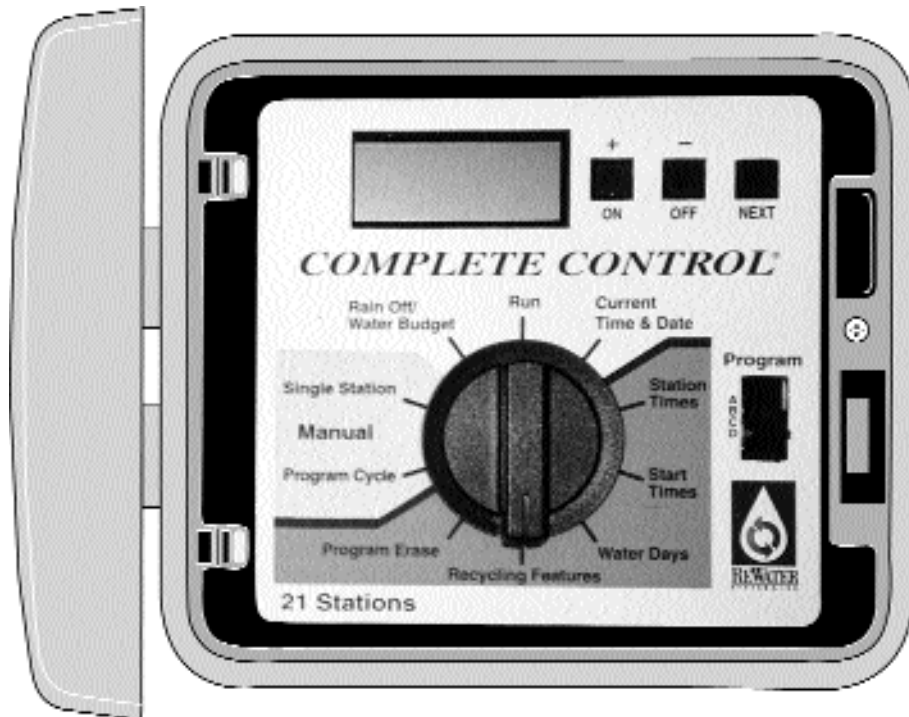




COMPLETE CONTROL[®] 21 STATION CONTROLLER



User's Guide

FEATURES

Thank you for purchasing a Complete Control® 21 Station recycling controller. Listed below are some of the important features that you should be aware of before you begin programming. Details on how to implement these features are described in detail on the following pages.

- Four fully independent programs that run concurrently
- Water programming for days of the week, odd calendar days, even calendar days, and intervals from 1 to 30 days. Days of the week and calendar days can be combined for more selective watering
- 365 day calendar, with automatic compensation for leap year. The calendar is valid for 1997 to 2096
- Sixteen available start times for each freshwater program
- Start time stacking and overlap protection
- Freshwater station watering time from 0 minutes to 10 hours in 1 minute increments.
- Recycling station water time from 0 to 30 minutes in 1 minute increments
- Independent program erase for each program
- Non-volatile memory that retains programmed information for up to 30 years in the event of a power failure.
- Accurate time and date retention for power failures up to 90 days continuous via a 9-volt alkaline battery (included)
- Water budgeting from 0 to 200% in 10% increments for each program
- Rain delay programmable to 7 days
- Self-diagnostic electronic circuit breaker that identifies and overrides faulty stations
- Manual operations available by station and program
- Sensor switch-ready for operation with any normally-closed rain switch device
- Slide switch control provided for rain switch sensor override
- Automatic recycling filter backwash
- Automatic freshwater supplementation on recycled valves
- Flow-sensor-ready for totalizing recycled water in hundred cubic feet
- Recycled water evenly distributed across all recycling stations

To take full advantage of all Complete Control features, please review the User's Guide completely before installing or programming your new controller.

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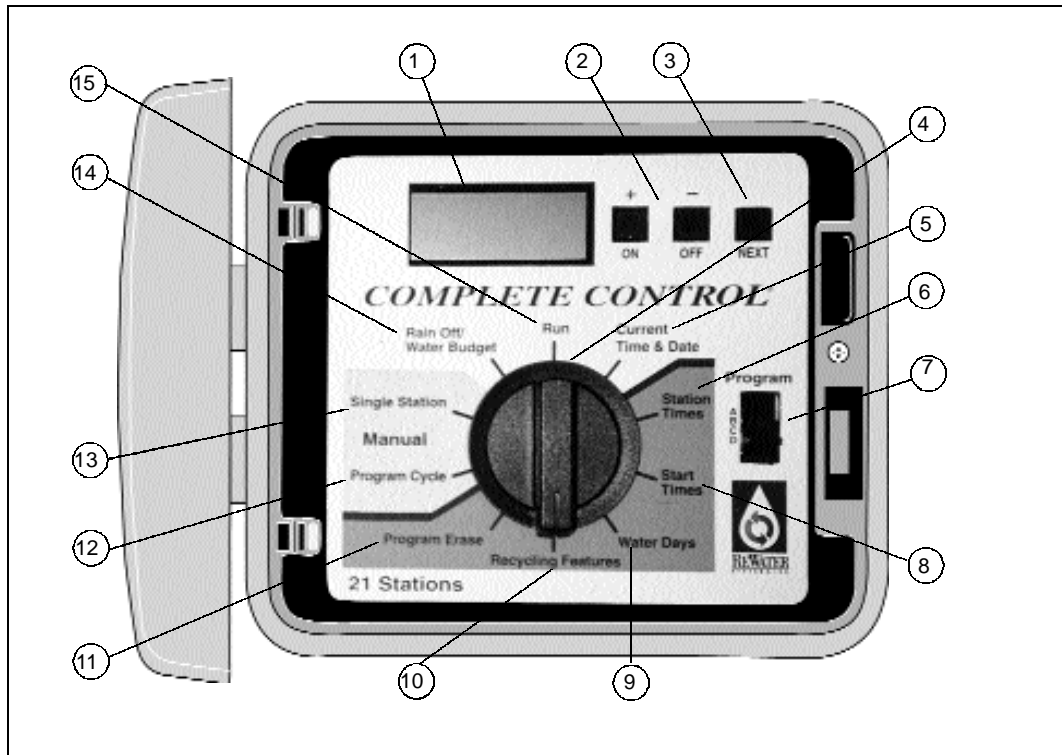
CONTROLLER COMPONENTS

Shown in Figure 1

- 1 LCD Display: For viewing time, program and status information.
- 2 +/On & -/Off Buttons: For entry of program information.
- 3 Next Button: For selection of information to be programmed or reviewed.
- 4 Function Dial: For selecting the programming and operating functions.
- 5 Current Time/Date: For setting the current time and date.
- 6 Station Times: For setting individual watering time for each station.
- 7 Program Select Switch: For selection of programs A, B, C or D.
- 8 Start Times: For setting the time each program cycle will start.
- 9 Water Days: For setting a watering day schedule for each program.
- 10 Recycling Features: For setting recycling functions.
- 11 Program Erase: For erasing information within a selected program.
- 12 Manual Program Cycle: For manual operation start of a selected program watering cycle.
- 13 Manual Single Station: For timed or untimed operation of a single station.
- 14 Rain Off/Water Budget: For immediate shut down of all controller output. Programmable output delay for 1-7 days (Rain Delay). For the increase or decrease of station times for all stations within a program without changing program memory.
- 15 Run: For automatic operation.

CONTROLLER COMPONENTS

Figure 1



CONTROLLER COMPONENTS

Shown in Figure 2

- 16 3-WAY Valve: For the connection of the 3-WAY valve actuator.
- 17 Float Switch: For the connection of the float switch from the recycling surge tank.
- 18 Flow Sensor: For the connection of an optional flow measuring sensor.
- 19 Mounting Holes: Pilot screw holes for attaching controller to wall.
- 20 Safety Fuse: Replaceable 2.0A slow-blow fuse provides protection from an internal short-circuit condition.
- 21 Sensor Control Switch: To override rain switch sensor input.
- 22 Sensor Connection Terminals: For the connection of an optional (normally closed) rain switch device.
- 23 Valve Common Terminals: For the connection of up to three field (24V) common wires.
- 24 Earth Ground Lug: For connection of a 12-16 gauge copper ground wire.
- 25 BW: For the connection of the backwash valve.
- 26 FW: For the connection of the FW supplement valve.
- 27 Pump: For the connection to the recycling pump relay.
- 28 Valve Wire Terminals: For the connection of valve control wires 1-21.
- 29 Battery Compartment: 9-volt alkaline battery access compartment.

GENERAL INFORMATION

This section contains general information on:

- How the backup system works
- How the electronic circuit breaker works
- How the sensor feature works

HOW THE BACKUP SYSTEM WORKS

The Complete Control uses non-volatile memory to store watering programs. This type of memory prevents the watering program information from becoming lost in the event of a power failure.

Because the current time and date are always changing, only the most recent date can be saved in non-volatile memory. Therefore, a battery is required to maintain the correct time and date in the event of a power failure. A 9-volt alkaline battery (provided) will maintain the correct time and date during power failures up to 90 days. In a typical installation, the battery should last from two to four years before replacement is necessary. Once the battery is installed, the controller can be fully programmed for operation.

Note: For operation of the valves, AC power must be applied.

To install the battery:

1. Unlatch the hinged control module assembly and carefully swing it outward to open.
2. Locate and remove the battery compartment cover from the lower back side of the module.
3. Connect the 9-volt alkaline battery supplied to the battery clip terminals.
4. Insert the battery into the compartment and reinstall the battery compartment cover.

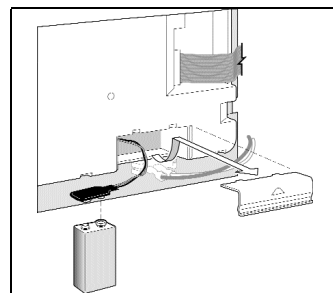


Figure 3

Caution: Batteries contain hazardous material. Always handle and discard batteries properly in accordance with the battery manufacturer's recommendations.

GENERAL INFORMATION

HOW THE ELECTRONIC CIRCUIT BREAKER WORKS

The controller is equipped with an electronic circuit breaker. If the controller detects a short circuit, the shorted station (valve) will be turned off automatically. The display will then flash "SHORT" and the shorted station number, or "RELAY," "3-WAY," "BW," or "FW." The controller continues to automatically water the other stations and the following watering programs until the shorted station is repaired. Each automatic start will attempt another cycle and retest the short-circuited valve. Listed below are the most common conditions which will activate the electronic circuit breaker. After correcting the problem, return the controller to normal operation as follows:

1. Set the dial to one of the following positions: Run, Manual-Single Station or Manual-Program Cycle.
2. Press the OFF button to return the controller to the normal operating mode.

Condition: The word "SHORT" displays with one or more station numbers.

Diagnosis: One or more stations are shorted.

Solution: Check the wiring of the displayed stations for the cause of the shorted condition. Repair valve(s) and/or wiring as needed.

Diagnosis: Too many valves operating at the same time causing an over load condition.

Solution: Check watering programs for concurrent station operation.

Maximum total output is 24 VAC at 1.25 amps. Reduce the number of stations running at the same time.

Condition: The word "SHORT" displays without one or more station numbers.

Diagnosis: A short circuit has occurred with a time duration too short for the controller to determine the station.

Solution: Check all valve wiring for breaks in the insulation which may cause a station output to short to common.

Diagnosis: A transient power surge spike has occurred.

Solution: Reset the controller.

Diagnosis: A short or overload occurred on one watering cycle but was no longer there on a subsequent cycle.

Solution: Check for loose and/or exposed valve wiring.

GENERAL INFORMATION

HOW THE SENSOR FEATURE WORKS

The Complete Control is equipped to operate with an optional rain sensing device, commonly called a "Rain Switch", to prevent automatic watering during rain.

The rain switch is a simple device, typically installed on a roof overhang or stationary structure exposed to rainfall and full sun and shielded from irrigation spray.

When rain occurs, the normally closed rain switch senses the moisture and opens the valve common circuit, effectively preventing all output to the field. The electronic programming portion of the controller is isolated from the rain sensor switch, and continues to operate as programmed. When rain stops and the rain switch returns to its normally closed state, the valve common circuit is restored, allowing watering to resume as scheduled.

A two-position Sensor switch (see figure 2, item 21 on page 5) is provided to enable you to easily bypass operation of the rain switch at any time. If you choose to disregard rain switch input, place the SENSOR switch in the Bypass position. To enable rain switch operation, place the Sensor switch in the Active position.



IMPORTANT:

If a rain switch is NOT connected to the controller, the SENSOR switch MUST be in the BYPASS position to enable controller operation.

The controller will not operate automatically or manually if the SENSOR switch is in the ACTIVE position without a rain switch connected.



IMPORTANT:

The rain sensor will also prevent the recycling function from operating.

PROGRAMMING THE CONTROLLER

This section covers the following topics:

- Getting started
- Setting the current time and date
- Erasing existing programs
- Setting the recycling features
- Setting the station run duration
- Setting the program start times
- Selecting the days to water

GETTING STARTED

The unique modular design of the Complete Control enables you to easily remove the control module from the cabinet and take it anywhere for handy programming - even at your kitchen table! Just swing the module out, disconnect the ribbon cable, disconnect the round cable, then unclip the module from its support frame. Now, by installing a 9-volt alkaline battery you can program and review your watering schedules and have it ready to operate upon completion of the installation. (See battery installation instructions on page 6.)

Read the ReWater Owner's Operation Manual before installing or programming your Complete Control.

Note: To extend battery life, the display will automatically dim after two minutes of inactivity. To restore the display, simply turn the function dial to any position.

PROGRAMMING THE CONTROLLER

WHAT IS A WATERING PROGRAM?

In basic terms, a watering program is a small set of instructions which tells the controller when to start a watering cycle, which stations will operate during the cycle, which days the cycle will be active and how long each station will operate during the cycle.

The Complete Control has four independent watering programs for your use. Separate programs are usually used to group stations with similar watering requirements. For example, you might use one program to water lawns in full sun every day. Another program could be used to water lawns in partial shade only on Monday, Wednesday and Friday. Trees and shrubs using drip irrigation could run on a separate program once a week. The recycled water areas might require watering every day. As you can see, the availability of four programs allows you to have unique watering programs for your varied landscape needs.

PROGRAMMING THE CONTROLLER

WHAT IS A PROGRAM WATERING CYCLE?

When a watering start time is selected, that time becomes the beginning of an automatic watering cycle. A watering cycle operates each station assigned to the program, one by one, in numerical order.

In the following example, (also shown on the sample watering plan on page 12) we have set up Program A to start at 2:00 a.m. and again at 3:00 a.m. on a 1-day interval (every day). Stations 1, 2, 4 and 5 are front and back yard lawn areas which get full sun throughout the day. These stations will run for 10 minutes each for a total of 20 minutes run duration per day. Stations 3, 6 and 7 are lawn areas which are shaded during the afternoon hours. These areas require less water, so we have assigned them to Program B and set them to run for 20 minutes on a 2-day interval (every other day).

At 2:00 a.m., Program A watering cycle starts. Station 1 turns on, runs for 10 minutes, and turns off. Station 2 turns on, runs for 10 minutes, and turns off. Stations 4 and 5 operate sequentially in the same manner, each running for their set run duration. When Station 5 shuts off, the watering cycle is completed for the first start time. At 3:00 a.m., the watering cycle starts again and repeats the same station-by-station watering sequence.

Note that we have 40 minutes total watering time per cycle in Program A. If we had set the next start time at 2:30 a.m., the start time would have been delayed until 2:40 a.m., enabling the first cycle to finish as programmed. This function is called "start time stacking", and can occur within each program.

Watering programs, however, operate independently, which means that two or more programs can run simultaneously. In our example, Program B will also start at 2:00 a.m. Therefore, Stations 1 and 3 will turn on at the same time, and Station 2 will turn on while Station 3 is running. This feature enables more watering to be completed within the prime "watering window", which is generally between Midnight and 6:00 a.m.

The recycling stations do not use start times. The station time is the total time per day, NOT the time per start.

Note: When scheduling watering programs to run simultaneously, it is important to ensure the water supply has sufficient pressure and volume to maintain optimum sprinkler performance.

PROGRAMMING THE CONTROLLER

WATERING SCHEDULE FORM (SAMPLE)

For your convenience, a Watering Schedule Form, with a Quick Reference Card on the back side, is provided. Use the form to plan and record your automatic watering activities. Use the quick reference instructions when minor programming changes are required. Keep the card with the controller by attaching it to the inside front door. See figure 4 for a scheduling example.

Figure 4

Watering Schedule Form			Program A	Program B	Program C	Program D
Watering Day Schedule	WeekDays		MWF			SMTWTF
	Odd/Even					S
	Interval			2	7	
Watering Cycle Start Times			2am, 3am	2am		
Station	Type	Station Description	Station Run Time			
1		Front Lawn (sun)	10min			
2		Front Lawn (sun)	10min			
3		Side Lawn (shade)		20min		
4		Back Lawn (sun)	10min			
5		Back Lawn (sun)	10min			
6		Back Lawn (shade)		20min		
7		Front Lawn		20min		
8						
9						
10						
11						
12						
13						
14	RE	North Trees			12min	
15	RE	South Tree			12min	
16	RE	East Shrubs			8min	
17	RE	West Shrubs			8min	
18	RE	Rose Bushes			12min	4min
19	RE	Flower Bed			12min	4min
20	RE	Lemon Tree			8min	2min
21	RE					

PROGRAMMING THE CONTROLLER

SETTING THE CURRENT TIME AND DATE

Before you can program the controller for automatic watering, you must set the controller clock to the current time and date. This controller features a 365-day calendar with automatic leap year compensation. Once the date is set, the controller keeps track of the date and enables troublefree, odd-even day of the month watering required in some locations. The time and date apply to all programs. To set the time and date, follow the steps below.

1. Turn the Function Dial to the Current Time & Date position. The Hour digits and AM/PM will flash.
2. Press the + button to increase or - button to decrease the hour digit.

Note: Continuous pressure on the + or - buttons causes the display to change rapidly.

3. Press the NEXT button to select the minutes digits. Use the + and/or - buttons to set the current minute.
4. Press the NEXT button to select the year digits. Use the + and/or - buttons to set the current year.
5. Press the NEXT button to select the month. Use the + and/or - buttons to set the current month.
6. Press the NEXT button to select the day digit(s). Use the + and/or - buttons to set the current calendar day.
7. Return the Function Dial to the Run position when the current time and date have been set.

ERASING EXISTING PROGRAMS

This process allows you to easily clear the controller memory of all user-defined watering program information within an individual program. This is an optional procedure and can be skipped if you wish to retain previous program operating information or the controller has not yet been programmed.

Erasing a program resets the memory to factory conditions: No station run durations, no program start times. Active watering (CONTINUED)

PROGRAMMING THE CONTROLLER

days set to S,M,T,W,T,F,S. Water Budget is set to 100%.

Note: This process is program independent and resets only the information for the selected program.

To erase program information for a selected program:

1. Select Program A, B, C or D with the Program switch.
2. Turn the function dial to the Program Erase position. The display will show ERASE .
3. Press and hold the OFF button until "DONE" is displayed.
4. Repeat this procedure for each program you wish to erase.

SETTING THE RECYCLING FEATURES

This section covers the following topics:

- Displaying total recycled water usage
- Turning recycling on and off
- Turning freshwater on and off
- Selecting the # of recycling valves
- Setting the backwash interval
- Setting the backwash duration

DISPLAYING TOTAL RECYCLED WATER USAGE

If flow sensor option is used, the Complete Control will count the total recycled water usage. The total flow is counted in HCF, hundred cubic feet. 1 HCF = 748 gallons. To display the recycled HCF, follow the steps below:

1. Turn the Function Dial to the Recycling Features position.
2. The display will alternate between the flow reading and HCF. That number is the total HCF that has been recycled by the system.

TURNING RECYCLING ON AND OFF

Use this feature to turn off the recycling stations for an indefinite period of time. This feature will only turn off the recycling stations. To turn the recycling stations on or off, follow the steps below:

1. Turn the Function Dial to the Recycling Features position.
2. Press the NEXT button once.

PROGRAMMING THE CONTROLLER

3. The first two digits on the display will be RE followed by either ON or OFF. Press the ON and OFF buttons to turn the recycling stations on or off.

TURNING FRESHWATER STATIONS ON AND OFF

Use this feature to turn off the freshwater stations for an indefinite period of time. This feature will only turn off the freshwater stations.

To turn the freshwater stations on or off, follow the steps below:

1. Turn the Function Dial to the Recycling Features position.
2. Press the NEXT button twice.
3. The first two digits on the display will be FW followed by either ON or OFF. Press the ON and OFF buttons to turn the recycling stations on or off.

SELECTING THE NUMBER OF RECYCLING VALVES

The 21 stations in the Complete Control system can be divided into freshwater stations and recycling stations. The lower numbered stations are freshwater, the higher numbered stations are recycling. This setting defines the first station number that is used for recycling. Stations with that number and above are all recycling. All station numbers that are less than the setting are freshwater.

For example, if the setting is 11, then stations 11 to 21 are recycling. Stations 1 to 10 are freshwater.

To set the station number for the first recycling valve, follow the steps below:

1. Turn the Function Dial to the Recycling Features position.
2. Press the NEXT button three times.
3. The display will show RE VN and the station number.
(RE VN is short for REcycling Valve Number)
4. Use the + and/or - buttons to set the first station number that will be a recycling station.

SETTING THE BACKWASH INTERVAL

The Complete Control will automatically backwash the filter vessel. As the

PROGRAMMING THE CONTROLLER

recycling system operates, the filter vessel collects debris. The backwash cycle removes this debris from the filter.

The backwash interval setting is used to adjust how often a backwash cycle is performed. The Complete Control tracks the number of hours used for recycling. When that count equals the backwash interval setting, the Complete Control will perform a backwash cycle after that day's recycling program is complete.

To set the back wash interval, follow the steps below:

1. Turn the Function Dial to the Recycling Features position.
2. Press the NEXT button four times.
3. The display will show RE BI and backwash interval in hours.
(RE BI stands for REcycling Backwash Interval)
4. Use the + and/or - buttons to adjust the backwash interval.

Note: The backwash interval is set to 14 hours at the factory. This setting should only be changed at the recommendation of ReWater Systems' personnel.

SETTING THE BACKWASH DURATION

This setting adjusts the length of a backwash cycle in minutes. The backwash duration is determined by the filter vessel size and water pressure. To set the back wash duration, follow the steps below:

1. Turn the Function Dial to the Recycling Features position.
2. Press the NEXT button five times.
3. The display will show RE BD and backwash duration in minutes.
(RE BD stands for REcycling Backwash Duration).
4. Use the + and/or - buttons to adjust the backwash duration.

Note: The backwash duration is set to 4 minutes at the factory. This setting should only be changed at the recommendation of ReWater Systems' personnel.

SETTING THE STATION RUN DURATION

A station is assigned to a program when it is given a station run duration (from 1 minute to 10 hours for freshwater stations, 1 minute to 30 minutes for recycling stations) in that program. The station can have only one run duration per program. Additionally, the station can be assigned to any number of programs and

PROGRAMMING THE CONTROLLER

have a different run duration assigned in each.

To set the run duration for each station:

1. Turn the function dial to the Station Times position. The controller displays STATION NUMBER 1 and OFF (or the current station runtime).
2. Select Program A, B, C or D with the Program switch.
3. Press the NEXT button to select the station number you wish to set (if other than the one displayed).
4. Use the + and/or - buttons to display the desired station run duration.

Note: OFF is the factory setting for each station. If the station has a run duration and you wish to remove it from this program, use the + and/or - buttons to select OFF, (displayed between 10:00 [ten hours] and 00:01 [one minute]).

Note: For the recycling stations, the display will show RE, followed by the station time. The RE is displayed as a reminder that this is a REcycling station.

SETTING PROGRAM START TIME(S)

This procedure is used to set the watering cycle start time(s) for each fresh water program. Each program can use up to 16 start times. Each start time will initiate a sequential watering cycle of all stations with an assigned run duration in the program.

To set program cycle start time(s):

1. Turn the function dial to the Start Times position.
2. Select Program A, B, C or D with the Program switch.
3. Use the + and/or - buttons to display the start time.

Note: To remove a start time, adjust the time to display OFF (located between 11:59 p.m. and 12:00 a.m.).

4. Press the NEXT button to assign another start time to the program.
5. Repeat steps 2 through 4 for each program as necessary.

Note: The Complete Control will operate one watering cycle in a program at a time. If a start time occurs while a watering cycle is in progress, the start time will be delayed until the previous cycle is finished (this is called "start time stacking"). If the watering cycle extends past midnight into the next day, the cycle will continue operating until finished. However, if a watering cycle has been

(CONTINUED)

PROGRAMMING THE CONTROLLER

delayed until after midnight into a non-watering day, the watering cycle will not occur.

Note: The recycling valves do not use start times. Setting multiple start times for a program will not increase the watering time for the recycling valves. To increase the watering time for a recycling valve, increase the station run duration for that valve.

SELECTING THE DAYS TO WATER

Several watering day scheduling options are available. Each watering program can utilize any ONE of the following schedules:

- Days of the week

Use this type of schedule to water on specific days of the week. The days are displayed as three-letter abbreviations. For example, Sunday is SUN, Monday is MON, etc. Only the days you select to water will remain on the display.

- Odd Days or Even Days

To select every odd or even number calendar day, use this option. Because the 31st and the 1st are both odd number days, the 31st is automatically removed from the schedule.

This watering option can be combined with Days of the Week to form a more complex watering schedule. For example, Days of the Week could be set to water on MON, TUE, WED, THU, and FRI with ODD DAYS set to ON. This schedule would only water on weekdays that have an odd calendar date, watering on MON, WED, and FRI on one week, TUE and THU the next week.

- Day Interval

Selecting watering days by Day Interval enables a specific number of days between watering to be selected. For example, selecting a 1-day Interval schedules watering for every day. A 2-day interval schedules watering for every other day. A 30-day interval is the maximum interval frequency, which provides watering once every 30 days.

Another setting within the Day Interval is the current day of the schedule. The current day (displayed as TODAY) can be set for any day within the interval.

PROGRAMMING THE CONTROLLER

This number automatically increases by one every day. When the TODAY number equals the Day Interval number, a watering day will occur. For example, to water every third day starting today, a 3-day interval would be set with TODAY as day 3. Or, to water every 5 days starting tomorrow, a 5-day interval would be selected with TODAY as day 4.

To set a watering day schedule for each program:

1. Turn the function dial to the Watering Days position. The display will show the current watering day schedule for the selected program.
2. Select Program A, B, C or D with the Program switch.
3. Set the watering day(s) for the program using one of the three following procedures: Days of the Week, Odd Days/Even Days or Day Interval scheduling procedure.
4. Repeat steps 2 and 3 as necessary to set a watering day schedule for each program.

Days of the Week

- A. Press the NEXT button until the weekday abbreviations are shown at the top of the display.
- B. SUN (Sunday) will begin flashing.
- C. To select the day, press the ON button. To remove the day from the schedule, press the OFF button.
- D. Press the NEXT button to select the next day.
- E. Repeat steps C and D to set the remaining days of the week.

Note: Day Interval must be off to select Days of the Week.

Odd Days or Even Days

- A. Press the NEXT button until ODD DAYS or EVEN DAYS is displayed.
- B. Press the ON button to select the schedule.

Note: Day Interval must be off to select odd days or even days.

Day Interval

- A. Press the NEXT button until the DAY INTERVAL option is displayed.

PROGRAMMING THE CONTROLLER

- B. Press the ON button to select this option.
- C. Press the NEXT button. The display shows the current Day Interval number (1-30).
- D. Use the + or - button to select the Day Interval (1-30 days).
- E. Press the NEXT button. The controller displays TODAY and its current setting.
- F. Use the + or - button to select the desired setting for today.

OPERATING THE CONTROLLER

OPERATING THE CONTROLLER

This section includes instructions for the following controller operations:

- Water Budget
- Manual Operations
- Off and Rain Delay Modes

WATER BUDGET

The Water Budget feature enables you to easily increase or decrease the station run duration (by percentage) of all stations assigned to a selected program. This is handy for making temporary, overall station run duration adjustments without changing the original run duration settings. Water Budget values range from 0 to 200% in 10% increments, with 100% being the normal setting.

For example, as the fall season approaches and the temperature decreases, you may want to reduce the station time for the stations in Program A by 30%. Later you can return station times to their original values by setting the Water Budget value back to 100%.

Note: It is possible to inadvertently cause start time stacking when increasing station run duration. Careful planning and use of Water Budget will prevent this from occurring.

SELECTING THE WATER BUDGET

1. Turn the Function Dial to the RAIN Off/Water Budget position.
2. Press the NEXT button once.
3. Select Program A, B, C, or D with the Program switch.
4. Use the + and/or - buttons to increase or decrease the percentage value (0-200%)
5. Turn the Function Dial to the Run position.

Note: When in the Run position, the controller displays the % symbol when the Water Budget is in use for any program. During station operation, the adjusted run duration will be displayed.

Manual operation allows you to run individual stations or start automatic watering programs as needed. The Complete Control provides separate dial positions for each type of operation: Single Station and Program Cycle.

OPERATING THE CONTROLLER

SINGLE STATION

This option enables individual stations to be operated for an untimed duration (turned On/Off) or operated for a selectable duration from one minute to 10 hours.

1. Turn the function dial to the Single Station position.
2. Select Program A, B, C or D with the Program switch.
3. Use one of the following options to operate the station.

For untimed operation:

- A. Press the NEXT button as necessary to display the station you wish to operate.
- B. Press the ON button. The station will turn on and remain on until one of the following occurs:
 - The OFF button is pressed
 - The controller clock passes midnight
 - The function dial is moved to another position

For timed operation:

- A. Press the NEXT button as necessary to display a station you wish to operate.
- B. Use the + and/or - buttons to set the desired amount of station run duration (for this operation only), from one minute to 10 hours.
- C. To select additional stations to operate in sequence, repeat steps A and B as desired. Each station will operate one-by-one in the order they were selected.
- D. After all manual Single Station commands have been entered, return the function dial to the Run position.

OPERATING THE CONTROLLER

For manual backwash:

- A. Press NEXT until the display reads BW OFF.
- B. Press the ON button to start a backwash cycle. The backwash cycle will run for the duration set in the recycling features.
- C. To terminate the backwash early, press the OFF button.

PROGRAM CYCLE

Use this feature to manually operate watering programs. Individual programs can be started or stopped.

Note: Only the stations with an assigned run duration in the program will operate during the program watering cycle.

1. Turn the function dial to the Program Cycle position.
2. Select Program A, B, C or D with the Program switch.
3. Press the NEXT button to select the first station of the watering sequence (if other than the station number displayed).
4. Press the ON button to start the watering cycle. Watering will start with the selected station and will be followed by all subsequent stations. The display will show the run duration remaining for the operating station.

Note: You may advance through the stations by pressing the NEXT key for the next station. To terminate operation at any time, press the OFF button.

5. After all manual Program Cycle commands have been entered, return the function dial to the Run position.

OPERATING THE CONTROLLER

RAIN OFF

Use this feature to turn off controller operation for a day (Off mode) or for a selected number of days (Rain Delay mode).

Turning Off the Controller

Turning the function dial to the Rain Off/Water Budget position places the controller in the Off mode until the next day. After a 2-second delay, any current watering activity will shut off and all subsequent watering program activity will be suspended until the next day. The controller clock continues to update current time and date, and all watering program information is retained while in the Off mode. Normal controller operation is resumed by simply placing the function dial in any other position.

Using the Rain Delay Mode

The Rain Delay mode enables automatic watering to be delayed from 1 to 7 days. At the end of the selected delay period, the controller resumes automatic operation.

To set a Rain Delay period

1. Turn the function dial to the Rain Off/Water Budget position.
2. Use the + and/or - buttons to select the number of days (1-7) to delay operation.
3. Turn the function dial to the Run position. The display will show the number of days remaining in the delay period. The day number will automatically decrease by one digit each time the clock passes midnight. Automatic operation resumes when the display shows no delay days remaining.

Note: The controller can be operated manually while in the Rain Delay mode.

To cancel the Rain Delay mode:

1. Turn the function dial to the Rain Off/Water Budget position.
2. Press the - button until the display shows no delay days remaining.
3. Turn the function dial to the Run position.

Note: The RAIN function affects ALL stations.

INSTALLATION PROCEDURES

This section includes instructions for mounting the controller cabinet and making the necessary wiring connections. To ensure safe operation, it is important to follow the instructions carefully. The following procedures include:

- I Selecting an Installation Site
- II Mounting the Controller
- III Connecting the Valve Wiring
- IV Connecting an Optional Rain Switch sensor
- V Connecting an Earth Ground
- VI Connecting the Power Wires
- VII Connecting the Recycling Pump Relay
- VIII Connecting the FW and BW Valves
- IX Connecting the 3-Way Valve
- X Connecting the Float Switch
- XI Connecting the Optional Flow Sensor

I. SELECTING AN INSTALLATION SITE

Selecting the proper installation site for the controller is essential to safe and reliable operation. The Total Control features a weather-resistant cabinet designed for indoor or outdoor installation.

For easy operation and better view of the display, install the controller so that the display is at, or slightly below, eye level.

The controller should be installed on a vertical wall or other sturdy structure near a grounded, three-wire, power source. Select a location that shades the controller during the hottest hours of the day and provides as much protection from direct sunlight, rain, wind and snow as possible. **DO NOT** mount the controller where it will be exposed to direct spray from the irrigation system.

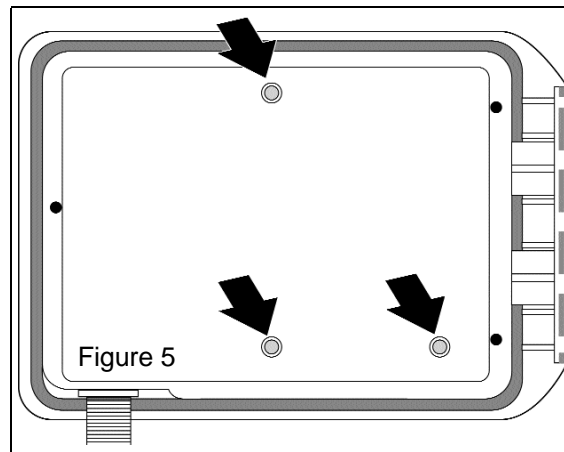
INSTALLATION PROCEDURES

II. MOUNTING THE CONTROLLER

1. Center the mounting template (supplied) on the wall at about eye level allowing a minimum of 14" (35.6cm) to the left of the template for cabinet door clearance. Using a small center punch or nail, mark the wall at the three mounting hole locations.

Note: When installing the controller on a plasterboard or masonry wall, use the appropriate type screw anchors to prevent the mounting screws from stripping.

2. Open the cabinet door and swing out the control module by pressing in on the release latch.
3. With the cabinet door and control module in the open position, turn the controller over, resting it face down on a clean smooth work surface.
4. Using a $\frac{3}{16}$ " (5mm) drill bit, carefully drill through the center of the three pilot holes located on the back of the controller cabinet. See Figure 4.



5. Attach the cabinet securely to the wall using the three #10 screws (provided) or the appropriate screw fasteners.

INSTALLING ELECTRICAL CONDUIT

Note: Electrical conduit and adapters are not supplied with the controller but may be required for installation in your area. Check local electrical codes and install conduit according to requirements.

1. For 120 VAC power wires, install a $\frac{1}{2}$ " (13mm) conduit controller junction box to the power source junction box.
2. For control (low voltage) wiring, install a $1\frac{1}{2}$ " (38mm) conduit adapter and conduit.

INSTALLATION PROCEDURES

III. CONNECTING THE VALVE WIRING

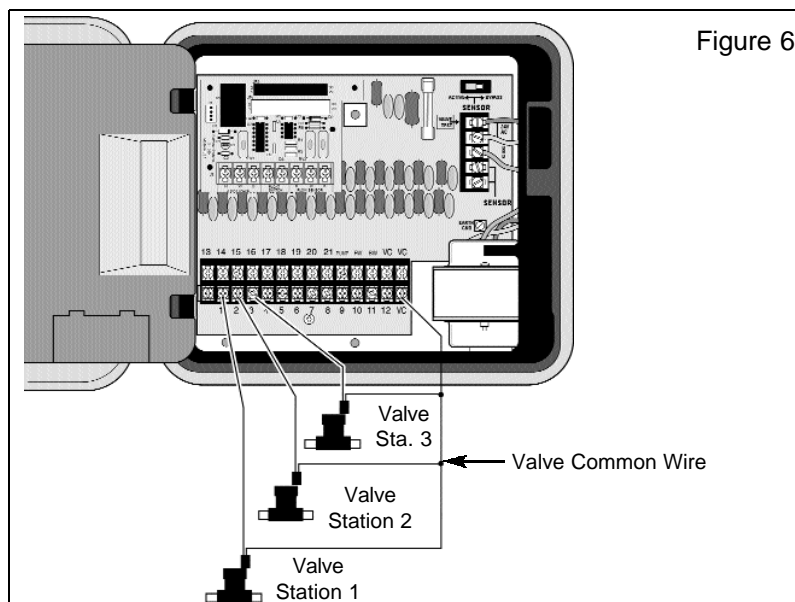
1. Use the lower numbered screw terminals for the freshwater sprinklers and drip irrigation valves (see page 15).
2. Use the higher numbered screw terminals for the recycling valves.

Caution: All wiring splices must be waterproofed to prevent short circuits and corrosion.

Caution: A maximum load of 12 VA (0.5 amps) may be connected to each station. A maximum load (including master valve) of 30 VA (1.25 amps) may be programmed to operate simultaneously. Exceeding these limits can damage the controller.

Caution: The recycling stations use 12 VA.

3. Route all wires from the irrigation valves into the controller cabinet through the 1½" (38mm) access opening. Remove approximately ½" (13mm) insulation from the ends of each wire.
4. Attach the common wire(s) to one of the three valve common terminals provided (labeled "VC").
5. Referring to Figure 6, connect each valve control wire to the appropriate station number terminal and tighten securely.



INSTALLATION PROCEDURES

IV. CONNECTING A RAIN SWITCH SENSOR

The Complete Control is designed for use with a normally-closed rain sensor or "Rain Switch". (Refer to page 6 for additional important rain switch information.)

To connect the rain switch sensor:

1. Route the two wires from the sensor into the cabinet through the field wire access opening.
2. Connect the wires to the "SENSOR" terminals in either order. See Figure 7.

Note: Refer to the installation instructions provided with the sensor for additional information.

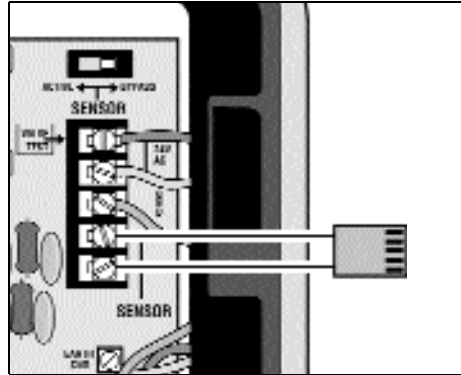


Figure 7

V. CONNECTING AN EARTH GROUND

A power surge is a sudden rise in voltage on the power main line. It is then often followed by a drop in voltage as the power line equipment tries to protect area users. A lightning strike on the power grid is the most common cause of power surges and can be damaging to the controller. Surge protection is built into the Complete Control PC board to stop potential surge damage by shunting the voltage to earth ground. Therefore, an important step in the installation process is to properly connect the controller to an earth ground source, especially if the controller is located in a lightning-prone area.

Caution: The built-in surge protection components cannot effectively protect the controller circuitry from power surge unless properly connected to an earth ground source.


To connect an earth ground:

1. Route a 12-16-gauge solid copper wire in the shortest and most direct path from the "EARTH GND" lug, located on the controller's terminal board (see item 24 on page 5), to an earth ground source such as metal (not plastic) water pipe or copper-clad ground rod.
2. Clamp the bare wire securely to the pipe or ground rod. Make sure the wire contact area is free of dirt and corrosion.

INSTALLATION PROCEDURES

VI. CONNECTING THE POWER WIRES

The controller has a built-in transformer which must be connected directly to a grounded three-wire 120 VAC power source.



WARNING

All electrical components must meet applicable national and local electrical codes including installation by qualified personnel. These codes may require an external junction box mounted on the transformer nipple and a means in the fixed wiring of disconnecting AC power having a contact separation of at least 0.120" (3mm) in the line and neutral poles.

Ensure the AC power source is OFF prior to connecting to the controller. The wire used for connection to the controller must

Caution: Do not connect the controller to one phase of a three phase power supply used by a pump or other electrical equipment.

1. Ensure the power source is off.
2. Route the Line, Neutral and Equipment Ground wires through electrical conduit to the controller.
3. See **Figure 9** on page 30 for wiring connections.
4. Close and secure the conduit box cover. Apply power to the controller.

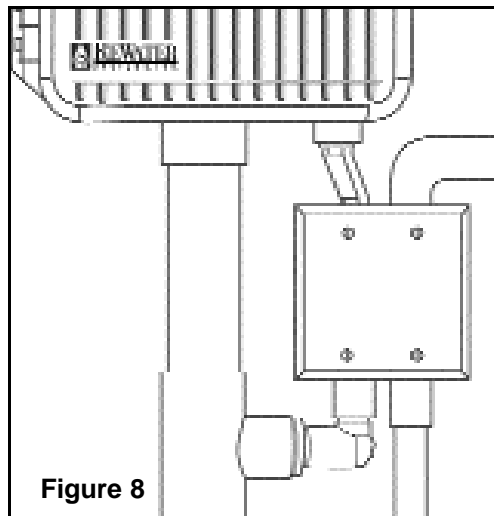


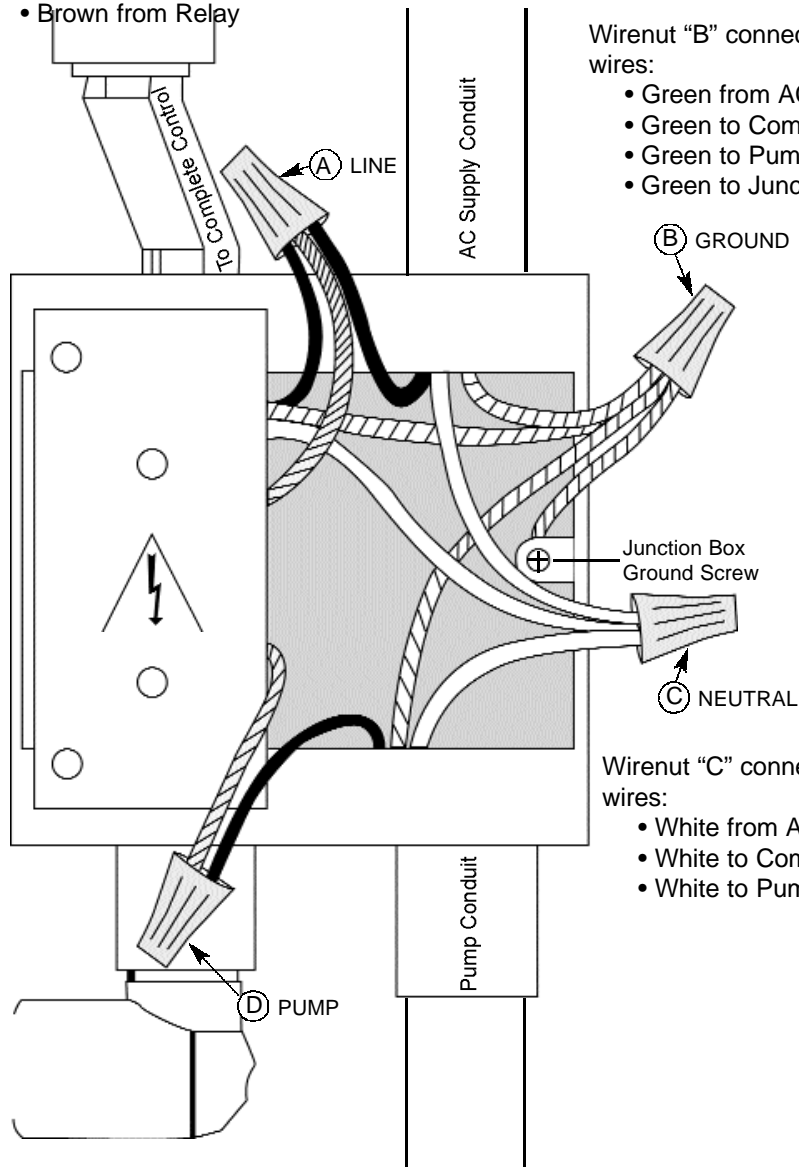
Figure 8

INSTALLATION PROCEDURES

Figure 9

Wirenut "A" connects the following wires:

- Black from AC supply conduit
- Black to Complete Control
- Brown from Relay



Wirenut "B" connects the following wires:

- Green from AC supply conduit
- Green to Complete Control
- Green to Pump
- Green to Junction Box

Wirenut "C" connects the following wires:

- White from AC supply conduit
- White to Complete Control
- White to Pump

Wirenut "D" connects the following wires:

- Black to Pump
- Brown from Relay

INSTALLATION PROCEDURES

VII. CONNECTING THE RECYCLING PUMP RELAY

The Complete Control uses a relay to operate the Recycling Pump. The relay is housed in the electrical junction box (see Figures 8 and 9). Two YELLOW wires are connected to the coil of the relay. The YELLOW wires have been routed through the 1½" conduit from the relay to the Complete Control. One of the YELLOW wires must be connected to the screw terminal labeled "PUMP" (see Figure 2, Item 25). The other YELLOW wire must be connected to a valve common, "VC", screw terminal.

Note: See the section, "Connecting the Power Wires", for instructions for the recycling pump power connections.

VIII. CONNECTING THE FW AND BW VALVES

The Complete Control recycling system includes a freshwater supplement valve (FW) and a backwash valve (BW). One wire from the freshwater supplement valve must be connected to the "FW" screw terminal (see Page 5, Figure 2, Item 26). The other wire from the freshwater supplement valve must be connected to a valve common, "VC", screw terminal. Similarly, the backwash valve must be connected to the "BW" and "VC" terminals (see Figure 2, Item 27).

IX. CONNECTING THE 3-WAY VALVE

The Complete Control uses a 3-Way Valve with a motorized actuator to enable the backwash cycle. The cable leading from the actuator contains three wires, RED, WHITE, and BLACK. These wires must be connected to the 3-WAY VALVE terminals labeled "R", "W", and "B" (see Figure 2, Item 16). To adjust starting position of this valve, toggle the switch on its rear.

X. CONNECTING THE FLOAT SWITCH

The Complete Control uses a float switch to detect that recycling water is available in the recycling holding tank. Each of the two wires from the float switch must be connected to one of the screw terminals labeled "FLOAT SWITCH" (see Figure 2, Item 17).

XI. FLOW MEASUREMENT SENSOR (OPTIONAL)

An optional flow measurement sensor may be connected to the Complete Control. This sensor measures the amount of recycled water that has been recycled. Water used by the freshwater supplement feature is not included in the measurement. The cable leading from the flow sensor contains three wires, RED, WHITE, and BLACK. These wires must be connected to the FLOW SENSOR terminals labeled "R", "W", and "B" (see Figure 2, Item 18).

TROUBLESHOOTING

<u>Error</u>	<u>Solution</u>
All valves will not turn on automatically	<ol style="list-style-type: none">1. Verify program: station time, watering start times, watering days schedule, current time, current day, water budget and rain delay.2. Check valve common wire for proper connection.3. Check for a shorted station; refer to "How the electronic circuit breaker works" on page 5.4. Ensure rain sensor (if installed) is properly connected and functioning properly. If rain sensor is not installed, ensure the SENSOR SWITCH is in BYPASS position.5. Make sure that freshwater & recycling are not turned off. See Turning Recycling On/Off.
Cannot program	<ol style="list-style-type: none">1. Disconnect power to controller for one minute. Reconnect power and reprogram.2. Install fresh 9-volt alkaline battery.
Controller skips a cycle	<ol style="list-style-type: none">1. Verify watering start times, current time and watering days schedule.
No display	<ol style="list-style-type: none">1. Check power source for tripped circuit breaker.2. If program module has been removed, this is a normal battery-saving feature. Turn dial to any position to reactivate display.3. Disconnect power and the battery to controller for one minute. Reconnect power and reprogram.4. Replace battery.

TROUBLESHOOTING

Error	Solution
Valve stays on	<ol style="list-style-type: none">1. Check station times and water budget.2. Check for Manual mode; place dial in Run position.3. Disconnect valve wire. If still on, valve malfunction is indicated.4. Check for manual bleed closure at valve (note that most valves can be manually operated multiple ways).
Valve will not turn on	<ol style="list-style-type: none">1. Ensure dial is not in Rain Off position or Rain Delay mode active.2. Verify program: station time, watering start times, watering days schedule, current time, current day and water budget.3. Make sure common wire and valve wire are correctly connected.4. Check for a shorted station, refer to page 7.5. If using sensor, check sensor.6. Check for blown fuse. Replace if necessary. See page 34 for fuse replacement information.7. Make sure that freshwater & recycling are not turned off. See Turning Recycling On/Off.
Short	<ol style="list-style-type: none">1. See "How the Electronic Circuit Breaker Works" on page 7 for troubleshooting information.

SPECIFICATIONS

Controller Cabinet: Plastic, weather-resistant, indoor/outdoor, wall mount with key-actuated locking cover

Junction Box: Metal, weather-resistant, indoor/outdoor, with gasketed cover.
Minimum installation footprint for controller and junction box
14.25"W x 19.5"H x 5"D

Wiring/Conduit Provision:
Power Wiring - 1/2" NPT Fitting
Field Wiring - 1 1/2" dia. conduit access

Power Specifications, Domestic Model (CC-21EX):

Input - 120 VAC, 60 Hz, 0.5A

Output - 24 VAC, 60 Hz, 1.25A (max. total), 0.5A (max. per station)

Battery: 9-volt, Alkaline

Fuse: 250V, 2A, Slow-Blow



WARNING:

If fuse replacement is required, replace only with the same type and rating. Installing a higher amperage fuse can result in serious injury and or equipment damage due to fire hazard.



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