
calsense
CS3000
DESIGNER'S GUIDE

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Revision History

Date	Changes
09/2015	Initial release
10/2015	Various changes to How to Specify and Flow Meters sections.
09/2017	Updated Tipping Rain Bucket information.
10/2019	Added additional items to How to Specify section.
08/2023	Full review and updates to many sections.
03/2026	• Full review and updates to many sections. • Moved Electrical Requirements, Grounding Instructions, and Transient Protection sections under Irrigation Controller heading. • Added Conventional Wiring Guidelines. • Added Compliance section. • Added new items including StrongBox Retrofit Kits and Ultrasonic Flow Sensors. • Added several "When to Specify" headings throughout the document. • Added Appendices A and B. • Removed CS3-RR section. • Removed Irrigation Management as a Service (IMaaS) section.
06/2026	• Added solar mounting pole specifications.

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Calsense Overview

Calsense leverages data and smart technologies to deliver advanced irrigation management solutions that help both its customers and the environment.

With 40 years of experience in irrigation management, Calsense began by providing centralized control solutions for a wide range of customers, including municipalities, K-12 school districts, departments of transportation, university campuses, homeowners' associations, and other commercial and public agencies. Over time, Calsense has earned a reputation for robust, long-lasting systems that support healthy, attractive landscapes. As the need for water efficiency and labor optimization continues to grow, Calsense's data-driven approach is more relevant than ever.

The Calsense CS3000 Designer's Guide provides detailed design and specification information for the CS3000 product line. For more information or product support, contact Calsense at (760) 438-0525, Monday through Friday, 8:00 a.m. to 5:00 p.m. Pacific Time.

Calsense Service

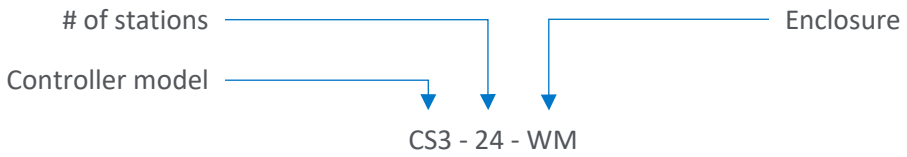
In addition to delivering durable, feature-rich products, Calsense offers a prominent level of after-sales training and support. This includes a centralized customer support helpdesk and a field-based service organization throughout the United States. Calsense field specialists work directly with customers' installation and maintenance teams to support proper system design, installation, and operation, including use of Calsense's cloud-based management platform, Command Center Online. Through these services, Calsense stays focused on helping customers conserve one of the world's most critical resources: water.

How to Specify

Specifications include system hardware, available options, communications components, and ancillary parts. The section below provides a brief overview of all available Calsense products.

How to Read Part Numbers

Example: CS3-24-WM1 corresponds to a CS3000 controller with 24 stations in a wall-mount enclosure.



Part Numbers & Descriptions

The following tables list available models and components, with brief descriptions for quick reference. Detailed design and specification guidance for each follows in subsequent sections of this guide.

Controller Model

Part #	Description
CS3	CS3000 base model with transient protection and field replaceable modules

Stations

Part #	Description
-8	8-station base model with support for one conventionally wired POC
-16	16-station base model with support for one conventionally wired POC
-24	24-station base model with support for one conventionally wired POC
-32	32-station base model with support for one conventionally wired POC
-40	40-station base model with support for one conventionally wired POC
-48	48-station base model with support for one conventionally wired POC
-2W	2-Wire base model with support for up to 128 2-Wire stations

Enclosure

All enclosures include transient protection with field-replaceable modules, as well as the choice for one or two pre-drilled antenna mounting holes when ordered with a communications kit that includes surface-mount antennas. In addition, all pedestal enclosures and retrofit kits are shipped fully assembled with a TP-110, GFCI, and receptacle.

Part #	Description
-WM	Wall-mount stainless-steel powder-coated enclosure

-S	Heavy-duty, stainless-steel pedestal enclosure
-SD	Dual-controller, heavy-duty, stainless-steel pedestal enclosure for two CS3000 controllers
-SL	Dual-controller, heavy-duty, stainless-steel pedestal enclosure for one CS3000 controller and one solar battery with charging equipment.
-LD16S-RETRO	Retrofit kit to install controller into an existing StrongBox LD-16S stainless-steel enclosure
-LD16SW-RETRO	Retrofit kit to install controller into an existing StrongBox LD-16SW stainless-steel wall-mount enclosure
-LD18SW-RETRO	Retrofit kit to install controller into an existing StrongBox LD-18SW stainless-steel wall-mount enclosure
-SB16SS-RETRO	Retrofit kit to install controller into an existing StrongBox SB-16SS stainless-steel enclosure
-SB16SSW-RETRO	Retrofit kit to install controller into an existing StrongBox SB-16SSW stainless-steel wall-mount enclosure
-SB18DSS-RETRO	Retrofit kit to install **two** controllers into an existing StrongBox SB-18DSS stainless-steel enclosure
-SB18SS-RETRO	Retrofit kit to install controller into an existing StrongBox SB-18SS stainless-steel enclosure
-SB18SSW-RETRO	Retrofit kit to install controller into an existing StrongBox SB-18SSW stainless-steel wall-mount enclosure
-SB36SS-RETRO	Retrofit kit to install **two** controllers into an existing StrongBox SB-18DSS stainless-steel enclosure
-SB36SSW-RETRO	Retrofit kit to install **two** controllers into an existing StrongBox SB-36SSW stainless-steel wall-mount enclosure
-SB24DSS-RETRO	Retrofit kit to install **two** controllers into an existing StrongBox SB-24DSS stainless-steel enclosure
-SB24SS-RETRO	Retrofit kit to install controller into an existing StrongBox SB-24SS stainless-steel enclosure
-SB24SSW-RETRO	Retrofit kit to install controller into an existing StrongBox SB-24SSW stainless-steel wall-mount enclosure
-ICA6P-RETRO	Retrofit kit to install a controller into an existing Heritage Technical Services ICA6P plastic pedestal enclosure

Optional Equipment

Communication Options

Part #	Description
CS3-GR-KIT	4G LTE cellular modem for CS3000 to communicate with cloud-based Command Center Online web application. Includes GR-STUBBY antenna. Requires Calsense cellular data plan, bought separately.

CS3-WEN-KIT	Wi-Fi device for CS3000 to communicate with cloud-based Command Center Online using an existing Wi-Fi network. Includes WEN-STUBBY antenna.
CS3-EN	Ethernet device for communicating with cloud-based Command Center Online using an existing Ethernet network
CS3-SR-KIT	Spread spectrum radio for wireless communication between CS3000 controllers. Includes SR-STUBBY antenna.
CS3-M-KIT	Hardwire communication card and terminal board for communication between controllers using Paige P7171D communication cable. For controllers in wall-mount enclosures (model -WM).
CS3-MSSE-KIT	Hardwire communication card and terminal board for communication between controllers using Paige P7171D communication cable. For controllers mounted in heavy-duty stainless-steel and dual-controller pedestals (models -S, -SD, and -SL).
CS3-GR	4G LTE cellular modem for communication with cloud-based Command Center Online web application. Requires stick or Yagi antenna and Calsense data access service plan, bought separately.
CS3-WEN	Wi-Fi device for communication with Command Center Online through an existing Wireless Ethernet (Wi-Fi) network. Requires stick or Yagi antenna, bought separately.
CS3-SR	Spread spectrum radio for wireless communication between controllers. Requires antenna, bought separately.

Field-Replaceable Add-on Modules

Part #	Description
CS3-2WIRE-OPT	2-Wire terminal with cover. Used to add up to 80 2-Wire Decoders to a conventionally wired base model CS3000 controller.
CS3-FL	*FLOWSENSE*® option for sharing flow, programming, weather data, and cloud communication among multiple controllers. Each controller requires a *FLOWSENSE*-compatible communication option such as hardwire (CS3-M-KIT and CS3-MSSE-KIT) or spread-spectrum radio (CS3-SR).
CS3-SRCMON	SourceMonitor™ option allows a controller upstream of other controllers and *FLOWSENSE* chains to monitor a shared trunk line for catastrophic mainline breaks and shut down downstream irrigation if detected. Requires a cloud communication option such as 4G LTE (model CS3-GR-KIT), Ethernet (model CS3-EN), or Wi-Fi (model CS3-WEN-KIT).
CS3-8STA-KIT	8-station addon card and terminal board to add up to eight conventionally wired stations to an existing controller. A single CS3000 supports up to six kits for a total of 48 stations.
CS3-W-KIT	Weather card and terminal board to allow connection of an ET Gage, Tipping Rain Bucket (model RB-1), Wind Gage (model WG-1), and/or third-party rain and freeze switches.
CS3-POC-KIT	POC card and terminal board used to add a conventionally wired POC (master valve and flow sensor) to a 2-wire controller
CS3-L-KIT	Lights card and terminal board to operate of up to four independent light circuits

2-Wire Decoders

Part #	Description
CS-2W-2ST	2-Wire Station Decoder with 2-station outputs
CS-2W-POC	2-Wire Point of Connection (POC) Decoder with one flow sensor input and one master valve output
CS-2W-MOIST	2-Wire Soil Moisture Sensor Decoder with one station output and attached moisture sensor. Measures soil moisture, temperature, and electrical conductivity (salinity).

Transient Protection

Part #	Description
TP-110	AC line protection

Weather Sensors

Part #	Description
RB-1	Tipping Rain Bucket
WG-1	Wind Gage

Flow Sensors

Part #	Description
FM 1B	1” bronze tee-mounted flow sensor
FM 1.25B	1.25” bronze tee-mounted flow sensor
FM 1.5B	1.5” bronze tee-mounted flow sensor
FM 2B	2” bronze tee-mounted flow sensor
FM 1.5	1.5” PVC schedule 80 tee-mounted flow sensor
FM 2	2” PVC schedule 80 tee-mounted flow sensor
FM 3	3” PVC schedule 80 tee-mounted flow sensor
FMBX	Insertion-style flow sensor for 3-inch and larger pipe. Screws into 2-inch NPT pipe saddle (not included).
UFS 1	1” polymer ultrasonic flow sensor with NTP female tapered threads
UFS 1.5	1.5” polymer ultrasonic flow sensor with NTP female tapered threads
UFS 2	2” polymer ultrasonic flow sensor with NTP female tapered threads

Antennas and Communication Accessories

Part #	Description
GR-STICK-5	Cellular stick antenna operating at 5 dBi. Does not include antenna cable.
GR-STUBBY	Cellular surface-mount antenna with 3’ antenna cable
GR-YAGI-11	4G LTE high-gain directional Yagi antenna operating at 11 dBi. Does not include antenna cable.
SR-STICK-6	Spread Spectrum Radio omni-directional stick antenna operating at 6 dBi. Does not include antenna cable.
SR-STICK-8	Spread Spectrum Radio omni-directional stick antenna operating at 8 dBi. Does not include antenna cable.
SR-STUBBY	Spread Spectrum Radio surface-mount antenna with 3’ antenna cable
SR-YAGI-6	Spread Spectrum Radio directional Yagi antenna operating at 6 dBi. Does not include antenna cable.
SR-YAGI-9	Spread Spectrum Radio directional high-gain Yagi antenna operating at 9 dBi. Does not include antenna cable.
SR-YAGI-11	Spread Spectrum Radio directional high-gain Yagi antenna operating at 11 dBi. Does not include antenna cable.
SR-FILTER	Spread Spectrum Radio frequency filter
WEN-STUBBY	Wi-Fi surface-mount antenna with 3’ antenna cable
WEN-YAGI-11	Wi-Fi high-gain directional Yagi antenna operating at 11 dBi. Does not include antenna cable.
LMR-400-DB	Antenna cable with end connectors. Available in 10', 20', 30', 40', and 50' lengths (e.g., LMR-400-DB-10ft). Special-order, custom lengths available. Maximum length 100’.
LMR-600-DB	Antenna cable with end connectors for cable lengths greater than 100’. Special-order, custom lengths only.
ANT-PROT	Antenna cable surge protection device
STICK-MNT-BRKT	Stick antenna mounting bracket
YAGI-MNT-BRKT	Yagi antenna mounting bracket

Enclosure Accessories

Part #	Description
CS3-SSBP	22" x 32" stainless-steel back panel for indoor wall mounting. Fully assembled with TP-110, GFCI, and receptacle. Must be ordered at same time as wall-mount controller (model -WM).
SSE-PED	Heavy-duty, stainless-steel riser for mounting Calsense pedestal (model -S) onto a metered enclosure. Requires Strong Box Stainless Steel Meter Pedestal (MPS) and Calsense mounting templated - supplied by others

Data Access Service Plans

Part #	Description

COMM-1YR	One-year prepaid data access service plan for one cellular modem (billed annually)
COMM-5YR	Five-year prepaid data access service plan for one cellular modem (billed every five years)
COMM-10YR	Ten-year prepaid data access service plan for one cellular modem (billed every ten years)

For more guidance on specification structure and CSI MasterFormat mapping, refer to Appendix A — Specification Guidance and CSI Mapping.

Irrigation Controller

CS3000

The Calsense CS3000 Irrigation Controller is an EPA WaterSense®-certified water conservation and irrigation management solution. Key features include integrated flow monitoring and management, as well as weather-based irrigation using daily evapotranspiration (ET). ET calculations automatically adjust station run times based on site-specific landscape parameters such as soil type, slope, plant material, sprinkler type, and sun exposure.

The CS3000 offers programming flexibility, including:

- **Unlimited irrigation programs**, capable of operating individual stations or interspersed stations to maximize hydraulic capacity and reduce total watering time.
- **Group-based landscape configuration**, allowing shared attributes, such as plant material, sprinkler type, and sun exposure, to be assigned to multiple stations for simplified programming.
- **Advanced flow management**, supporting up to four mainlines and 12 points of connection (POCs) simultaneously when sharing flow across multiple controllers using the optional *FLOWSENSE*® feature (see *FLOWSENSE* (model CS3-FL) on page 39).
- **Automatic cycle-and-soak scheduling**, enabling fixed cycle runtimes with soak intervals to improve soil infiltration and minimize runoff.
- **Multiple scheduling options**, including even days, odd days, specific days of the week, and interval schedules ranging from every other day up to every four weeks.
- **Predictive water budgeting**, designed to maximize water savings during drought conditions and in response to watering restrictions.
- **Always-connected operation**, using an Internet of Things (IoT) architecture to enable irrigation management via phones, tablets, and computers from any location.
- **Manual irrigation programs**, allowing stations to run for preset durations up to six times per day, ideal for hydroseeding and new plant establishment.
- **Electrical diagnostics and alerts**, including short-circuit and no-current detection, to aid technicians in troubleshooting field wiring and solenoid issues.
- **Non-volatile permanent memory**, preserving all programming and configuration data, including date and time, without risk of data loss.
- **Multiple station count options**, available in 8, 16, 24, 32, 40, and 48 stations, with the ability to add stations at any time if fewer than 48 are initially installed.
- **Expanded station capacity with 2-Wire**, supporting up to 128 stations total, including:
    - Up to 128 2-Wire stations (maximum of 70 decoders), or
    - A hybrid configuration of up to 80 2-Wire stations and up to 48 conventionally wired stations.
- **Modular backplane design**, supporting field-replaceable components such as terminal strips, 2-Wire modules, and Calsense accessories, including the ET Gage and Tipping Rain Bucket.
- **Comprehensive reporting,** available both at the controller and through the Command Center Online web application, including daily events and alerts, water usage, budget comparisons, usage by mainline, POC, and station, and soil moisture trends over time.

Electrical Requirements

Calsense CS3000 controllers are powered by low-voltage 24-VAC step-down transformers. Field valve wiring is connected to factory-labeled terminals, and field common wires are connected to the controller common terminals.

Electrical Specifications

- UL-approved

  Note: Creating additional holes in the enclosure will void the UL listing.
- Input: 120-VAC, 60-Hz, 1.0A (120-VAC power connected to transformer input leads)
- Transformer: 56-VA (Class 2 output, rated 24-VAC, maximum total load of 2.0 A)
- Outputs:
  - 24-VAC to valves
  - 24-VAC to master valve
  - 24-VAC output for pump start relay
- Electrical surge protection

Electrical Hook-up

All 120-VAC electrical and grounding connections must be installed in accordance with applicable local codes and the National Electrical Code (NEC).

For wall-mount controllers (model -WM), the 120-VAC power supply must be enclosed in a grounding-approved conduit and securely connected to the transformer nipple. All pedestal enclosures are supplied with a prewired conduit and rear-mounted junction box. Connections to outgoing conduits must be made within the junction box.

The transformer is capable of simultaneously powering:

- Up to six 0.25-amp solenoids, or
- A master valve or pump start relay in combination with five 0.25-amp solenoids.

When using 2-Wire, up to six solenoids on a single 2-Wire path may be energized simultaneously.

Note: Any individual output may be loaded up to 1.5 A, provided the total combined load does not exceed 2.0 A.

Conventional Wiring Guidelines

The purpose of this section is to guide designers and specifiers in selecting proper wire types, gauges, and routing practices for conventionally wired CS3000 installations.

Recommended Wire Types

- UL-listed, direct-burial rated irrigation wire
- Solid copper conductors preferred for long-term reliability
- Color-coded insulation for station identification (optional but recommended)

Wire Gauge and Maximum Distance

The example in Table 1 below details the maximum one-way distance between the controller and a sample valve solenoid (24 VAC, 250 mA inrush current, 190 mA holding current, 60 Hz).

Common/Ground Wire (AWG)	Conventional Control Wire Size (ft.)					
	18 AWG	16 AWG	14 AWG	12 AWG	10 AWG	8 AWG
18	850	1040	1210	1350	1460	1540
16	1040	1340	1650	1920	2150	2330
14	1210	1650	2150	2630	3080	3450
12	1350	1920	2630	3390	4170	4880
10	1460	2150	3080	4170	500	6670
8	1540	2330	3450	4880	6670	8700

Table 1 - Maximum recommended wire lengths (in feet) by gauge and solenoid load (based on 24-VAC, 60Hz, 2A transformer)

Note: Distances are approximate and assume 0.25A solenoids. Always verify actual solenoid draw and total load.

Common Wire Considerations

- Use a dedicated common wire for every 6 - 8 stations to reduce voltage drop.
- Use larger gauge wire (e.g., 12 AWG or 10 AWG) for common wires serving multiple valves.
- Avoid splicing common wires where possible; use approved waterproof connectors if splicing is necessary.

Wire and Electrical Connectors

If splices are unavoidable, they must be installed in a valve box using one of the following:

- 3M™ Scotchcast™ 3570G Connector Sealing Packs
- 3M DBR/Y-6 Direct-Bury Splice Kits
- Spears® DS-100 Dri-Splice Connectors with DS-300 Dri-Splice Sealant

Note: Spears Dri-Splice Connectors may not be used for 2-Wire connections.

Routing and Installation Best Practices

- Use conduit where required by code or where mechanical protection is needed.
- Avoid running valve wires parallel to high-voltage lines to prevent interference.
- Label all wires at controller and valve ends for easier troubleshooting.
- Maintain separation between communication cables and valve wiring.

Grounding and Surge Protection

- Ensure proper grounding per NEC and local codes.
- Use TP-110 transient protection module for AC line protection.
- Consider additional surge protection for long wire runs or lightning-prone areas.

Grounding Instructions

Each irrigation controller requires a 5/8-inch × 8-foot copper ground rod or an equivalent ground plate installed a minimum of 8 feet from the controller and from other electronic equipment. Wall-mount controllers installed side-by-side may share a single ground rod or ground plate only if they are supplied by the same electrical branch circuit.

Ground rods or ground plates must be connected to the controller's ground lug using #6 AWG solid copper wire (non-braided) with minimal bending. If bends are required, the bend radius must be greater than 8 inches. The grounding connection must be accessible and installed either within a 10-inch round valve box or, for pedestal installations, routed through the pedestal base. The connection to the ground rod or plate must be welded or brazed, and the ground rod or plate must not be shortened.

Wall-mount controllers include an opening for PVC conduit to route the grounding conductor through the bottom of the enclosure. Pedestal controllers require the grounding conductor to be routed through a sweep ell installed in the concrete base.

For 2-Wire systems, a 5/8-inch × 8-foot copper ground rod or ground plate must be installed:

- At the controller
- At least every 300 feet (or at the nearest decoder) along each 2-Wire path, and
- At the end of each 2-Wire path

Ground rods and ground plates must be installed a minimum of 8 feet from the 2-Wire path to ensure effective grounding.

Note: The solar panel supplied with a Calsense solar enclosure requires a separate ground rod or ground plate from the controller. The included grounding conductor must be routed through the solar pole (sourced separately; see Solar Panel Details for pole specifications) and terminated at the dedicated ground rod or plate.

Transient Protection

The Calsense CS3000 backplane incorporates transient protection on each field-replaceable module to prevent electrical surges from entering the controller (see Figure 1). Because lightning strikes and other transient events can cause severe damage to irrigation equipment, the backplane is designed to help mitigate these risks.

Transient protection is provided with transorbs, solid-state suppression devices that divert incoming transient energy to ground, directing it away from sensitive controller electronics.

Note: Transient protection effectiveness is dependent on proper grounding. Inadequate grounding may significantly reduce the level of protection provided.

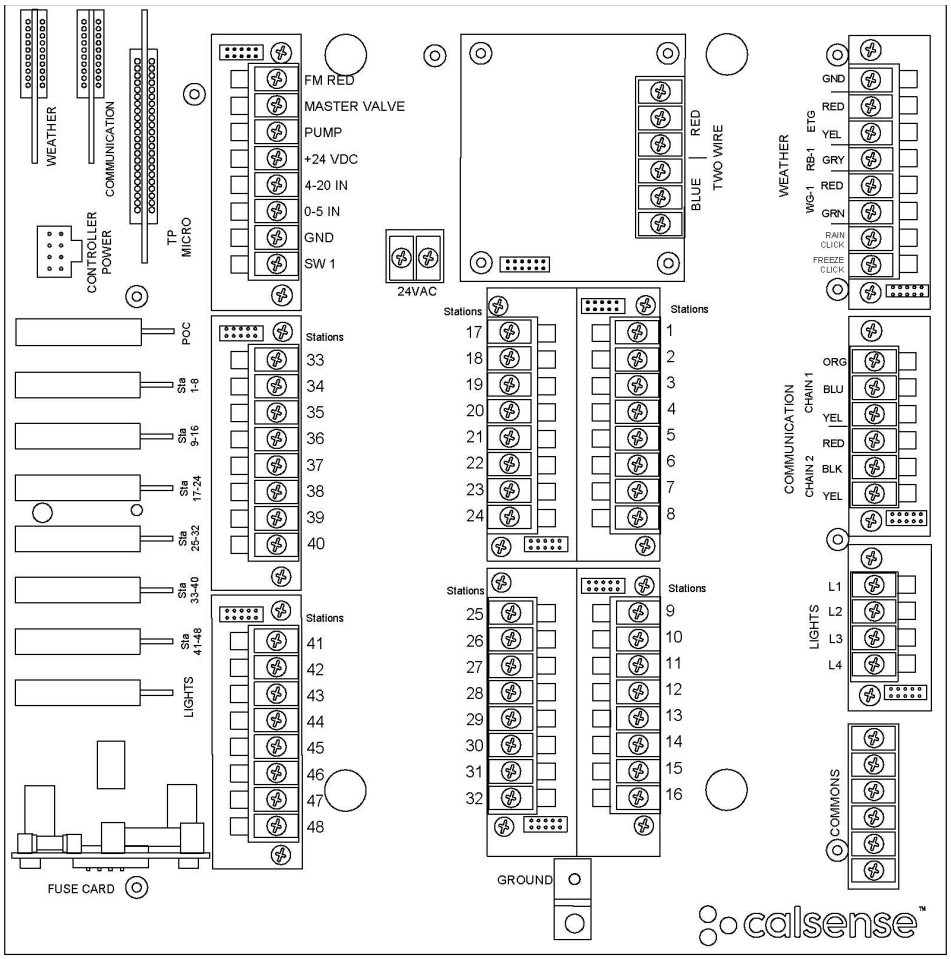


Figure 1 - CS3000 Wall-mount backplane detail (model CS3-MB)

Compliance

Build America, Buy America Act (BABA)

Calsense certifies that the products and materials listed below, manufactured and supplied by Calsense, are in full compliance with the Build America, Buy America Act (BABA) requirements as mandated under the Infrastructure Investment and Jobs Act (Pub. L. No. 117-58, §§ 70901-70927). Calsense further certifies that these products meet the definition of a “manufactured product” under BABA, with final assembly occurring in the United States and greater than 55% of total component costs attributable to U.S.-manufactured components. Supporting compliance documentation, including assembly location information, is available upon request.

- **CS3000 irrigation controllers** and **enclosures**.
- **Communication options** when pre-installed on controllers at time of purchase.
- **Modules** when preinstalled with controllers at time of purchase.
- **FM** and **FM B** model impeller flow sensors.

Buy America and American Recovery and Reinvestment Act of 2009 (ARRA)

Calsense further certifies that all products meet the requirements of the Buy America provisions outlined in 23 CFR § 635.410 and, where applicable, the American Recovery and Reinvestment Act of 2009 (ARRA), for projects still governed by ARRA provisions, as detailed in 2 CFR 176.140. Specifically, all iron and steel components used in these products are manufactured in the United States, including all coating processes. Final manufactured products are assembled domestically with greater than 55% of component costs sourced from U.S. suppliers.

EPA WaterSense

The CS3000 Irrigation Controller is a WaterSense® labeled irrigation controller, independently certified by the U.S. Environmental Protection Agency (EPA) to meet strict criteria for water efficiency and performance. The WaterSense label identifies irrigation controllers that apply water based on actual site conditions, such as weather and landscape factors, rather than fixed, clock-based schedules. By adjusting irrigation runtimes to better match plant water needs, WaterSense labeled controllers help reduce overwatering while maintaining healthy, well-performing landscapes. To earn this designation, controllers must be third-party tested and verified to demonstrate both irrigation adequacy and water efficiency under a range of operating conditions.

Made in USA

Calsense products are Made in the USA of U.S. and imported parts, in accordance with the Federal Trade Commission's Made in USA Labeling Rule (16 CFR Part 323) and applicable FTC guidance and California Business and Professions Code §17533.7. Final assembly and substantial transformation occur in the United States, and imported components are used only where domestic alternatives are unavailable or impractical.

UL

When Calsense controllers are factory preinstalled within Calsense enclosures, the resulting assembly is UL certified in accordance with applicable UL standards for industrial control panels and electrical enclosures, as identified by the UL mark applied to the enclosure nameplate. UL certification indicates that the complete, pre-assembled controller-and-enclosure system has been evaluated by an independent third party for electrical safety, construction, and suitability for its intended use. This evaluation applies to the enclosure, the installed components, internal wiring, and factory assembly as a complete unit, rather than to individual components alone.

Cloud Control

Command Center Online

Calsense Command Center Online is a cloud-based irrigation management platform designed to provide centralized, remote control of all CS3000 controllers. The application allows users to manually run up to six valves simultaneously from any internet-connected device.

Daily weather data may be automatically shared with controllers from WeatherSense, ET Gages, Tipping Rain Buckets, and/or external weather sensors. Using this real-time data, controllers dynamically adjust station run times to improve irrigation efficiency while helping reduce water usage and labor costs.

Command Center Online provides access to a wide range of reports from PCs, tablets, and smartphones. The Daily Alerts report shows flow and electrical issues, including their locations and probable causes. Other system reports capture data for every irrigation cycle, including water usage versus budget, total gallons applied, percentage of water saved, and logged events or configuration changes at the controller. Reports are also available for a variety of other operational and performance metrics.

Each customer system is secured with password-protected access. User accounts are created and managed by an administrator account, ensuring that only authorized users can view or change controller data. System administrators may also generate reports summarizing site activity and user access.

Command Center Online supports multiple communication methods between controllers and the cloud platform, including Ethernet, wireless Ethernet (Wi-Fi), and cellular modems. Available communication options are described in detail in Communication Options on page 40.

Calsense's Asset Management feature offers a centralized view of all connected irrigation assets across a site or portfolio, helping agencies and organizations maintain accurate records and improve long-term system reliability. Through Command Center Online, users can track controllers, flow sensors, weather sensors, and other connected components, along with their locations and configuration details. By maintaining visibility into system assets and their operational status, Asset Management supports proactive planning, simplifies maintenance coordination, and helps organizations manage infrastructure consistently across multiple sites.

Calsense also provides an automated, e-mailed daily digest that summarizes critical issues requiring field attention. This digest highlights actionable events such as mainline breaks, flow anomalies, electrical faults, and other system alerts detected during operation. By consolidating high-priority issues into a single daily message, the digest helps field managers and technicians quickly identify where to focus their efforts, reduce time spent reviewing individual alerts, and respond more efficiently to conditions that could impact water use, system performance, or site safety.

Calsense Connect

Calsense Connect is the mobile version of Command Center Online, designed to support onsite operations and enable users to manage CS3000 controllers from a smartphone or tablet.

The application allows users to manually turn stations on and off, including operating up to six valves simultaneously. Calsense Connect also provides real-time flow information and alerts for mainline breaks, as

well as real-time weather data when connected to on-site Calsense devices such as the Tipping Rain Bucket, Wind Gage, and ET Gage.

Key features include:

- **Mobile access to Command Center Online**, enabling seamless field operations from smartphones and tablets.
- **Manual station control**, including the ability to operate up to six valves simultaneously on CS3000 controllers.
- **Real-time system visibility**, including water flow data, mainline break details, and weather information from connected on-site Calsense sensors.
- **Enhanced security features**, designed to protect system data and user access.
- **Quick command execution**, allowing control at multiple levels, from entire sites down to individual stations.

WeatherSense

WeatherSense is a feature available within the Command Center Online cloud platform that provides real-time evapotranspiration (ET) and rainfall data without requiring an on-site ET Gage or Tipping Rain Bucket. Weather data is shared daily with field controllers to support accurate, weather-based irrigation scheduling.

WeatherSense delivers real-time ET and rainfall data for locations throughout the United States using aggregated information from more than 25,000 weather stations, computer-modeled near-surface weather conditions, and localized data from statewide networks such as California's CIMIS and Colorado's CoAgMet weather networks. This blended data approach helps ensure accurate representation of current conditions, even in areas with localized microclimates. By using a controller's geographic coordinates or map placement within Command Center Online, WeatherSense can precisely identify weather conditions at each controller location.

For sites equipped with existing on-site weather stations, such as the Campbell Scientific ET107 or WxPRO, WeatherSense may be able to access real-time weather data through a partnership with Western Weather Group. Contact your Calsense representative for additional information.

When to Specify – WeatherSense vs On-Site Sensors

- WeatherSense is appropriate when on-site sensor installation is impractical.
- Specify on-site sensors where microclimates, wind exposure, or localized weather variation materially affect irrigation outcomes.
- Hybrid approaches are common: WeatherSense for baseline scheduling plus on-site sensors where site conditions demand it.

Enclosures

Wall-Mount Enclosure (model -WM)

The Calsense Wall-Mount Enclosure is a fully assembled unit supplied with a Calsense CS3000 Irrigation Controller (see Figure 2). The enclosure measures 16.25 in × 14.5 in × 7.375 in and is constructed of weather- and vandal-resistant, powder-coated stainless-steel. It includes integrated transient and lightning protection and is supplied with factory-labeled terminals.

The enclosure features a security-tight locking mechanism, louvered vents with splash guards, and insect screens. When ordered concurrently with a communications option utilizing a surface-mount antenna, such as cellular, wireless Ethernet (Wi-Fi), or spread-spectrum radio, the enclosure is provided with the appropriate number of pre-drilled antenna mounting holes. All wall-mount enclosures are UL-approved and include a 10-year warranty.

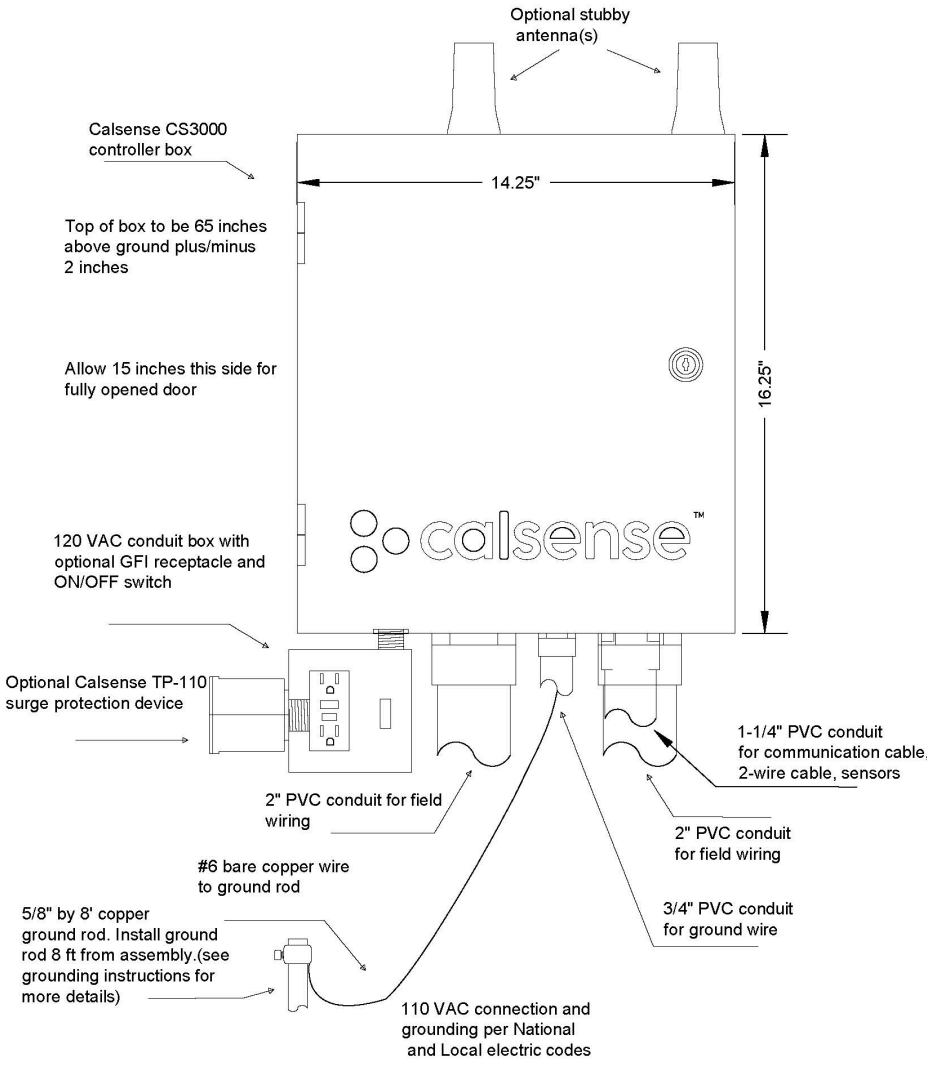


Figure 2 - Wall-Mount enclosure installation detail

Installation

When selecting a mounting location, ensure that all power wiring is accessible and that routing to irrigation remote-control valves is carefully planned. Calsense recommends that the 120-VAC power supply be provided with a disconnect switch.

A minimum of 2 inches of clearance above the controller is required to allow door removal after installation. In addition, the enclosure door requires at least 15 inches of clearance on the left side to fully open.

Wall-mount enclosures must be installed using the supplied mounting template and secured to a flat surface. For optimal visibility and ease of use, the liquid crystal display (LCD) should be positioned at approximately eye level.

Heavy-Duty Stainless-Steel Enclosure (model -S)

The Heavy-Duty Stainless-Steel Enclosure (SSE) is a fully assembled pedestal-mounted unit supplied with a Calsense Irrigation Controller (see Figure 3). The controller is mounted at a 25-degree angle to improve access and visibility. The enclosure measures 37.875 in × 14.5 in × 13.325 in and is constructed of weather- and vandal-resistant 304 stainless-steel. It includes integrated transient and lightning protection and is supplied with factory-labeled terminals, a GFCI receptacle, and a power toggle switch.

The SSE features a security-tight locking mechanism, louvered vents with splash guards, and insect screens. When ordered concurrently with a communications option utilizing a surface-mount antenna, such as cellular, wireless Ethernet (Wi-Fi), or spread-spectrum radio, the enclosure is provided with the appropriate number of pre-drilled antenna mounting holes. All SSE enclosures are UL-approved and include a 10-year warranty.

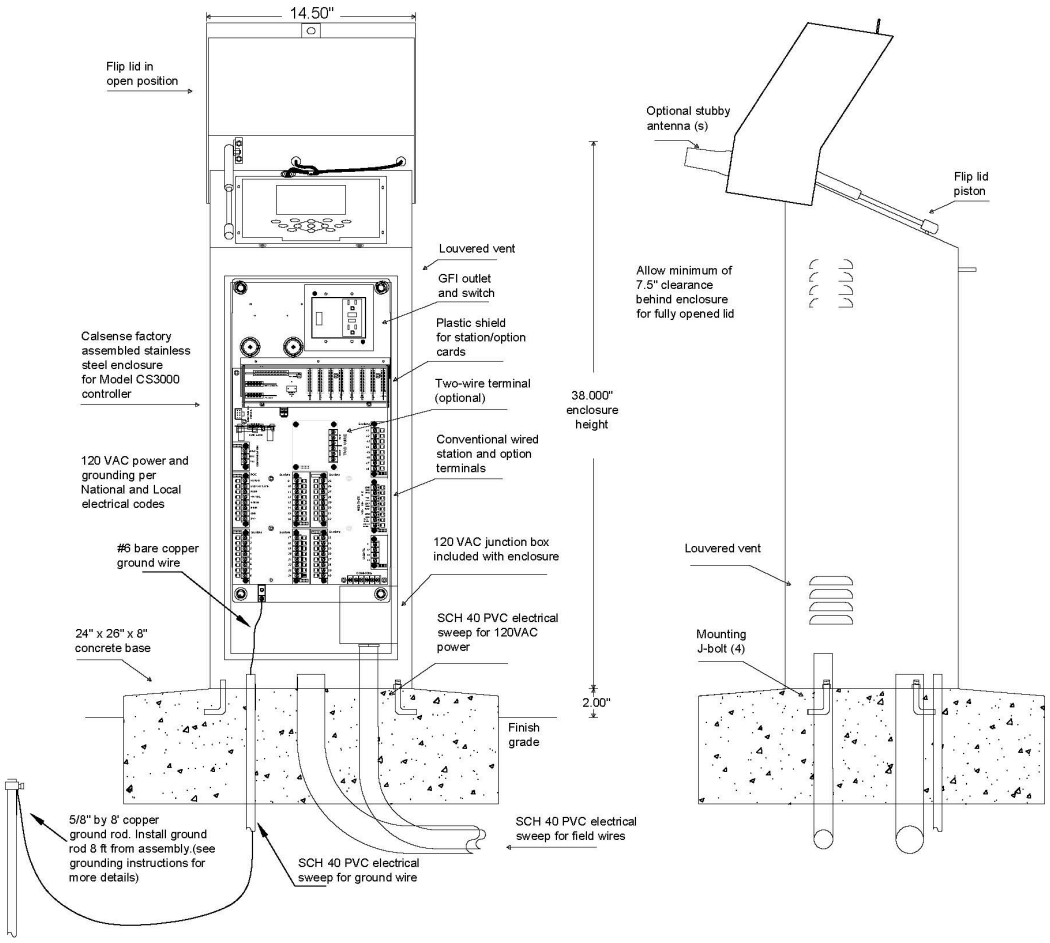


Figure 3 - Stainless steel enclosure installation detail

Installation

When selecting a location for a pedestal-mounted CS3000 controller, ensure that all power wiring is accessible and that routing to irrigation remote-control valves is carefully planned. Pedestal enclosures require a minimum of 7.5 inches of rear clearance to allow the lid to fully open.

The pedestal must be mounted on a level concrete base measuring 24 in × 26 in × 8 in, with the top of the base extending at least 2 inches above finished grade. Each model is supplied with four anchor bolts for securing the enclosure and a mounting template for positioning the bolts. Anchor bolts must be set in place before the concrete cures, and the mounting template must be removed prior to installing the pedestal.

Pedestal controllers are equipped with a dedicated power switch. Sweep ells for irrigation control wiring should be positioned on the right side of the pedestal, while the sweep ell for 120-VAC power wiring should be positioned on the left side. All sweep ells must be installed within the concrete form. For additional information on electrical installation and grounding requirements, refer to Electrical Requirements on page 13.

Note: When installing more than one controller on the same concrete base, allow a minimum of 5 inches of clearance between the outside edges of the mounting templates.

Heavy-Duty Dual-Controller Stainless-Steel Enclosure (model -SD)

The Heavy-Duty Dual-Controller Stainless-Steel Enclosure is a fully assembled pedestal-mounted unit designed to house any combination of two Calsense CS3000 Irrigation Controllers (see Figure 4). The enclosure measures 37.875 in × 26.5 in × 13.325 in.

The Dual-Controller Enclosure supports the following configurations:

- Two CS3000 conventional controllers, each supporting up to 48 stations (model CS3-xx-SD), or
- Two CS3000 2-Wire controllers (model CS3-2W-SD)

Additional station capacity may be added using CS3-8STA-KIT station expansion kits.

The enclosure is constructed of weather- and vandal-resistant 304 stainless-steel and includes integrated transient and lightning protection. It is supplied with factory-labeled terminals, a GFCI receptacle, and a power toggle switch. Additional features include a security-tight locking mechanism, louvered vents with splash guards, and insect screens.

When ordered concurrently with a communications option utilizing a surface-mount antenna, such as cellular, wireless Ethernet (Wi-Fi), or spread-spectrum radio, the enclosure is provided with the appropriate number of pre-drilled antenna mounting holes. All Dual-Controller enclosures are UL-approved and include a 10-year warranty.

Installation

When selecting a location for dual-controller enclosure-mounted CS3000 controllers, ensure that all power wiring is accessible and that routing to irrigation remote-control valves is carefully planned. Pedestal enclosures require a minimum of 7.5 inches of rear clearance to allow the lid to fully open.

The pedestal must be mounted on a level concrete base measuring 38 in × 24 in × 8 in, with the top of the base extending at least 2 inches above finished grade. Each model is supplied with anchor bolts for securing the enclosure and a mounting template for positioning the bolts. Anchor bolts must be set in place before the concrete cures, and the mounting template must be removed prior to installing the pedestal.

Pedestal controllers are equipped with a dedicated power switch. Sweep ells for irrigation control wiring should be positioned on the right side of each controller, while sweep ells for 120-VAC power wiring should be positioned on the left side. All sweep ells must be installed within the concrete form. For additional information on electrical installation requirements, refer to Electrical Requirements on page 13.

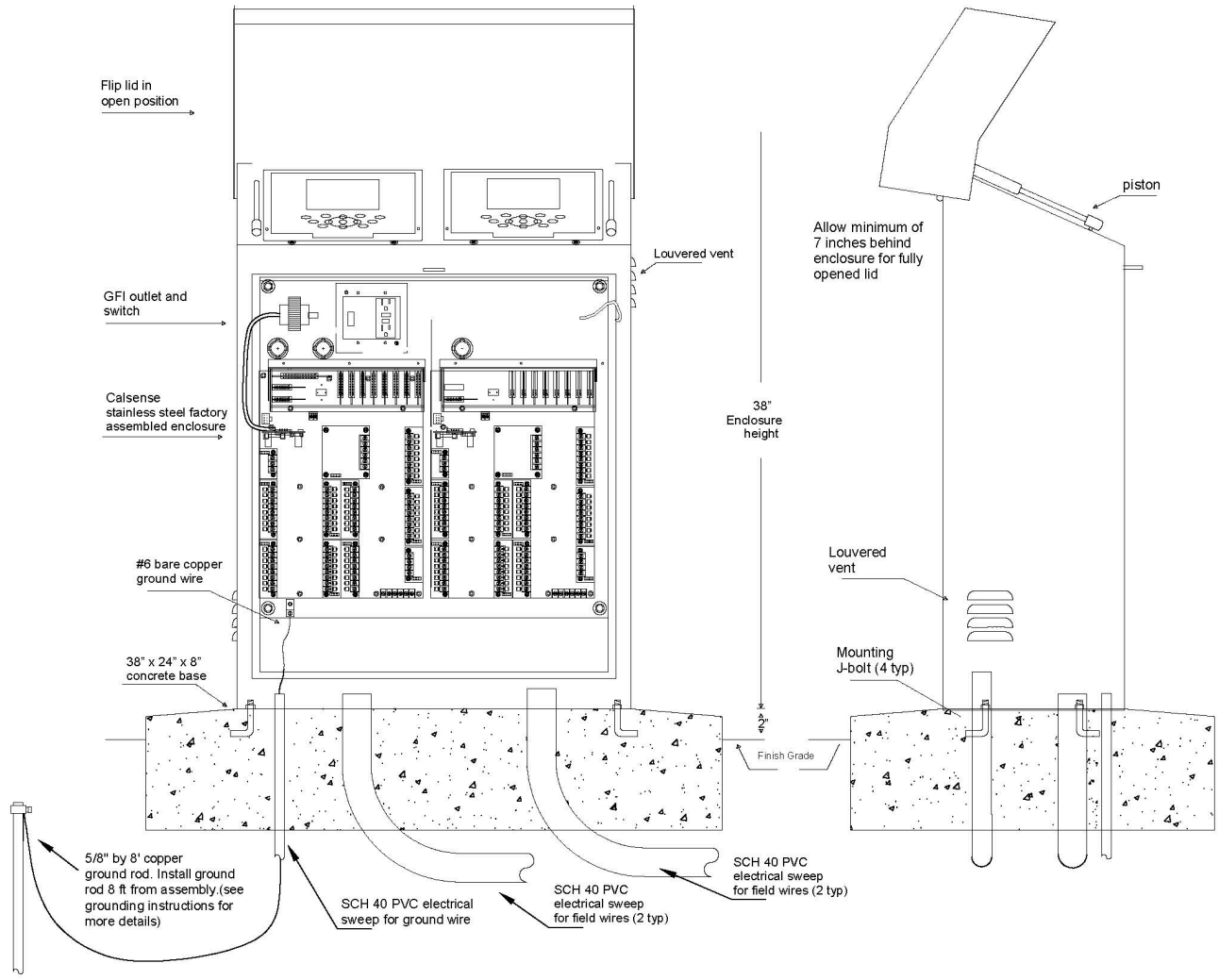


Figure 4 - Double-wide stainless-steel enclosure installation detail

Heavy-Duty Stainless-Steel Solar Enclosure (model -SL)

The Heavy-Duty Stainless-Steel Solar Enclosure is housed within the Calsense Dual-Controller Stainless-Steel Enclosure (model -SD), a UL-approved, flip-top pedestal enclosure. The assembly includes a Calsense CS3000 irrigation controller mounted on the left side and dedicated solar charging and control equipment mounted on the right (see Figure 5).

The enclosure is supplied fully assembled and pre-wired and includes a solar panel, power inverter, power monitor, batteries, and circuit breakers. The solar enclosure is compatible with CS3000 conventional controllers supporting up to 48 stations, as well as CS3000 2-Wire controllers. Communication with the Command Center Online cloud platform is supported via a cellular communication option (model CS3-GR-KIT).

The controller is mounted at a 25-degree angle to improve access, visibility, and ease of programming. The solar power assembly eliminates the need for a nearby AC power source and is designed to automatically manage battery charging and long-term battery health. The system may be deployed as a standalone installation or integrated into an existing Calsense irrigation network.

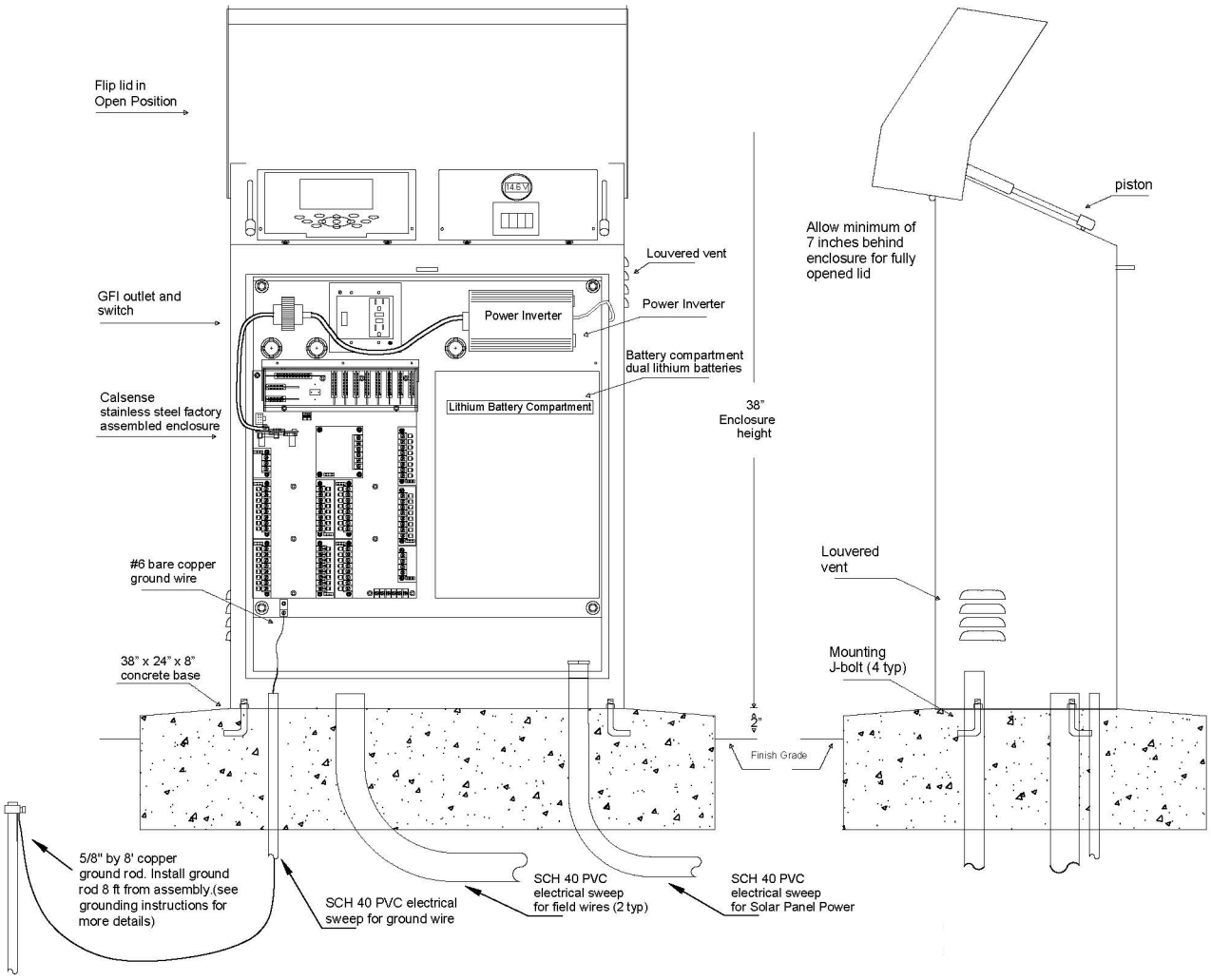


Figure 5 - Solar enclosure installation detail

Installation

When selecting a location for a solar enclosure, ensure that routing to irrigation remote-control valves is carefully planned. Solar pedestal enclosures require a minimum of 7.5 inches of rear clearance to allow the lid to fully open.

The enclosure must be mounted on a level concrete base measuring 38 in × 24 in × 8 in, with the top of the base extending at least 2 inches above finished grade. Each model is supplied with anchor bolts for securing the pedestal and a mounting template for positioning the anchor bolts. Anchor bolts must be installed prior to the concrete setting, and the mounting template must be removed before installing the enclosure.

Solar Panel Details

The CS3000 Solar Enclosure includes a solar panel that supplies power to the controller and charges two internal batteries, which provide system power during periods of insufficient sunlight.

The solar panel must be installed within 30 feet of the controller (up to 60 feet with a splice) and mounted on a 36 in × 36 in concrete form (see Figure 6). The panel must be oriented to maximize year-round sun exposure, typically facing southwest, and installed in a location free from shading or obstructions.

The solar panel requires a mounting pole, which is not included with the Calsense solar enclosure and must be sourced separately by the designer or contractor. The pole must meet the following minimum specifications:

- Pole Height: 16 ft
- Pole Size: 4.5 in round steel (4 in Schedule 40 pipe)
- Wall Thickness: 0.237 in minimum
- Base Plate: 9.5 in × 3/4 in
- Bolt Circle: 6.5–10.25 in
- Anchor Bolts: 3/4"-10 × 24" HDG, 3.25–3.75 in projection
- Finish: Hot dip galvanized

The maximum allowable cable length from the top of the solar panel to the enclosure connection point is:

- 60 feet using the supplied wiring.
- 90 feet when using custom-length solar panel wiring.

The solar panel is supplied with a 10-gauge grounding conductor, which must be routed through the solar pole and terminated at an approved ground rod or grounding plate.

Design Checklist – Solar Installations

- Confirm year-round solar exposure (avoid seasonal shading).
- Verify panel orientation and mounting location can meet cable length limits.
- Provide separate grounding for the solar panel per installation requirements.
- Confirm solar panel mounting pole has been sourced and meets the specifications listed under Solar Panel Details.

Solar Assembly Specifications

- Two 12.8V, 49 Ahr lithium batteries
- 20-Watt solar panel
- DC miniature circuit breakers
- Smart Bluetooth® power monitor
- 250VA pure sine wave inverter
- 75/15 solar charger controller
- 24-VAC output to valves, including master valve and pump start relay
- Electrical surge protection
- Solar components are not UL approved

Note: Designers must verify that the installation site receives sufficient sunlight to support continuous controller operation based on panel orientation, available solar exposure, and seasonal daylight duration.

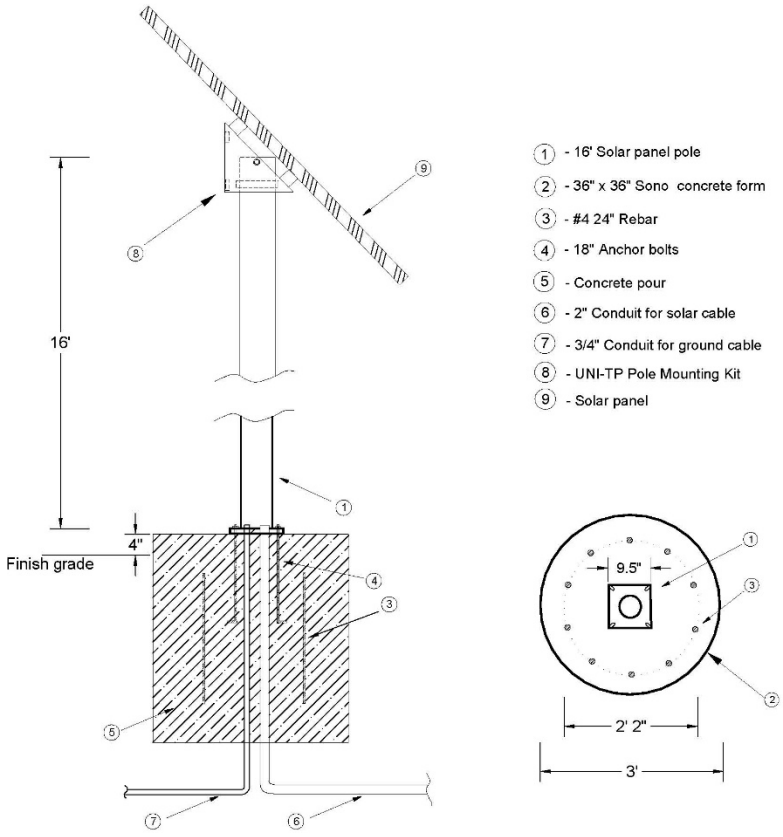


Figure 6 - Solar panel installation detail

StrongBox Retrofit Kits

Calsense StrongBox Retrofit Kits are designed to allow CS3000 irrigation controllers to be installed within existing StrongBox stainless-steel enclosures, providing a cost-effective path to modernize legacy irrigation infrastructure while retaining serviceable field hardware. Retrofit kits support both wall-mount and pedestal-style StrongBox enclosures and are available in single-controller and dual-controller configurations, depending on the enclosure model.

Each retrofit kit includes a preconfigured mounting assembly and required hardware to securely install the CS3000 controller within the existing enclosure, while maintaining proper clearances, accessibility, and environmental protection. Retrofit installations preserve the functional characteristics of the original enclosure, including weather resistance and physical security, while enabling full CS3000 functionality such as cloud connectivity, flow monitoring, weather-based irrigation, and advanced diagnostics.

StrongBox Retrofit Kits are intended for use where existing enclosures are structurally sound and appropriately located, allowing agencies and owners to extend the useful life of installed assets while upgrading controller technology. Retrofit kits are compatible with standard CS3000 enclosure options and accessories, including communication options and antenna configurations, as specified for new installations.

The kits include integrated transient and lightning protection and are supplied with factory-labeled terminals, a GFCI receptacle, and a power toggle switch.

2-Wire

2-Wire Option (model CS3-2WIRE-OPT)

Unlike conventional irrigation systems, 2-Wire systems use a single pair of wires to connect the controller to multiple field stations through a network of decoders. This 2-Wire path runs underground and delivers both power and communication signals to each decoder along its route. The controller sends digital signals over the wire path to activate individual decoders, which in turn energize the corresponding solenoids. As a result, each solenoid does not require a dedicated power wire.

Decoders are electronic devices connected to the 2-Wire path and operate irrigation components based on commands received from the controller. Three decoder types are supported:

- Station decoders (2-station)
- Point of Connection (POC) decoders
- Soil moisture sensor decoders

A single controller supports up to 80 total decoders, including up to 70 station decoders, across a maximum of 128 total stations. Each decoder is identified by a unique serial number, which is used during field installation to assign station numbers within the controller.

When to Specify - 2-Wire Systems

2-Wire is typically preferred for sites with long or complex wire routes, phased expansion, or where minimizing home-run conductors (multiple individual valve-to-controller wire runs) is desirable. Conventional wiring may be preferred for smaller sites with short wire runs.

Installation Guidelines

2-Wire decoders connect to a dedicated 2-Wire cable - Regency® Hunter Decoder Cable or Paige® P7354D - originating at the irrigation controller. The maximum total 2-Wire cable length per controller is 7,000 feet. Each station decoder may operate up to two valves.

For proper surge protection and signal integrity, a 5/8-inch × 8-foot copper ground rod or ground plate must be installed:

- At the controller
- At least every 300 feet along each 2-Wire path (or at the nearest decoder), and
- At the end of each 2-Wire path

Ground rods or ground plates must be installed a minimum of 8 feet from the 2-Wire cable path.

Communication between the controller and decoders relies on electronic signaling so all electrical connections must be fully waterproof. Calsense recommends the use of 3M™ Scotchcast™ 3570G Connector Sealing Packs for all 2-Wire connections, including splices along the wire path. If 3M Scotchcast 3570G sealing packs are not available, 3M DBR/Y-6 Direct Bury Splice Kits may be used as an alternative.

IMPORTANT! Connector sealing packs MUST be installed as soon as wire connections are made to prevent water intrusion.

2-Station Decoder (model CS-2W-2ST)

The 2-Station Decoder operates up to two solenoids, using a separate, color-coded wire for each station output (see Figure 7). A single CS3000 2-Wire controller can operate up to 128 valves, distributed across a maximum of 70 physical 2-Station Decoders.

All wiring runs between decoders and valves must be direct pulls with no intermediate splices, except at the decoder connection point.

2-Wire decoders utilize #14 AWG direct-burial wire for connections to remote control valves. The maximum allowable wire length between a decoder and each valve is 100 feet.

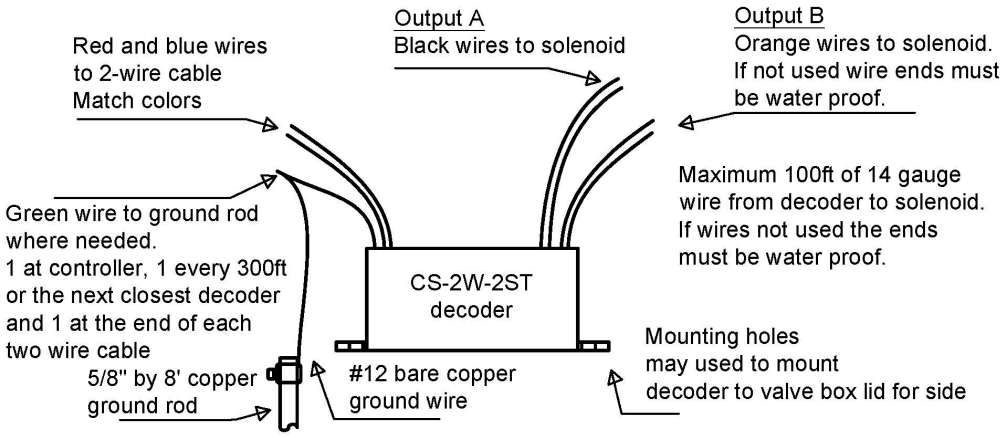


Figure 7 - 2-Wire 2-Station decoder installation detail

POC Decoder (model CS-2W-POC)

The Point-of-Connection (POC) Decoder operates a single master valve and flow sensor (see Figure 8). A single controller supports up to six POC Decoders.

When used with *FLOWSENSE*, the system supports a total of up to 12 points of connection (POCs) distributed across the controllers.

POC decoders use #14 AWG direct-burial wire for connections to field devices. The maximum allowable wire lengths are:

- Up to 10 feet from the decoder to the flow sensor
- Up to 100 feet from the decoder to the master valve

All wiring runs between valves, sensors, and 2-Wire decoders must be direct pulls with no intermediate splices, except at the decoder connection point.

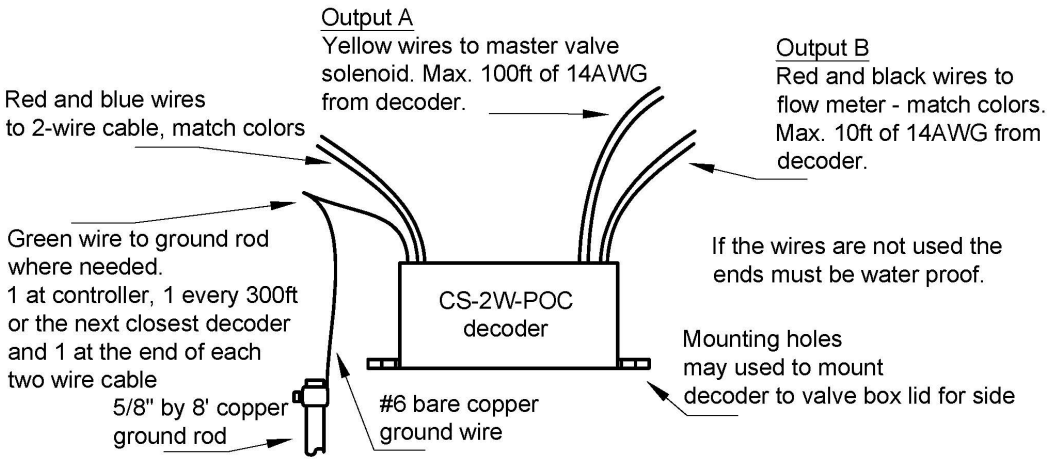


Figure 8 - 2-Wire POC decoder installation detail

Soil Moisture Sensor Decoder (model CS-2W-MOIST)

The Soil Moisture Sensor Decoder measures volumetric water content at the installed sensor depth by evaluating the soil's dielectric constant using capacitance/frequency-domain technology. This data helps manage irrigation application to maintain proper soil moisture balance for optimal plant growth.

In addition to soil moisture, the sensor measures soil temperature and electrical conductivity (EC). Soil temperature has a considerable influence on plant growth, water uptake, and irrigation timing, often more so than air temperature. Electrical conductivity provides an indication of salt accumulation resulting from reclaimed or poor-quality water, fertilizer buildup, or insufficient leaching. Together, these measurements allow irrigation decisions to be based on actual root-zone conditions, rather than weather data or fixed schedules alone.

The dual sensor assembly is supplied with a 16-foot cable and includes the ability to wire one remote control valve to the 2-Wire cable. Soil moisture sensors may be installed anywhere along the 2-Wire path, providing flexibility in sensor placement.

Within the CS3000, a soil moisture sensor may be assigned to a Station Group, which can include stations across multiple locations that share similar landscape characteristics. The controller compares sensor readings at regular intervals against a user-defined moisture setpoint to determine when to stop irrigation or skip an irrigation cycle entirely.

Flow Sensors

Calsense flow sensors enable CS3000 irrigation controllers to measure system flow rates, an essential input for water-use reporting and for detecting conditions such as mainline breaks, broken risers, and closed or stuck valves. Flow sensors are installed in the mainline piping downstream of the water meter or backflow preventer.

Flow sensors may be installed on either the upstream or downstream side of the master valve, and the master valve may be configured as either normally open or normally closed, depending on system design requirements.

Proper flow sensor sizing is based on expected station flow rates and the allowable pressure loss through the sensor. As a result, the mainline pipe is typically reduced in size to accommodate installation of the flow sensor. Refer to Flow Sensor Sizes and Permissible Pressure Loss for additional guidance.

To ensure accurate measurement, the flow sensor must be installed with adequate lengths of straight, unrestricted pipe (see Table 2):

- Upstream: minimum length equal to 10 times the nominal sensor diameter
- Downstream: minimum length equal to 5 times the nominal sensor diameter

Note: These straight-pipe requirements do not apply to Calsense UFS-series ultrasonic flow sensors.

Flow Sensor Size (in.)	Minimum Upstream Pipe Length (in.)	Minimum Downstream Pipe Length (in.)	Pipe Diameter (in.)
1	10	5	1
1.25	12.5	6.25	1.25
1.5	15	7.5	1.5
2	20	10	2
3	30	15	3

Table 2 - Tee-type flow sensor sizing chart

The arrow on the top of the flow sensor indicates the required direction of flow and must be oriented correctly during installation. Flow sensors should be installed in an accessible location and housed within a rectangular valve box clearly marked “FM” or “FS” to allow for inspection, service, and maintenance.

For assistance selecting the appropriate flow sensor or determining optimal placement for a specific site, contact your Calsense representative.

When to Specify - Flow Sensors

- Size sensors based on station flow range and allowable pressure loss, not mainline diameter.
- Use ultrasonic sensors (model UFS) where straight-pipe lengths are not available or a wide range of flow is required.
- Consider a bypass manifold when a large mainline serves both high- and low-flow stations.

Tee-Type Flow Sensor (model FM)

The Tee-Type Flow Sensor is available in nominal pipe sizes ranging from 1.25 inches to 3 inches and is offered in bronze or PVC construction (see Figure 9). CS3000 controllers are preconfigured to operate with Calsense Tee-Type Flow Sensors without additional programming.

Bronze models are rated for operation at temperatures up to 150 °F, while PVC models are rated for operating temperatures between 35 °F and 110 °F.

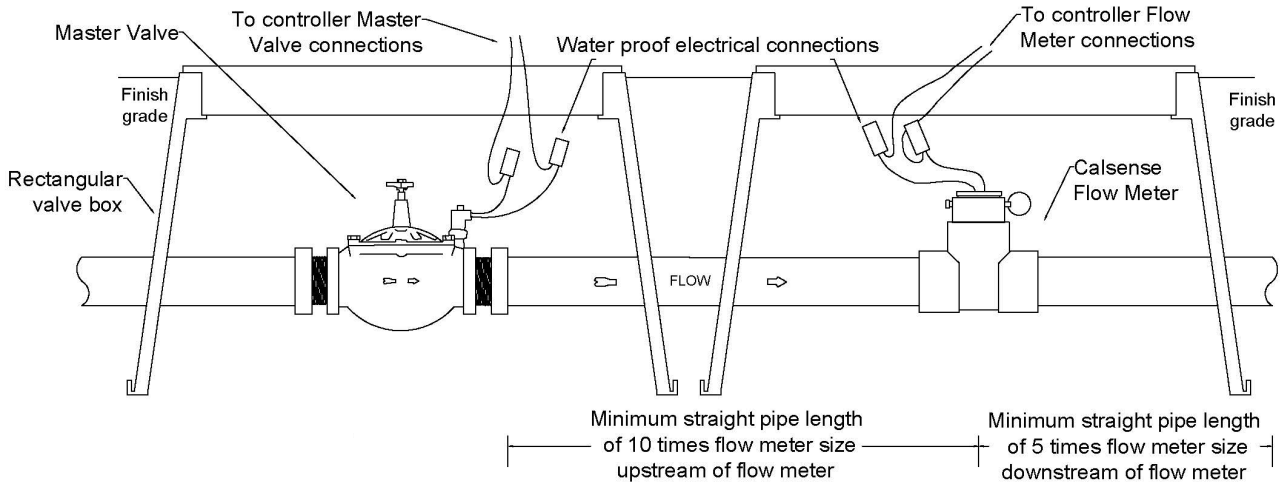


Figure 9 - Tee-type flow sensor installation detail

Insert-Type Flow Sensor (model FMBX)

The Insert-Type Flow Sensor is available for pipe sizes ranging from 3 inches to 18 inches (see Figure 10). The sensor is mounted to the pipe using either a pipe saddle or a welded, threaded fitting (not included).

The assembly is constructed of bronze with bronze hardware and is supplied with a 2-inch NPT externally threaded hex adapter for mounting.

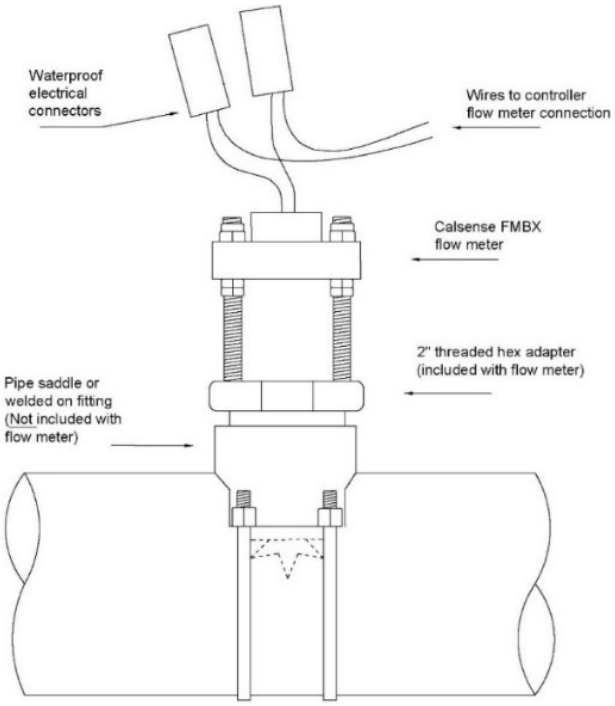


Figure 10 - Insert-type flow sensor installation detail

Ultrasonic Flow Sensors (model UFS)

Calsense UFS-series ultrasonic flow sensors are available in 1-inch, 1.5-inch, and 2-inch sizes with female NPT tapered threads (see Figure 11). Unlike traditional tee-style flow sensors, ultrasonic sensors do not require straight-run piping, allowing installation immediately adjacent to elbows, tees, or master valves.

The sensors are fully submersible and may be installed in either horizontal or vertical piping. When installed in vertical pipe, flow must be oriented upward to ensure the pipe remains completely full for accurate measurement.

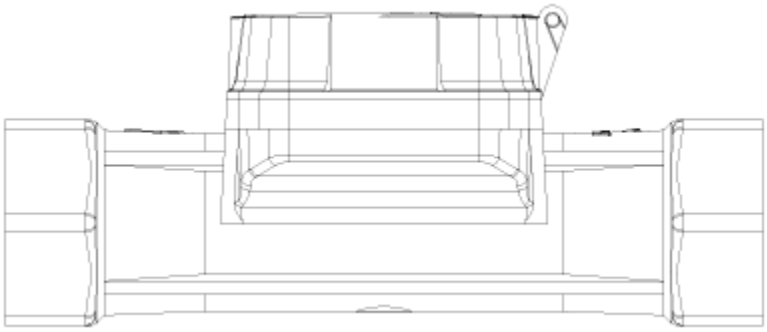


Figure 11 - Ultrasonic flow sensor detail

Third-Party Flow Sensors

Calsense supports a variety of third-party flow sensors that provide compatible pulse outputs. Supported models include:

- Badger Meter Series 228PV Tee Industrial Flow Sensors
- Badger Meter Series 250 Metallic Flow Sensors
- Badger Meter Dynasonics® RS-900w Polymer Ultrasonic Flow Sensor
- Creative Sensor Technology (CST) FSI T Series PVC Flow Sensors
- Great Plains Industries (GPI) FLOMEC® QS200 Series Ultrasonic Insertion Flow Sensors with Tee

Other flow sensors may be compatible provided they generate a similar pulse output to the models listed above. Scaled pulse outputs are not supported.

Third-Party Hydrometers

The CS3000 controller supports a range of third-party hydrometers, including Electronic Register and Photodiode register hydrometers manufactured by Netafim, BERMAD, and ARAD, as well as Reed Switch register hydrometers.

For Reed Switch registers, supported hydrometer sizes range from 1.5 inches to 10 inches, with pulse outputs of:

- 1 pulse per 1 gallon, or
- 1 pulse per 10 gallons

Note: Hydrometers are not supported on 2-Wire paths and must be wired directly to the POC terminal on the controller.

Flow Sensor Specifications

Flow Sensor Sizing

Calsense flow sensors are available in multiple models to accommodate a wide range of pipe sizes and operating pressures.

Proper flow sensor sizing is based on station flow rates and allowable pressure loss through the sensor, not on the diameter of the irrigation mainline. The selected flow sensor must be capable of accurately measuring both the maximum and minimum expected station flow rates.

- The maximum system flow rate should fall within the upper operating range of the sensor.
- The minimum system flow rate must be above the sensor's minimum measurable flow threshold.

If actual flow rates fall below the minimum measurable range, readings may become inconsistent and may trigger false no-flow alerts during irrigation.

Model	Recommended Design Flow Range	Accuracy
FM 1.5, FM 2, FM 3	0.5-30 ft/sec	± 1.0% of full scale
FM 1B, FM 1.25 B, FM1 1.5B	0.5-15 ft/sec	± 1% of reading
FM 2B	0.5-30 ft/sec	± 1.0% of full scale
UFS 1, UFS 1.5, UFS 2	0.5-30 ft/sec	± 2% of reading

Table 3 - Flow sensor operating ranges

Flow Sensor Selection Procedure

To determine the correct flow sensor size:

- Identify the station with the highest flow rate in the system.
- Identify the station with the lowest flow rate in the system.
- Confirm that both flow rates fall within the operating range of the selected flow sensor size (see Table 3).
- For systems with large mainlines or wide variation between high- and low-flow stations, consider a bypass manifold configuration to accurately measure both flow ranges (see Bypass Manifold on page 36).

Operation

Flow sensors measure system flow in gallons per minute (GPM). During system setup, the controller learns the expected flow rate for each station. During subsequent irrigation cycles, the CS3000 continuously compares actual flow to expected flow to detect abnormal conditions.

Based on user-defined thresholds, the controller can take corrective actions, including:

- High-flow conditions (e.g., broken head or riser):
  - Generates a high-flow alert,
  - Shuts down the affected station, and
  - Advances irrigation to the next station.
- Low-flow conditions (e.g., closed valve, obstruction, or flow below sensor minimum):
  - Generates a low-flow alert.

Alerts are displayed at the controller and within Command Center Online, in the Alerts Report.

If the water source is restricted or shut off (e.g., closed backflow preventer or water meter), all stations on the controller will indicate a no-flow condition. Alerts and corrective actions remain active until the issue is resolved.

When equipped with a flow sensor, the CS3000 continuously monitors system flow and will close all master valves in the event of a detected mainline break. Mainline-break thresholds may be configured independently for:

- Active irrigation
- Scheduled master valve operations (overrides)
- All other non-irrigation periods

For systems with multiple mainlines, a break on one mainline only affects the associated points of connection. Other mainlines continue to operate normally.

System Restrictions

The CS3000 calculates expected flow independently for each station so flow sensors must be installed in piping that carries all and only the water controlled by that controller.

Looped systems or systems with multiple controllers feeding a shared mainline may use *FLOWSENSE®* to coordinate flow data and manage the system efficiently.

Maximum Flow Sensor Pressure

Maximum recommended operating pressures for each Calsense flow sensor model are provided in Table 3.

Flow Sensor	Maximum Pressure	Temperature @ Max Pressure
FM 1.5, FM 2, FM 3	100 psi	105 °F
FM 1B, FM 1.25B, FM 1.5B	400 psi	150 °F
FM 2B	200 psi	150 °F
UFS 1, UFS 1.5, UFS 2	200 psi	140 °F

Table 4 - Flow sensor permissible pressure loss

Electrical Installation

Each flow sensor requires one black and one red #14 AWG irrigation control wire connected to the controller or a 2-Wire POC Decoder.

- Maximum wire length between flow sensor and controller: 2,000 feet
- When connected to a 2-Wire POC Decoder, the flow sensor must be located within 10 feet of the decoder

At the controller:

- Black wire → GND terminal on the POC terminal strip
- Red wire → FM RED terminal

Flow sensor wiring must be clearly labeled where it enters the CS3000 enclosure.

CAUTION: Applying 24-VAC to flow sensor wiring during field-wire testing will permanently damage the sensor. If this occurs, the flow sensor insert must be replaced.

All electrical connections must remain tight, dry, and corrosion-free. Buried splices between the flow sensor and controller are not permitted. Use only Calsense-approved connectors (see Wire and Electrical Connectors).

Flow Sensor Wiring and Connections

Flow sensors communicate with the controller using low-voltage digital pulse signals. For reliable operation:

- All wiring must be direct-pull with no splices.
- All connections must be fully waterproof. See Wire and Electrical Connectors.

Multiple Flow Sensors

For sites with multiple water sources, the 2-Wire option supports:

- Up to six flow sensor inputs
- Up to six master valves per CS3000 controller

The controller aggregates readings from multiple flow sensors for reporting and provides flow breakdowns by point of connection to:

- Meet water budgets.
- Provide mainline break protection.
- Manage system flow during irrigation.

When flow sensors are shared across multiple controllers, the *FLOWSENSE* option communicates flow data between connected controllers (see *FLOWSENSE* on page 39).

Bypass Manifold

A bypass manifold uses two or three master valves equipped with flow sensors to accurately measure a wide range of flows on a large mainline (see Figure 12). This configuration is particularly effective when low-flow stations are served by oversized mains.

Bypass manifolds require:

- 2-Wire POC Decoders (model CS-2W-POC)
- The 2-Wire option (model CS3-2WIRE-OPT), if not already specified

Note: Bypass manifolds are supported only with 2-Wire decoders. Conventionally wired POC terminals cannot be used.

During operation, the controller dynamically routes flow through the most appropriate flow sensor by opening and closing master valves as flow demand changes. This ensures accurate measurement across the widest possible operating range.

A single controller may operate one bypass manifold. When designing a bypass manifold:

- The smallest master valve may be normally open or normally closed.
- All other master valves must be normally closed.
- Flow sensors must be sized smallest to largest.

- The smallest flow sensor cannot be an Insert-Type Flow Sensor (model FMBX).

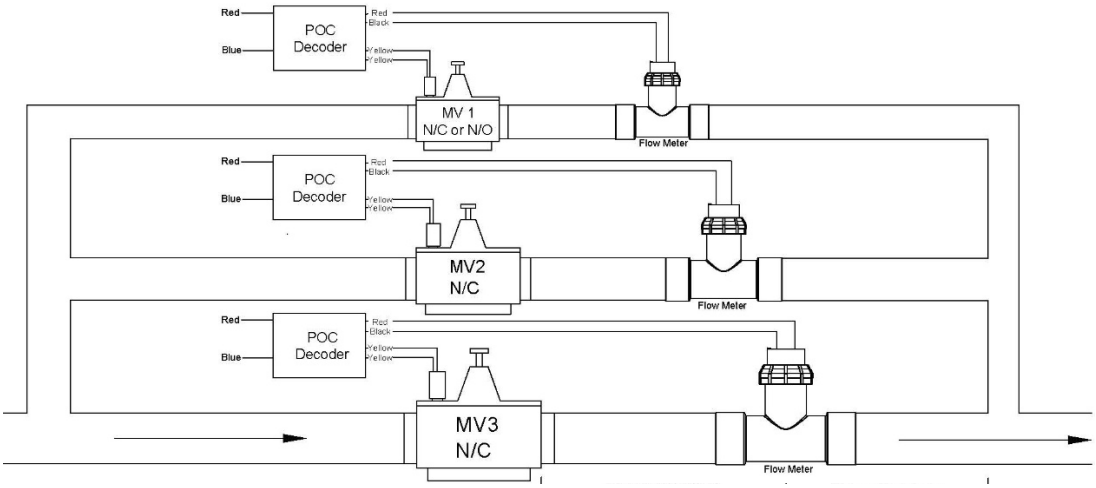


Figure 12 - Example of a three-tier bypass manifold

Points of Connection (POC)

Master Valve Output

The master valve output provides a 24-VAC source to operate irrigation systems equipped with a master valve. Master valves protect irrigation systems by isolating the mainline and reducing the risk of catastrophic water loss in the event of a mainline break.

The *FLOWSENSE*® option (model CS3-FL) is optimized for irrigation systems in which multiple controllers share one or more master valves. For additional information on using multiple master valves with a single controller, refer to Flow Sensors on page 30.

Pump Start Output

The pump start output provides a 24-VAC source to activate an external pump relay or control circuit. Pump activation is assigned by Station Group, allowing pumps to operate for specific stations while remaining off for others.

The *FLOWSENSE* option supports communication in systems where multiple controllers share one or more pumps. Each controller's POC terminal allows the user to specify whether a pump is connected, preventing false electrical alerts when no pump is present.

Water Management

The CS3000 Irrigation Controller coordinates irrigation, whether across one mainline or multiple, allowing users to:

- Control the number of simultaneously active valves.
- Maintain flow within allowable mainline capacities.
- Reduce irrigation window duration.
- Operate pumps efficiently at design capacity.

Users can configure maximum allowable mainline flow rates, with or without pumps, and limit valve activation based on hydraulic capacity in different sections of the system.

Manual operation allows users to start stations directly at the controller or from any Internet-connected device, including mobile devices.

Flow Monitoring

CS3000 flow monitoring identifies high-flow and low-flow conditions caused by broken sprinklers, risers, piping, stuck valves, or electrical issues. When a flow event occurs:

- Affected valves are shut down.
- The next scheduled valve is activated.
- The event is communicated to other controllers in the *FLOWSENSE* chain, if applicable.
- An alert is sent to Command Center Online.

Controllers also detect and share electrical issues, including shorted solenoids and broken field wiring, enabling coordinated system response.

FLOWSENSE (model CS3-FL)

The Calsense *FLOWSENSE* option enables multiple CS3000 controllers to share system-level communication for common master valves, flow sensors, and/or pumps. *FLOWSENSE* also shares real-time weather data from devices such as Calsense Tipping Rain Buckets, ET Gages, and supported third-party rain and freeze sensors.

Controller-to-controller communication is achieved through a two-way field network, using either:

- Hardwire communication (models CS3-M-KIT and CS3-MSSE-KIT), or
- Spread Spectrum Radio (model CS3-SR-KIT)

FLOWSENSE is required whenever multiple controllers must coordinate shared system resources or exchange real-time operational data. When two or more controllers are interconnected in this way, it is referred to as a chain.

Benefits of *FLOWSENSE*

- Ability to share a single Internet-connected communication device for access to Command Center Online.
- Synchronized programming across controllers, allowing any controller in the chain to be programmed from another.
- Elimination of additional relays when sharing pumps or master valves.
- Flow-based valve management to maintain mainline capacity limits.
- Prevention of scheduling conflicts between multiple controllers.
- Advanced water management, with or without flow sensors.

SourceMonitor (model CS3-SRCMON)

The SourceMonitor™ option provides standalone CS3000 controllers with advanced capabilities to detect leaks or breaks in large-diameter irrigation lines, including trunk lines, service lines, city lines, supply lines, and mainlines. When a break is detected, the SourceMonitor option proactively communicates with downstream controllers, and/or *FLOWSENSE* chains.

Irrigation is automatically paused until the issue is resolved, helping protect infrastructure and reduce water loss. After repairs are completed, users may clear the break condition both at the SourceMonitor-equipped controller and at any downstream CS3000 controllers that were shut down.

Key Benefits

- Minimize water loss.
- Reduce property damage.
- Eliminate unnecessary No Flow alerts.
- Ensure efficient and responsible irrigation management.

Core Features

- **Break Detection**: Enables monitoring of trunk and supply lines for mainline breaks.
- **Critical Alerts**: Break notifications appear in Command Center Online and may be emailed to users when email alerts are enabled.
- **Proactive Shutdown**: Automatically closes the trunk-line valve to prevent further water loss.

Communication Options

Calsense offers multiple communication options to support cost-effective system design, with the flexibility needed for complex, multi-controller irrigation systems.

Refer to Appendix A — Specification Guidance and CSI Mapping for guidance on specifying communication methods versus items typically left to contractor coordination.

When to Specify – Communication Options

- **Ethernet (model CS3-EN):** Best where a wired network is available; lowest ongoing cost.
- **Wi-Fi (model CS3-WEN-KIT):** Best where a stable site Wi-Fi network exists.
- **Cellular (model CS3-GR-KIT):** Best where no local network is available; requires AT&T coverage and a Calsense data plan.
- **Hardwire / Spread Spectrum Radio (models CS3-M / CS3-SR-KIT)**: Best for multi-controller sites requiring controller-to-controller coordination (*FLOWSENSE*® option); select Hardwire for close/side-by-side installs and Radio where trenching or cabling is impractical.

Cellular Communications (model CS3-GR)

The Calsense Cellular Communication Option enables CS3000 controllers to communicate with Command Center Online via the Internet using a cellular network. While there are no fees needed to access the basic version of Command Center Online, data usage charges apply through the cellular network.

Note: If using the -KIT version, a stubby antenna is included. If specifying CS3-GR (modem only), be sure to also specify a compatible external antenna (e.g., GR-STICK-5 or GR-YAGI-11) and proper cable (e.g., LMR-400-DB).

This option includes an external cellular modem that connects to the Internet using an Access Point Name (APN) over a current-generation cellular data connection.

Benefits

- Reliable, long-distance data communication via the Internet.
- No trenching or hardwired network connections required.

Requirements

To use the Calsense Cellular Communication Option, the following are required:

- A Calsense Data Service Access Plan (see Data Access Service Plans on page 47).
- AT&T cellular coverage at the controller installation location.

Wireless Ethernet (Wi-Fi) Communications (model CS3-WEN)

The Calsense Wireless Ethernet (Wi-Fi) Communication Option enables CS3000 controllers to communicate with Command Center Online using an existing Wi-Fi network.

Note: If using the -KIT version, a stubby antenna is included. If specifying CS3-WEN (radio only), be sure to also specify a compatible external antenna (i.e., WEN-YAGI-11) and proper cable (e.g., LMR-400-DB).

This option includes an external communications module supporting dual-band 5 GHz Wi-Fi (IEEE 802.11ac),

providing improved wireless performance, reliability, and transmission range compared to earlier Wi-Fi solutions. The device supports IP address assignment via DHCP or static IP configuration.

The controller establishes an outbound TCP/IP connection to Command Center Online, allowing users to remotely monitor and manage irrigation systems without recurring cellular data charges.

The Wireless Ethernet option also supports enterprise-level security, including AES encryption, WPA/WPA2/WPA2-Enterprise, EAP, and IEEE 802.1X authentication.

Benefits

- Utilizes an existing private or public Wi-Fi network.
- No trenching or hardwired network connections required.
- No additional licensing or recurring cellular fees.

Requirements

To connect a Calsense Wireless Ethernet device, the following are required:

- An existing Wi-Fi network.

  Note: Ad-hoc networks are not supported.
- A network using Internet Protocol version 4 (IPv4).
- Outbound TCP connections on TCP Port 16001 permitted through any intervening firewalls or routers.

Ethernet Communications (model CS3-EN)

The Calsense Ethernet Communication Option enables CS3000 controllers to communicate with Command Center Online using a user's existing wired Ethernet network, without recurring data charges.

This option includes an external Ethernet communication device equipped with a single Ethernet port. The device is configured directly at the controller and supports IP address assignment via DHCP or static IP configuration. Communication with Command Center Online is established through an outbound TCP/IP connection, allowing users to remotely monitor and manage irrigation systems without the recurring costs associated with cellular communication.

Benefits

- Utilizes an existing wired Ethernet network.
- No recurring data charges.
- No additional licensing required.

Requirements

To connect a Calsense Ethernet device to a network, the following are required:

- An existing Ethernet network.

  Note: Gigabit-speed and higher networks are supported only if the network auto-negotiates down to 100 Mbps
- A network using Internet Protocol version 4 (IPv4).
- Outbound TCP connections on TCP Port 16001 permitted through any intervening firewalls or routers.

- Category 5 (CAT-5) or higher Ethernet cable.
- Maximum cable length of 100 meters (328 feet) between the controller and the nearest network switch or router.

Spread Spectrum Radio Communications (model CS3-SR)

The Calsense Spread Spectrum Radio Communication Option enables two or more CS3000 controllers to communicate directly with one another using spread spectrum radio technology.

Note: If using the -KIT version, a stubby antenna is included. If specifying CS3-SR (radio only), be sure to also specify a compatible external antenna (e.g., SR-STICK-8 or SR-YAGI-6) and proper cable (e.g., LMR-400-DB).

Each radio is a 1-watt device operating in the 902-928 MHz ISM (Industrial, Scientific, and Medical) band. Spread spectrum radios mitigate interference by frequency hopping across multiple channels, providing reliable communication in environments where wired connections are impractical.

Benefits

- No trenching or hardwired connections required.
- Provides a wireless communication path for *FLOWSENSE*.
- Operates in an unlicensed frequency band; no FCC license required.

Requirements

To use the Calsense Spread Spectrum Radio Communication Option, the following are required:

- Each controller must be equipped with the *FLOWSENSE* option (model CS3-FL).
- A maximum of 12 controllers may be linked together within a *FLOWSENSE* communication chain.

Hardwire Communications (models CS3-M-KIT and CS3-MSSE-KIT)

The Calsense Hardwire Communication Option (models CS3-M-KIT and CS3-MSSE-KIT) enables communication between two or more CS3000 controllers using Paige® P7171D communication cable.

Benefits:

- Lowest-cost communication option for side-by-side or closely grouped controller installations.
- Provides a wired communication path for *FLOWSENSE*.

Requirements

To connect two or more Calsense controllers using hardwired communication, the following are required:

- Each controller must be equipped with the *FLOWSENSE* option (model CS3-FL).
- A maximum of 12 controllers linked together within a *FLOWSENSE* communication chain.
- Paige® P7171D communication cable, with a maximum total length of 5,000 feet per communication chain.
- Expansion loops in accordance with appropriate NEC requirements for cable pulls exceeding 100 feet (Figure 13). Splices are not recommended.

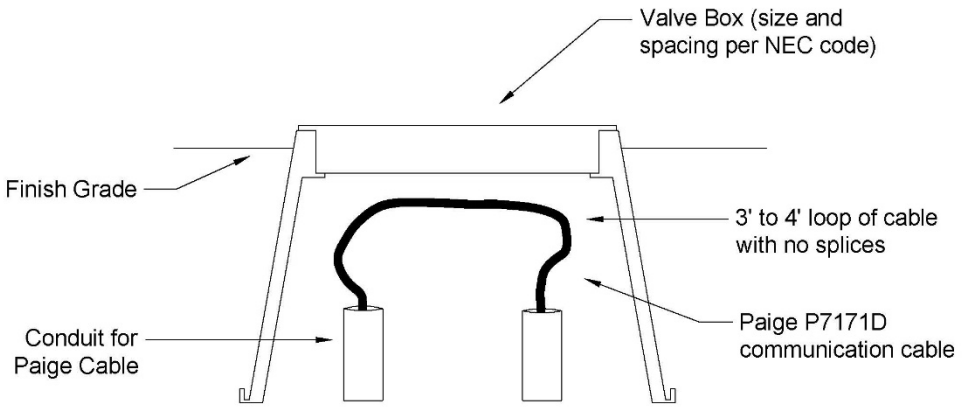


Figure 13 - Recommended wiring for Hardwire communication options

- If splices are unavoidable, they must be fully insulated from soil and moisture using an approved waterproof connector, as seen in Wire and Electrical Connectors on page 14 (see Figure 14).

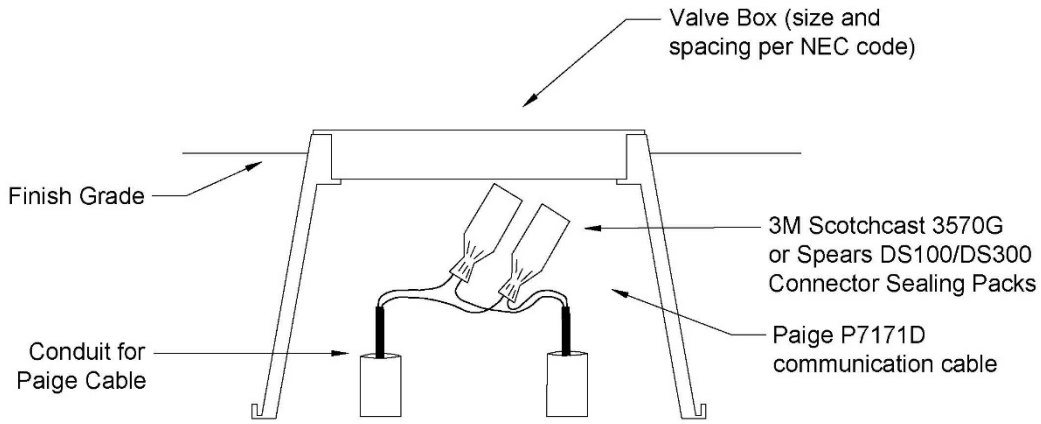


Figure 14 - Recommended wiring for Hardwire communication options with splices

- Calsense recommends installing direct-pulled Paige P7171D communication cable in conduit.
- For runs less than 100 feet, 18-gauge multi-conductor irrigation wire installed in conduit may be used as an alternative.

Communication Accessories

Antennas

Many Calsense communication options require the use of an external antenna and antenna cable. Antennas and cables are included with -KIT communication options and are available separately when required. Calsense offers a range of antenna options designed to accommodate varying site conditions and communication requirements.

For additional information on communication options, accessories, or assistance selecting the appropriate antenna configuration for a specific site, contact your Calsense representative.

Stubby Antenna

Calsense Stubby Antennas are omnidirectional, surface-mount antennas designed for use with Calsense communication options. Stubby antennas are supplied with integral antenna cables and are the standard antennas included with Calsense -KIT communication options. Antenna cable extensions may be used only with prior approval from Calsense.

Stubby antennas are included with the following kits: CS3-GR-KIT (Cellular), CS3-WEN-KIT (Wireless Ethernet / Wi-Fi), and CS3-SR-KIT (Spread Spectrum Radio).

Available Stubby Antenna Models

- **Cellular Stubby Antenna** (model GR-STUBBY) - Broadband surface-mount cellular antenna operating at 3 dBi to 5 dBi, depending on frequency band.
- **Wireless Ethernet (Wi-Fi) Stubby Antenna** (model WEN-STUBBY) - Omnidirectional Wi-Fi antenna with 3 dBi gain, suitable for dual-band wireless Ethernet applications.
- **Spread Spectrum Radio Stubby Antenna** (model SR-STUBBY) - Omnidirectional antenna operating at 3 dBi, designed for use with spread spectrum radio communication.

Stick Antenna

Calsense Stick Antennas are fiberglass, omnidirectional antennas designed to extend the communication range of radios in challenging coverage environments (see Figure 15). Stick antennas are typically mast-mounted and are used when additional antenna gain is required beyond standard surface-mount options.

Available Stick Antenna Models

- **Cellular Stick Antenna** (model GR-STICK-5) - Broadband cellular antenna operating at 0 dBi to 5 dBi, depending on frequency band.
- **Spread Spectrum Radio Stick Antenna** (models SR-STICK-6 and SR-STICK-8) - High-gain omnidirectional antennas operating at 6 dBi and 8 dBi, respectively. These antennas are generally recommended for installations in areas with poor radio coverage or extended communication distances.

Note: Masts and other metallic antenna-support structures must be properly grounded in accordance with the National Electrical Code (NEC).

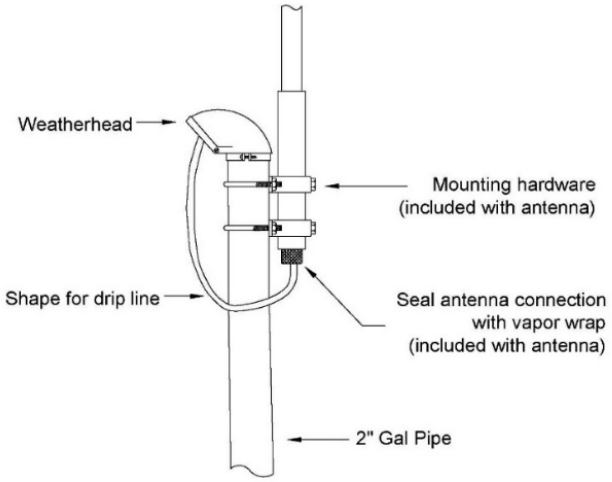


Figure 15 - Stick antenna mounting detail

Yagi Antenna

Calsense Yagi Antennas are directional aluminum antennas designed to extend communication range for a specific controller location (see Figure 16). Yagi antennas are typically used when focused, point-to-point signal transmission is required to overcome distance, obstructions, or challenging site conditions.

Available Yagi Antenna Models

- **Cellular Yagi Antenna** (model GR-YAGI-11) - Directional cellular antenna operating at 11 dBi.
- **Wireless Ethernet (Wi-Fi) Yagi Antenna** (model WEN-YAGI-11) - Directional Wi-Fi antenna operating at 11 dBi.
- **Spread Spectrum Radio Yagi Antennas** (models SR-YAGI-6, SR-YAGI-9, and SR-YAGI-11) - Directional antennas operating at 6 dBi, 9 dBi, and 11 dBi, respectively.

Note: Masts and other metallic antenna-support structures must be properly grounded in accordance with the National Electrical Code (NEC).

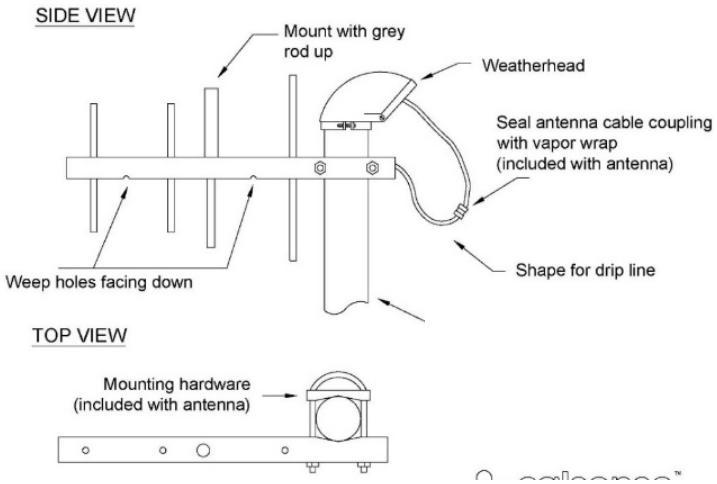


Figure 16 - Yagi antenna mounting detail

External Antenna Cables

Stick and Yagi antennas require LMR-400-DB or LMR-600-DB antenna cable (purchased separately). The maximum recommended cable length is 100 feet; longer cable lengths may be available with prior approval from Calsense. Custom cable lengths are also available to accommodate site-specific installation requirements.

Spread Spectrum Radio Filter (model SR-FILTER)

The optional Calsense Spread Spectrum Radio Filter is a band-pass radio-frequency (RF) filter designed to reduce interference from unwanted frequencies within the spread spectrum band.

The filter is commonly specified when using high-gain spread spectrum antennas, such as SR-STICK or SR-YAGI models, where increased antenna gain can also amplify background RF noise. By filtering out out-of-band interference, the filter helps improve communication reliability and overall radio performance.

Antenna Cable Surge Protector (model ANT-PROT)

The Calsense Antenna Cable Surge Protector is designed to protect radio communication equipment, and any installed radio-frequency (RF) filters, from damage caused by lightning-induced surges (see Figure 17).

The surge protector is installed in line with the antenna cable and provides an additional layer of protection for high-exposure antenna installations.

The Antenna Cable Surge Protector is required when using Stick or Yagi antennas. A mounting bracket is included with the surge protector.

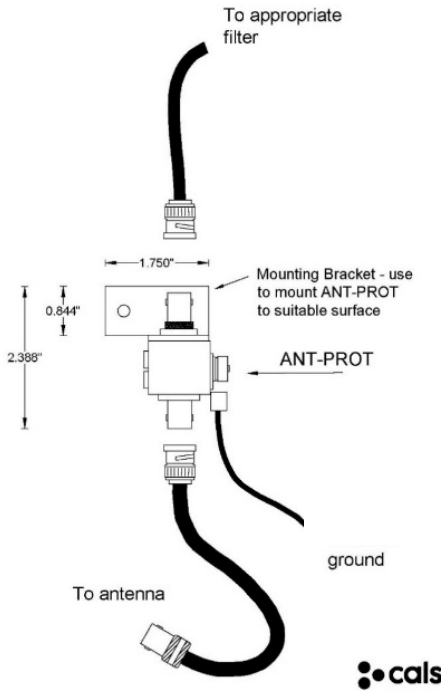


Figure 17 - Antenna cable surge protector wiring detail

Data Access Service Plans

Calsense offers one-year, five-year, and ten-year prepaid data access service plans for the Cellular Communication Option (models CS3-GR-KIT and CS3-GR). Prepaid plans provide data service without requiring a contract from a third-party cellular provider. Calsense manages the cellular service for the duration of the plan, including any necessary changes or updates.

The Calsense Data Access Service is available in three plan options:

- COMM-1YR which offers 1-year of service
- COMM-5YR which offers 5-years of service
- COMM-10YR which offers 10-years of service

Weather Sensors

Weather sensors provide real-time, on-site weather data to CS3000 controllers equipped with the Weather Option (model CS3-W-KIT). Using this data, CS3000 controllers automatically adjust irrigation run times and can pause irrigation during specified weather events to optimize water use and system performance.

For additional guidance on selecting the appropriate weather sensors for a specific site, contact your Calsense representative.

Tipping Rain Bucket (model RB-1)

The Calsense Tipping Rain Bucket enables CS3000 controllers equipped with the Weather Option (model CS3-W-KIT) to record accumulated rainfall (see Figure 18). The rain bucket uses a tipping mechanism to measure rainfall increments to the nearest 0.01 inch. As rainfall is measured, water drains from the base of the housing.

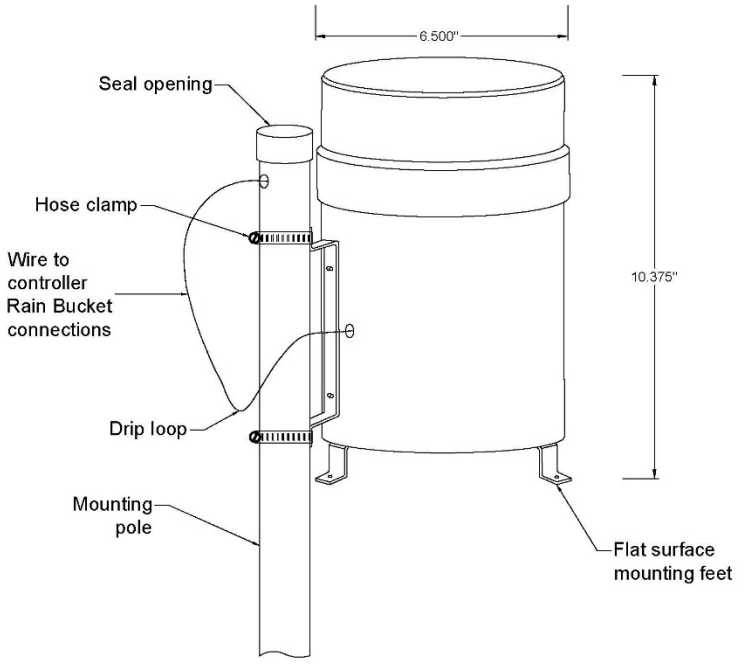


Figure 18 - Tipping Rain Bucket installation detail

Rainfall data is transmitted to the controller, which offsets station run times based on both the rate and total amount of rainfall received. Rain measurements from a single Tipping Rain Bucket may be shared between controllers using *FLOWSENSE*® or Command Center Online. When configured, the rain bucket can also cause all connected controllers to suspend irrigation once a user-defined rainfall threshold is reached.

Rain Bucket Cable

The Tipping Rain Bucket is supplied with 25 feet of two-conductor cable. The maximum allowable cable length is 200 feet when using Paige® P7171D communication cable. For cable runs shorter than 100 feet, 18-gauge multi-conductor irrigation wire may be used as an alternative.

Cabling must be installed in conduit between the rain bucket and the controller equipped with the Weather Option. Cable runs should include minimal splices, using only approved electrical connectors as specified in Wire and Electrical Connectors on page 14.

Wind Gage (model WG-1)

Wind speed may be monitored by a CS3000 controller using the Calsense Wind Gage in conjunction with the Weather Option (model CS3-W-KIT) (see Figure 19). The Wind Gage accurately measures wind speeds from 0 to 135 mph and communicates with the controller to pause irrigation when wind exceeds a user-defined threshold. When wind conditions return to acceptable levels, irrigation resumes automatically at the point where it was paused.

Wind Gage data may be shared between controllers using the *FLOWSENSE* option but is not shared through Command Center Online.

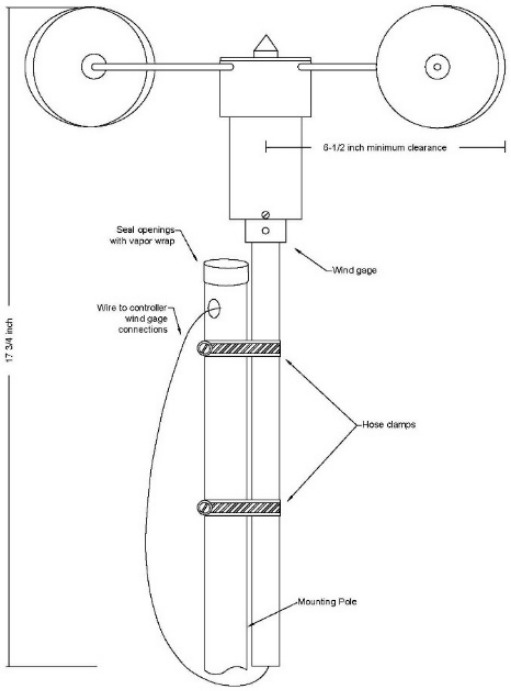


Figure 19 - Wind Gage mounting detail

Wind Gage Cable

The Wind Gage is supplied with 60 feet of two-conductor cable. The maximum allowable cable length is 1,000 feet when using Paige® P7171D communication cable. For runs under 100 feet, 18-gauge multi-conductor irrigation wire may be substituted.

Cable runs connecting Wind Gages to controllers with the Weather Option must be installed in conduit and should include minimal splices, using approved electrical connectors as specified in Wire and Electrical Connectors on page 14.

Third Party Rain/Freeze Sensors

Third-party rain and freeze sensors typically operate by interrupting the field common circuit to pause irrigation during adverse weather conditions. The Weather Option (CS3-W-KIT) includes a dedicated terminal that allows compatible third-party rain and freeze sensors to communicate directly with the controller.

For controllers not equipped with the Weather Option, a single third-party device may be connected to the SW1 terminal on the POC terminal strip. The SW1 terminal can be configured to accept normally open or normally closed switches, providing flexibility for pausing or stopping irrigation based on external sensor input.

Lights, Gates, & Water Features

Lights Option (model CS3-L-KIT)

The CS3000 Irrigation Controller Lights Option enables control of lighting, gates, water features, and other auxiliary devices directly from the controller.

The Lights Option supports up to four independent programs, each operating on a 14-day rolling schedule. Each output allows two programmable start and stop times per 24-hour period. Lighting and auxiliary device schedules operate independently of irrigation programs, allowing flexible control without impacting irrigation timing.

Each light output provides a 24-VAC control signal intended to operate an external relay.

Compatible Relays

The following relay assemblies have been verified to operate reliably with the CS3000 lights output:

- Dayton 5X852M Relay Socket with 5X823M Relay
- IDEC SH2B-05C Relay Socket with RH-Series Relay

Appendix A – Specification Guidance and CSI Mapping

This appendix is provided as a reference to assist designers and specifiers in mapping Calsense CS3000 system components to common CSI MasterFormat sections. It is not intended to replace project specifications or dictate means and methods.

CS3000 Component	Typical CSI Section
Irrigation Controllers (CS3000)	32 84 00 – Irrigation
Central Control / Cloud Software	32 84 00
Flow Sensors & Hydrometers	32 84 00
Weather Sensors	32 84 00
2-Wire Decoders & Cabling	32 84 00
Master Valves & POCs	32 84 00
Communication Equipment	32 84 00
Electrical Power (coordination only)	26 00 00 – Electrical

Designers should specify the following items:

- Controller model and station count.
- Enclosure type (wall-mount, pedestal, dual, solar).
- Communication method (Cellular, Ethernet, Wi-Fi, Radio, Hardwire).
- Flow sensing strategy (single sensor, multiple sensors, bypass manifold).
- Weather data strategy (WeatherSense, on-site sensors, or hybrid).
- 2-Wire vs conventional wiring approach.
- Use of *FLOWSENSE*® and/or SourceMonitor™ where shared resources exist.

The following items are typically left to the contractor or integrator, within the constraints defined by the design:

- Antenna type and mounting method (stubby, stick, Yagi), based on site conditions.
- Exact routing of field wiring and communication cabling.
- Final antenna orientation and tuning.
- Specific relay models for auxiliary outputs, where equivalent models are permitted.

Suggested specification language:

The irrigation control system shall be a Calsense CS3000 controller system configured as shown on the drawings and specified herein. The system shall include flow monitoring, weather-based irrigation control, and remote cloud management capabilities.

Note: Full Written Specifications are available on the Calsense website under in the Specified Documents section of the Documentation page.

Appendix B – Specification Checklist for CS3000 Systems

Category	Item to Specify
Controller	☐ CS3000 model (conventional or 2-Wire)
	☐ Number of stations (8, 16, 24, 32, 40, 48, or up to 128 with 2-Wire)
Enclosure	☐ Type: Wall-Mount (-WM), Pedestal (-S), Dual (-SD), Solar (-SL), Retrofit
Communication	☐ Method: Cellular (CS3-GR), Wi-Fi (CS3-WEN), Ethernet (CS3-EN), Radio (CS3-SR), Hardwire (CS3-M)
	☐ Antenna type (Stubby, Stick, Yagi)
	☐ Data access plan (COMM-1YR, 5YR, 10YR) if using cellular
Flow Sensing	☐ Flow sensor type (Tee, Insert, Ultrasonic, 3rd-party)
	☐ Flow sensor size and model
	☐ Bypass manifold configuration (if applicable)
	☐ Use of SourceMonitor (CS3-SRCMON)
Weather Sensing	☐ WeatherSense or on-site sensors (ET Gage, Rain Bucket, Wind Gage)
	☐ Weather Option module (CS3-W-KIT)
Points of Connection (POC)	☐ Master valve and pump start configuration
	☐ POC Decoder (CS-2W-POC) or POC Kit (CS3-POC-KIT)
2-Wire System	☐ 2-Wire Option (CS3-2WIRE-OPT)
	☐ Number and type of decoders (station, POC, moisture)
	☐ Grounding plan (every 300 ft and at end of 2-Wire path)
Lighting & Aux Outputs	☐ Lights Option (CS3-L-KIT)
	☐ Number of circuits and relay types
Electrical & Wiring	☐ Wire gauge and type for station and common wires
	☐ Maximum wire lengths per gauge
	☐ Surge protection (TP-110, ANT-PROT)

Compliance	☐ BABA, ARRA, WaterSense, UL, Made in USA requirements
Documentation	☐ Mounting templates, CAD files
	☐ Specification language (Division 32 84 00)
	☐ Submittal package requirements