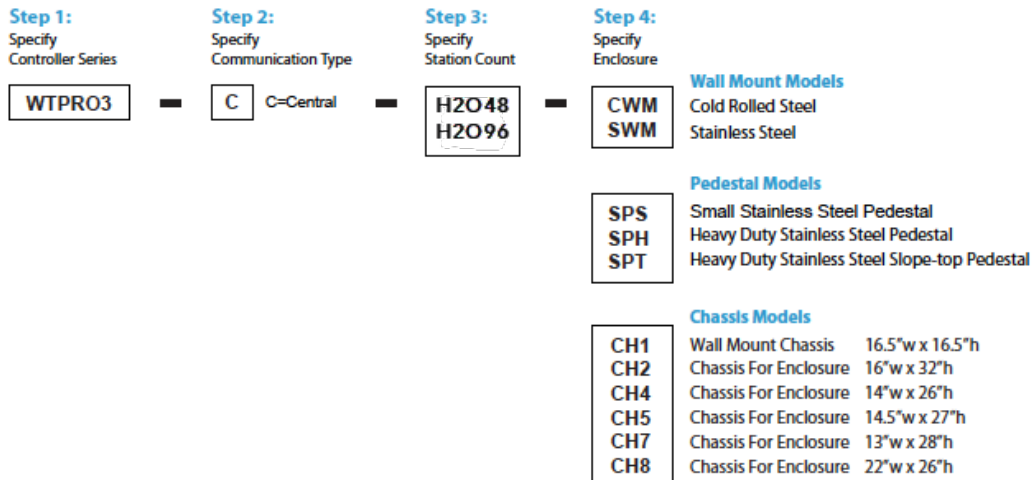
Available Configurations

WeatherTRAK OptiFlow XR 2-Wire



WeatherTRAK ET Pro3 2-Wire Controller

WeatherTRAK ET Pro3 2-Wire



WeatherTRAK 2-Wire Controller Specifications

Operational Features

- Two station configurations: 0-48 and 49-96
- Single and dual valve decoders for easy installation and troubleshooting - splice kits included
- Non-volatile memory stores settings without battery
- Automated valve and decoder fault detection and diagnostics with built-in amp meter
- Supports up to two 2-wire paths with independent line isolation and diagnostics
- Simultaneous Valves: up to 17 or up to 2700mA (8 programs, 4 master valves, 4 flow sensors, and 4 pump starts)

Programmable Features

- Eight programs with five program modes, two start times
- Proven WeatherTRAK Scheduling Engine optimizes by plant, soil, sprinkler, and slope data
- Automated daily runtime adjustments using site specific ET Everywhere™ weather
- Percentage adjust – fine tune by station
- Automated skip days based on zone specific soil moisture depletion
- Sports turf and high desert specific scheduling

- User-defined water days and water windows per program to comply with agency regulations
- Runtime rationing protects plant health under constricted water windows
- Multi-station manual watering from 1-99 minutes
- Independent station programming (72 cycles/station) with automated cycle and soak

Supported Devices

- Supports up to 4 flow sensors
- Supports up to 4 master valves
- Supports up to 4 pump start decoders
- Supports single and dual valve decoders
- Compatible with WeatherTRAK Flow3, FlowHD as well as Badger, CST and Netafim RS flow sensors

Central Control Features

- Cellular radio and first year WeatherTRAK Central service included
- Built-in remote with free WeatherTRAK Mobile app or Pro-Max™-UA, TRC™ Commander 32 interface
- Remote web-based programming at WeatherTRAK.net
- Remote operation via WeatherTRAK Mobile

Wiring Requirements

- 3M DBR/Y-6 splice kits required for all electrical wiring connections to the 2-wire path (DBR/Y connectors are acceptable for wired connections on the valve side)
- WeatherTRAK Wire (Paige Electric P7072D, P7296D, P7350D, and P7354D) required for all 2-wire path applications

Surge Protection and Grounding

- In standard applications, install a surge arrester every 600 feet on the 2-wire path and at the end of any 2-wire branch longer than 50 feet.
- In lightning prone areas, install a surge arrester every 300 feet on the 2-wire path and at the end of any 2-wire branch longer than 50 feet.
- Grounded with resistance of 2-wire to ground 25 ohms maximum and 25 ohms maximum at the controller

Enclosures and Chassis

- Wall mount enclosure option in both stainless steel or powder-coated steel, with option to mount on small pedestal

- Three stainless steel enclosure options
- Five chassis options to quickly retrofit existing high value pedestals

Warranty

- Five-year warranty for WeatherTRAK ET Pro3 2-wire
- Ten-year warranty for WeatherTRAK OptiFlow XR 2-wire

Controller Electrical Specifications

- Input Power 120 VAC +/- 10%, (60 Hz) or 220 VAC +/- 10%, (60 Hz)
- Idle State Power 3.0 Watts Maximum
- Output Power Station: 24VAC Valves up to 1000 mA including pump start
- Master Valve: 24VAC Valves up to 1000 mA
- Flow Sensor: Loop Current 6.5 mA, 0-400Hz
- Total Load: 3.0 Amps (80 VA)
- Certifications FCC Certified, UL Listed on all full enclosures models and UL Registered on all chassis models

WeatherTRAK Flow Specifications

See specific WeatherTRAK controller specification for more details.

- Mainline / catastrophic break detection and shutdown
- WeatherTRAK True Leak Detection™ and leak management
- Real-time station specific flow monitoring and control
- Remote station learned flow
- Fault detection, diagnostics and alerts
- Supports multiple flow sensor brands and custom K and offset
- Normally open or normally closed master valve

WeatherTRAK Central Specifications

- Multi-user access via secure login with access levels
- Station Group Management: multi-controller station changes
- Manual watering via web or mobile app
- Smart alert and email notification
- Alerts dashboard and detail with drill-down interface
- Customized naming: controller, program, and station
- Customizable controller and site-based reporting

- Analytics-based one-click reporting (export to Excel or PDF)
- Customizable dynamic filtering and search
- Setting change tracking history: station and program specific
- Actual and estimated usage by site, controller, and station
- WeatherTRAK Site Asset Manager: interactive Google™ Maps site landscape asset inventory reporting
- WeatherTRAK Budget Manager: performance tracking and analysis of water consumption to budget
- Access to manual operation, station % adjust, controller mode, and rain pause via WeatherTRAK Mobile

WeatherTRAK 2-Wire Component Specifications

Valve Decoder (WT2W-H20-1VD, WT2W-H20-1VD)

The valve decoder connects to each control valve solenoid. This kit also includes four (4) 3M DBR/6 splice kits. This decoder can also be used for the master valve.

Solenoid requirements

Requires typical solenoid with approx. 400mA inrush current and approximately 200mA holding current.

Flow Decoder (WT2W-H20-FS)

The flow decoder connects to compatible reed switch or photo diode based flow sensors. This kit also includes four (4) 3M DBR/Y-6 splice kits.

Compatible Flow Sensor: WeatherTRAK Flow3, FlowHD, Badger 228PV series, Creative Sensor Technologies and Netafim hydrometer using reed switch or photo diode registers.

Line Surge Protection (WT2W-H20-SA)

The 2-wire path must be properly surge protected and grounded. Failure to properly ground and surge protect the controller and 2-wire path can result in failure of your controller and 2-wire system and voiding the warranty. See the section on grounding for specific installation recommendation using the line surge protector.

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