

ET2000 (500 SERIES) IRRIGATION CONTROLLER



SPECIFICATION



CONTROLLER SPECIFICATION

HOW TO SPECIFY CONTROLLER:

 **Step 1 Controller Model Number, Number of stations desired.**

The first section of the part number identification process is deciding the model of Calsense irrigation controller that you want to order. The ET2000 portion is listed first, then the amount of stations that you require.

Controller Model Number	Number of Stations
ET2000	-8 stations
	-12 stations
	-16 stations
	-24 stations
	-32 stations
	-40 stations

PART NUMBER EXAMPLE:

ET2000-24

 **Step 2 Communications.**

The second step of the part number process is to identify the communications options that you want to utilize on the controller. Currently Calsense offers two (2) Communications options per Irrigation controller. The Choices are as follows:

(-R) Phone Modem:

This may be a site with a single irrigation controller, or a project where each irrigation controller will have its own phone line. The customer requests a RJ-11 phone jack from the telephone company at the location of each irrigation controller. The irrigation controller is plugged directly into the phone jack. Each Irrigation controller used with its own phone line is specified as a Model -R.

(-M) Multi-Controller Communications System:

This is a location with several irrigation controllers sharing a single phone line, or another type of communication. A phone line with an RJ-11 phone jack supplied by the telephone company, or a particular communications device is installed at the most feasible controller location. All groups of these controllers must have one controller with the Communications option. The other controllers in the group will all be designated as -M controllers. This option includes the -M interface and cables. All irrigation controllers are hardwired to the communications controller using Paige P-7171-D communications cable in conduit.

Restrictions:

- There can only be up to 31 irrigation controllers on one multi-controller communications system.
- The maximum total length of all cable on one multi-controller communication system is 5,000 feet.
- Communication cable is to be direct pull, installed in conduit. Splices are not recommended.
- If a project has more than 32 irrigation controllers or a cable length of more than 5,000 foot. A second multi-controller communications chain must be set-up. This must include a second communications controller, and communications cable to communicate with the second group of irrigation controllers.

(-LR) Local Radio:

The Calsense Local Radio system is designed for wireless communications in local areas. A central 'HUB' located at the project site will communicate with controllers in a local area. The system consists of a telephone modem at the central computer, one or more LR-HUB's, and -LR controllers. Several HUB's can be combined in a central system. The communication type can be mixed with other communication type controllers, hard wired controller, and phone controllers in the same central system. The Calsense Local Radio system also offers the flexibility of multiple irrigation controllers

sharing one Radio Modem. An advantage of using the Local Radio system is there are no monthly fees.

Equipment Needed:

Central: The central computer uses a telephone modem for the Base Station to communicate to the LR-HUB's. Local Radio communications will work only with Command Center for Windows software.

LR-HUB: The LR-HUB is mounted in a standard irrigation controller cabinet. The HUB panel is the same size as a standard controller panel. The HUB contains a radio and a telephone modem. The central computer communicates to the HUB through the telephone modem. The HUB communicates to the -LR controllers by Local Radio. The LR-HUB requires an antenna, an LR-STICK (stick antenna) or LR-YAGI (Yagi antenna). Optionally the LR-HUB may be directly connected to the central computer through standard serial cable, or may also be mounted in a Calsense SSE enclosure.

-LR: The -LR is a controller with a local Radio installed. It is mounted in a standard irrigation controller cabinet. It can also be mounted in the Calsense SSE-R enclosure. The controller requires an antenna, either the LR-DOME dome type antenna, or the LR-YAGI Yagi type antenna. The SSE-R enclosure comes with the LR-DOME antenna installed when specified for use with Local Radio.

Note: It is also possible to chain -M controllers to the -LR controller via Paige cable (see -M communications for definition). This combination would be referred to as a -MLR.

(-CR) CDPD Radio:

The Calsense CDPD Radio system offers centralized control of Calsense field irrigation controllers without telephone lines. The Calsense system is part of a national network, owned and maintained by CDPD service providers, of wireless cellular data communications. It consists of a CDPD radio modem at the central computer and a CDPD radio modem at the field irrigation controller(s). If a project has more than one controller, the Calsense CDPD Radio system offers the flexibility of multiple irrigation controllers sharing one radio modem. It should be noted that a service contract must be signed with a CDPD service provider and there is a monthly access fee for each controller using these networks, typically \$10.00 - \$35.00 per month.

Actual fees could be more or less depending on how the user utilizes the communication network.

Note: Before committing a project to CDPD radio communications, the designer should contact Calsense to test and verify signal strengths at location sites.

Equipment Needed:

Central: The Calsense CDPD Radio for the central computer is specified as a DTR-C. Depending on the location of the central computer, an antenna may or may not be necessary. This is verified by the radio field technician during the site visit. If an antenna is necessary, it is specified as a CR-STICK (Stick antenna) or a CR-YAGI (Yagi antenna). The antenna does not include the coaxial cable. The length of cable must be specified on the plans and uses model number LMR-400-DB.

Single controller: If the project site consists of a single irrigation controller using its own radio, the irrigation controller is specified as a -CR. The standard type of antenna used on an enclosure is the dome antenna and is specified as a CR-DOME. Antennas mounted on buildings or a post are specified as CR-STICK (stick antenna), or CR-YAGI (Yagi antenna). The antenna does not include the coaxial cable. The length of cable must be specified on the plans and uses model number LMR-400-DB.

Multiple controllers: If a project site consists of multiple irrigation controllers, one irrigation controller is specified as the master radio and designated as a -M-CR, while the other controllers hardwired to it are designated as -M controllers.

Restrictions:

- Location of certain projects may warrant use of stick or yagi antennas.
- The maximum number of irrigation controllers linked together using a hardwire cable and connected to a radio equipped controller is 31.
- The maximum length of cable connecting hardwired controllers together to a radio equipped irrigation controller is 5,000 feet.

(-SR) Spread Spectrum Radio:

The Spread Spectrum Radio option is used when a hardwire link between controllers is not possible. The Spread Spectrum Radio can be thought of as replacing the hardwire link with radios. The Spread Spectrum radio operates in a non-licensed radio frequency band. This radio utilizes a frequency hopping technology to eliminate interference.

The –SR option would be primarily used on a site where the *FLOWSENSE®* option is used. The –SR option may be combined with hardwire link on a site to create a flexible and cost efficient communication network.

Equipment Needed:

Multiple controllers (Radio Link only): The project site consisting of multiple irrigation controllers. Each of the irrigation controllers is specified as a –SR communications option. Each controller requires an antenna, the standard type of antenna used on an enclosure is the dome antenna and is specified as an SR-DOME. The irrigation controllers will be setup to communicate between themselves with the Spread Spectrum radio using unique communication addresses.

Multiple controllers (with Hardwire link): The project site will consist of multiple irrigation controllers. One of the controllers will be specified as the master radio with the designation –MSR communications option. The controller with the –MSR option requires an antenna, the standard type of antenna used on an enclosure is the dome antenna and is specified as a SR-DOME. The other irrigation controllers will be specified with the –M communications option. These will be linked to the master radio controller using Paige P-7171-D communications cable in conduit. You may have several controllers on a site communicating with the radio link only along with several other controllers on the same site with a hardwire link. This allows the designer to mix and match the two communications options to provide the most flexible communications network possible.

Restrictions:

- A Radio survey must be conducted by Calsense. There is no-charge for this service.

- The Radio requires a clear line of site for communications.

(-EN) Ethernet communications:

The Calsense Ethernet communications option provides reliable data communication links utilizing the customers existing Ethernet network. The option is designed to connect the Calsense ET2000 controller with serial interface to an existing Ethernet. The Ethernet option is typically used where a user has easy access to an existing Ethernet network. Typical projects include a school campus, business campus or a city with buildings that are linked with an Ethernet network.

The Computer, when connected to a network and operating the Calsense Command Center software, will access any controller that is connected to the Ethernet network. The Calsense controller is specified with a –EN option when one controller is sharing one Ethernet connection.

The Ethernet communication option is compatible with the Calsense ET2000 controller. The Calsense Ethernet option is integrated into the controller and does not require a separate power source. This arrangement provides for a small highly dependable package.

The user must supply an Ethernet (RJ45) connection at the controller location with the network set to have access to this connection. The Ethernet network must also be set to assign a static IP address to the ET2000 controller.

(-GR) GPRS Modem:

The GPRS radio delivers reliable, long distance data communication links through the advantage of wireless technology. The Calsense GPRS radio is integrated into the controller and does not require a separate power source. Compact in size, the GPRS fits into the standard Calsense wall mountable enclosure.

The GPRS system utilizes Internet Protocol (IP) addressing, assigning a permanent IP address to each modem when activated. Built-in encryption maintains the security of the data transmitted. The system is always “on” and never requires dial up or delays in connecting. A central computer operating the Calsense Command Center software requires a GPRS host radio for access to the GPRS network.

The user is required to enter into an agreement with a third-party network service provider. The associated monthly fees paid to this provider are the responsibility of the user. These fees are estimated to be about \$35.00 per month per field controller.

A radio survey is required before final acceptance of GPRS radio as the communication method. Please consult with your service provider for proper coverage. The GPRS option requires the end user to sign a service contract with a third-party network provider.

(-FOM) Fiber Optic Modem:

The Calsense Fiber Optic Modem communications option provides High-reliability traffic signalization networking. This option is designed to connect the Calsense ET2000 controller with a Fiber Optic Modem to a Fiber Optic Network. Typical Projects include Freeway or highway systems that are linked via Fiber Optic Network.

The Computer, when connected to a network and operating the Calsense Command Center software, will access any controller that is connected to the Fiber Optic network. The Calsense controller is specified as a -FOM option when one controller is shearing one Fiber Optic connection.

The Fiber Optic communications option is compatible with the Calsense ET2000 controller. The Calsense Fiber Optic option is integrated into the controller and does not require a separate power source. This arrangement provides for a small highly dependable package.

COMMUNICATIONS OPTION CHART		
COMM1	COMM2	DEFINITION
-R		Phone Line capability, one phone line – one controller
-M	-M	Ability to chain controllers together with cable and share the first communications option
-LR	-LR	Local Radio, one Local Radio – one controller
-CR	-CR	CDPD Radio modem, one CDPD modem – one controller
-SR	-SR	Spread Spectrum radio, one Spread Spectrum Radio – one controller
-EN	-EN	Ethernet device, one Ethernet device – one controller
-GR	-GR	GPRS modem, one GPRS modem – one controller
-FOM	-FOM	Fiber Optic Modem, self healing, single mode.

Note: Certain communications option combinations are non-practical these include:

- EN-EN
- FOM-FOM
- GR-FOM
- GR-EN

PART NUMBER EXAMPLE:

ET2000-24-M-SR

Note: The following communications types require an antenna, (-GR), (-LR), (CR), (-SR).



Note: If no communication option is desired just leave the part number the way it is and move on to step three.

Step 3 Options.

The Calsense irrigation controller allows you to select a number of options that you can include in the overall design they are as follows:

(-F) Multiple Flow Meter Interface:

All Models of the Calsense controller can receive up to three separate flow meter inputs on projects consisting of more than one water source for irrigating landscape. The controller will sum up the readings of all flow sensors connected. The irrigation controller is specified as a (-F) controller. The first flow meter is wired to the irrigation controller using the standard Calsense red and black flow meter wires. The second and third flow meters are wired to the irrigation controller using an additional wire harness supplied when a (-F) option is specified.

(-G) ET Gage interface:

All Models of the Calsense controller can receive the ET Gage interface option. This allows the controller to collect Evapotranspiration data via an ET gage. The controller keeps a table of the last 28 days of ET. When it comes time to irrigate a station, the controller adds up the ET numbers since the last irrigation. If it has been 3 days since it irrigated, it will total the first three numbers in the table. If these numbers are .20", .15", and .10", the total would be .45". The controller will multiply this number by the station %of or ET factor to calculate how much water to apply (% of ET factor is used to adjust for irrigation efficiency and crop type). If the % of ET factor is 60%, the controller would multiply .6 times .45" to get .30". Using the precipitation rate stored in the controller, the run time is calculated. If the precipitation rate is 2.00" per hour, the run time will be 15 minutes (1/4 hr. The user can program the cycle and soak feature to divide up the 15 minutes into individual run times. If the cycle time is set to 5 minutes, there will be one start time and two repeats. If there is no signal from the ET Gage, historical data is used as a back-up.

(-RB) Rain Bucket interface:

The Calsense Irrigation controllers can keep a record of accumulated rainfall when using the Calsense Model RB-1 Rain Bucket. The irrigation controller is specified as a –RB controller. The rain bucket consists of a tipping mechanism which measures every 0.01 inches of rainfall, and is used in conjunction with the daily ET mode of the irrigation controller. The Calsense controller receives this information and takes into account the actual amount and rate of rainfall when calculating station run times. The measured water drains out of the bottom of the housing. Therefore the bucket requires no additional service of any kind. It is completely automatic. One rain bucket can be shared by multiple controllers, or Rain Bucket data can be shared by multiple controllers through the Calsense Command Center software.

(-WG) Wind Gage interface:

The Calsense Irrigation controllers can monitor wind speed using the Calsense Model WG-1 Wind Gage. The irrigation controller is specified as a –WG controller. The wind gage sends pulses to the Calsense irrigation controller, which in turn automatically stops irrigation once the wind speed increases above a user set limit. As wind dies down, the Calsense irrigation controller will resume irrigation where it left off. The wind gage cannot share with other controllers through the Calsense Command Center Central System (unless the -FL option is in use with all other controllers in the same chain).

(-FL) FLOWSENSE® interface:

The Calsense *FLOWSENSE®* option is available on the ET2000 and ET2000e Irrigation controllers. This option is used when one or more controllers are sharing one or more Master Valves, Flow Meters, or Pumps.

The Calsense *FLOWSENSE®* option is designed to allow the user to setup and operate this feature directly in the field with the Calsense controller. There is no requirement for a central computer to operate this feature. The *FLOWSENSE®* option makes use of innovative technology to cooperatively communicate between controllers and manage the proper operation of irrigation valves.

The *FLOWSENSE®* option allows management of the following irrigation system components:

- Eliminates relays when sharing pumps or Master Valves with several controllers.
- Manages the number of valves operating based on irrigation system flow capacities.
- Eliminates scheduling conflicts with multiple controllers.
- Provides water management capabilities with or without a flow meter.
- Allows Wind / ET to be shared to other controllers.
- All of these features are done in the field without a central.

The cooperative nature of *FLOWSENSE®* allows the sharing of flow readings, Master Valve and pump information between controllers. The sharing of information is done through a mutual two-way communication hardware link between controllers. The hardware link is made up of hardware, radio or a combination of both.

FLOWSENSE® Water Management:

The Calsense *FLOWSENSE®* option allows the user to control the number of valves turned ON based on flow capacities. By doing this the water window is minimized and the system flow rate is never exceeded. Pumps operate at their capacities and the entire irrigation system is operated at maximum efficiency. The user is able to select the system maximum flow rate with or without pumps. In addition, the user can control the number of valves coming ON for areas of the mainline based on mainline capacities. The final result is an irrigation system operating at maximum efficiency, all controlled in the field through the irrigation controllers. The *FLOWSENSE®* technology will also allow the user to turn pumps ON and OFF by program.

Manual operation through the manual key on the controller or through the optional Radio Remote is combined with the *FLOWSENSE®* technology so that even during programmed irrigation these

functions will not overflow the system causing a reduction in performance.

Flow Monitoring:

The *FLOWSENSE®* option is able to pinpoint valves with high flows due to broken pipes or low flows. The controllers will identify which valve is causing the problem, shut this valve down and alert the user for quick and easy repair. The controllers will also identify problem valves based on electrical problems such as shorted solenoids or broken wires.

When a faulty valve is detected and shut off, the controller will find another valve to turn on, always working to shorten the water window and maximize pumping efficiencies, while at the same time not exceeding the irrigation system capacity.

Communications Options

The *FLOWSENSE®* option will be able to communicate between the controllers with a hardwire link or an unlicensed low wattage radio link, or even a combination of both, on the same project. The *FLOWSENSE®* option is also available in a single controller if the user needs to irrigate based on system watering capacities.

Multiple Controllers:

The *FLOWSENSE®* option is especially powerful when operated on a project using several controllers. It is necessary for each controller to be specified with the -FL option for proper communication between controllers. In addition to the features previously mentioned, the controllers make full use of the *FLOWSENSE®* technology by sharing flow, Master Valve and pump information between themselves. The irrigation system is water managed in the field through user-friendly menus.

Hard Link:

The *FLOWSENSE®* option when specified as a -FL option and with the appropriate hardwire link (-M) will allow the user to link several controllers with the standard 4 conductor communications cable. The -FL option, when combined with a hardwire chain link, is used when more than one controller is sharing more than one point of connection with more than one controller. This option allows several controllers to share the irrigation programs and flow information between themselves for:



- Monitoring of system flows.
- Avoiding scheduling conflicts between multiple controllers.
- Minimizing water window by maximizing number of valves on without exceeding system flow capacity.
- Turning OFF valves with excessive flow rates due to broken lateral lines.
- Tracking water usage and comparing to a water budget.
- Elimination of relays when sharing pumps and Master Valves.

Radio Link:

The *FLOWSENSE®* option, when specified as a –FL option and a –SR communications option, allows the user to link several controllers with unlicensed frequency hopping radios. This radio link can be viewed as simply replacing the hardwire described in the hardwire link section and is available only with the Calsense controller. A Radio survey conducted by Calsense is required prior to installation to confirm proper radio coverage for efficient system communication. The radios operate in an unlicensed frequency band and deal with interference by hopping through multiple frequencies. This hopping technique is preprogrammed into the controllers and assures the user the system is communicating efficiently. If after several retries the system cannot communicate, the controllers revert to stand-alone operation continuing to operate as stand-alone controllers without the *FLOWSENSE®* option. When *FLOWSENSE®* communication is re-established, the controllers automatically start maximizing the irrigation with the *FLOWSENSE®* option.

Note: The (–FL) option is in addition to and independent from any central communication option. The –FL option may be combined with any other Calsense controller option and is available only with the model ET2000 and ET2000e.

(–RR) Radio Remote interface:

The optional Calsense Integrated Radio Remote (–RR) option receiver allows the user to turn on and

off valves without requiring the user to go to the controller first. Range of coverage (line of sight) has been factory tested at over 4.5 miles. The receiver is integrated onto the Calsense controller board. During operation the controller display will indicate remote operation. The integrated Radio Remote receiver will operate all irrigation station outputs on the Calsense controller. The user activates the current controller by issuing a “Wake-Up” command from the transceiver. Only the controller receiving the “Wake up” command will respond to the station on/off commands, guaranteeing the correct irrigation station coming on. Multiple transceivers may be used on large sites without interfering with each other by utilizing unique controller addressing. The receiver unit controls up to 40 irrigation station outputs and a Master Valve output that is on any time one or more outputs are activated. The controller stations may be turned on or off in any order.

The Calsense controller makes use of “Rapid Commands”. This provides quick and easy station up or down commands for rapid changing of stations.

The transceiver can be used for two way voice communications, if a second transceiver is available, as well as turning valves on and off.

The transceiver includes a battery charger. The transceiver case is designed to meet strict MIL-STD810E standards for water and shock resistance. Batteries are easily replaced. All components comply with FCC rules and regulations. The user is responsible for any licensing requirements if necessary.

(–L) Lights interface:

The Model ET2000 Irrigation controller provides an optional program that can be used to control various devices such as lights, gates, or water features. The additional light circuits are added at the time of ordering the controller by specifying the (–L) Lights option. This option includes the hardware and software for four additional isolated light circuits. These are in addition to the outputs for stations. The lights program operates independently from the irrigation programs. The output is 24 VAC, and is used to operate a relay. The program has a 14 day schedule, with two start and stop times in each 24 hour period.

OPTIONS CHART	
OPTION	DEFINITION
-F	Interface to read two (2) additional flow sensors.
-G	Interface to read an ETG (ET Gage)
-RB	Interface to read a RB-1 (Rain Bucket)
-WG	Interface to read a WG-1 (Wind Gage)
-FL	FLOWSENSE® software only, requires a communications option when more than one controller is using this option.
-RR	(-RR) Calsense integrated Radio Remote board for ET2000
-L	(-L) Calsense hardware and software for four (4) additional light circuits

PART NUMBER EXAMPLE:
ET2000-24-M-SR-F-G-RB-WG-FL-L-RR

Note: You can add up to seven (7) options on any one controller, the only restriction is that more than one of a like item is not permitted.

 **Step 4 Enclosure.**

The Calsense controller can be housed in a number of different enclosures. They are as follows.

(PD-1) Powder coated enclosure.

The Calsense Powder coated enclosure is a weather resistant, pre-driller unit, ready for any Calsense controller and optional Transient Protection Board (TP-1). The pedestal is mounted to a concrete base using hardware supplied with the pedestal.

(SSE, SSE-R) Stainless-steel enclosure (-R denotes antenna).

The Calsense heavy-duty enclosure is a completely assembled unit, ready for any Calsense controller. The controller panel is mounted at a 25 degree angle for easy access and viewing. The enclosure is constructed of weather and vandal resistant stainless-steel. The unit comes complete with TP-1 and TP-110 transient and lightning protection, factory labeled terminals, GFI outlet and keyed switch. It is also available with a pre-mounted radio antenna for use with the Calsense Local Radio controllers. It features a security-tight locking mechanism, louvered vents with splash guards and bee/wasp screens, and comes with a 5 year warranty for the enclosure and the Calsense installed equipment within. The Calsense enclosure is fully UL approved.

PART NUMBER EXAMPLE:
ET2000-24-M-SR-F-G-RB-WG-FL-L-RR-SSE-R

Note: Only the SSE and SSE-R enclosures are added to the end of the controller part number. The PD-1 enclosure is ordered separately.



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