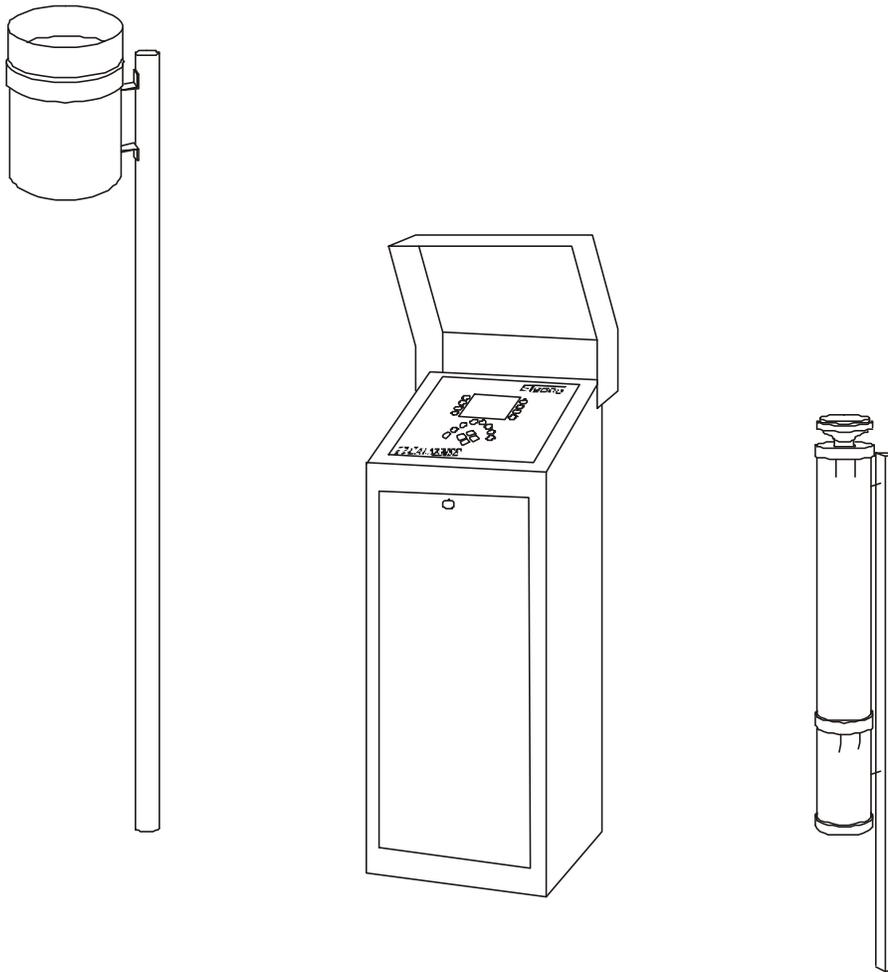




Real Time Weather Based Water Management



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1. Weather Based Water Management

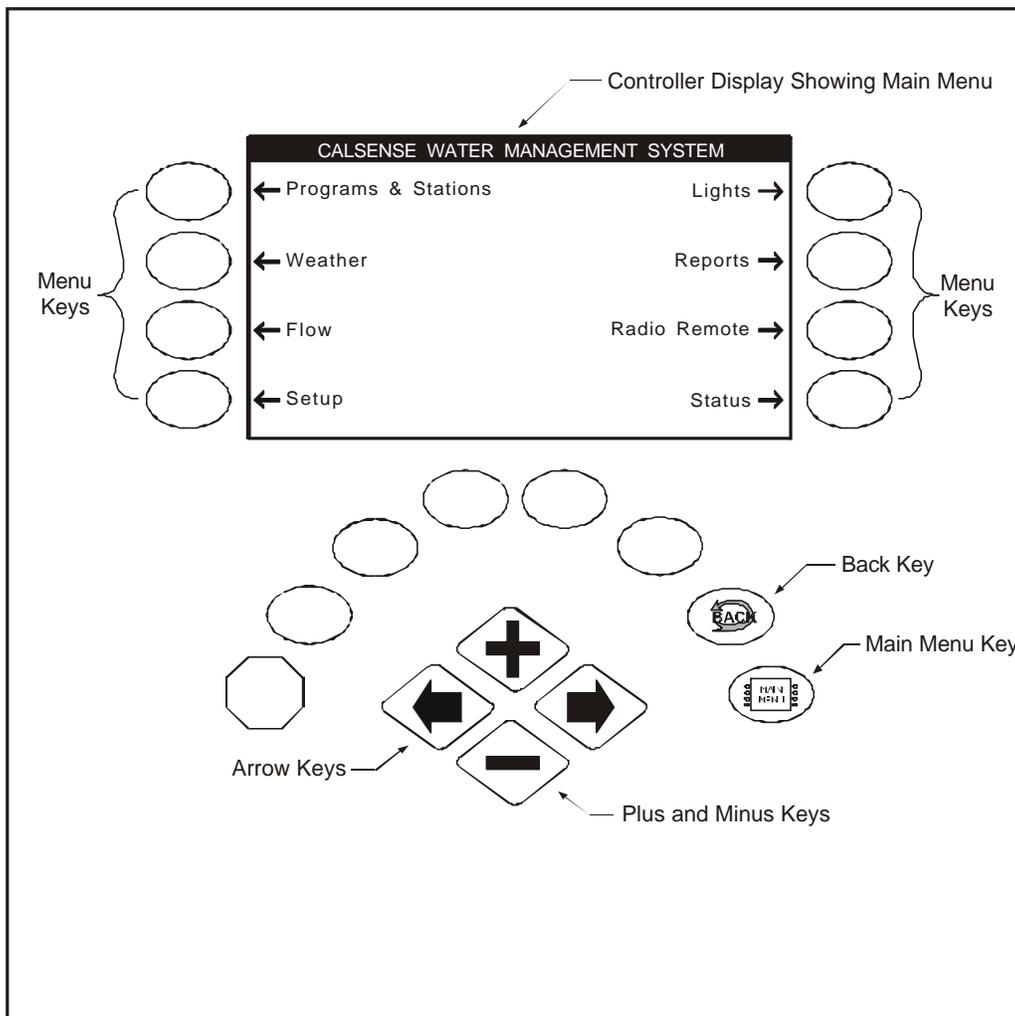
Using real-time weather conditions to control irrigation is one of the important features of the ET2000 controller. Through the use of optional Calsense equipment such as an ET Gage and a Tipping Rain Bucket, you can set-up the ET2000 controller to use real-time weather to control irrigation run-times. You can also share the weather information with other controllers using the Calsense Command CENTER software.

The two parts that make up the Weather Based Water Management system in the ET2000 are, daily-ET (evapotranspiration) and rain. The controller can be set-up to use either one or the other, or both of these features together. This guide explains how to set-up the ET2000 controller to use real-time weather and how the controller uses this information to control irrigation. It also explains adjustments to settings after the controller has been set-up for use in real-time weather mode. It is assumed that you are familiar with the basics of programming the ET2000 controller (*see the ET2000 Programming Manual for more information*).

2. Programming Keys

The following describes the conventions used in this guide. When instructed to press a key, the description of the key will be **CAPITALIZED AND BOLD**. The illustration below shows the location of the keys used for programming. There are eight Menu Keys located on either side of the display. The Menu Key's description will be the text on the display, the arrow next to the description points to which Menu Key to press. The other programming keys are the **MAIN MENU** Key, **BACK** Key, **PLUS** or **MINUS** Keys and the **ARROW** Keys. The screen in the illustration below shows the Main Menu, which is accessed by pressing the **MAIN MENU** key. The descriptions with the arrows are pointing to the Menu Keys which are to be pressed to access the various parts of the controller's program. All programming functions begin from the Main Menu. As you move through the programming screens you can always return to previous screens by pressing the **BACK** key.

The **PLUS**, **MINUS** and **ARROW** keys are used to make program changes. A change can only be made to a setting while it is highlighted by the cursor, press the **PLUS** or **MINUS** key to make the change to the highlighted setting. Press either **ARROW** key to move the cursor to the setting you want to change. If the highlighted setting is a number you can quickly scroll to the desired setting by pressing and holding down the **PLUS** or **MINUS** key.



3. Irrigation System Evaluation

One of the most important factors in water conservation is an efficient irrigation system. To maximize water savings, evaluate and if necessary, upgrade the irrigation system to improve uniformity of coverage. The payback for this expense is relatively short where water costs are high. If you do not have the expertise to perform a water audit, contact an irrigation consultant or a certified water auditor.

4. Getting Essential Information

Before you can irrigate using real-time weather, the controller must be programmed with the precipitation rate (application rate) for each station. This is the amount of water applied during irrigation and is measured in inches per hour. You can get this information using one of the following methods:

- Method 1. Perform an irrigation audit to measure the effective precipitation rates for each station. This method will give you the most accurate information.
- Method 2. Measure or calculate the flow rate for each station. If a Calsense flow meter is installed this process is very simple, the controller will measure flow rates automatically for each station, and keep a record of this information for you to access when setting up daily-ET (see page 15 for other methods you can use to calculate flow rates if a flow meter is not installed). Then measure the area covered for each station (in square feet). This can be done with a planimeter on an as-built drawing or with a measuring wheel in the field. Enter this information into the controller and it will automatically calculate a precipitation rate for each station.
- Method 3. Use precipitation rates published by the equipment manufacturer for the type of irrigation heads being used. You will also need to determine the flow rates for each station.

5. Calsense ET-Gage

The Calsense ET Gage is a device which measures evapotranspiration (ET) in .01 inch increments. When connected to the Calsense ET2000 Irrigation Controller (or shared using the Calsense Command CENTER software), the controller(s) will use the ET information to automatically calculate station run-times whenever scheduled irrigation is set to occur. Since ET is determined by weather conditions, irrigation run-times change daily based on current weather conditions. This helps conserve water and creates healthier plant material.

Before enabling daily-ET be sure the ET Gage is properly installed and functioning. (refer to ET Gage Installation Instructions or call Calsense at 800-572-8608) If you do not have an ET Gage installed you can still enable daily-ET in the controller and adjust the station run times using the built in historical ET numbers. Historical ET is the average of monthly ET for a given area. The Calsense ET2000 controller has built in historical ET tables for most areas throughout California. You can also create and store your own historical ET numbers for your area. These historical ET numbers are also used as a backup for actual real-time ET in case a problem should occur with the ET Gage.

6. Calsense Tipping Rain Bucket

The Calsense Tipping Rain Bucket is a device which measures the amount and rate of rainfall in .01 inch increments. When connected to the Calsense ET2000 irrigation controller (or shared using the Calsense Command CENTER software), the controller(s) will use the rain information to reduce irrigation run times. Depending on the amount of rain, and the rate of rainfall, the controller will either have station run-times reduced or not irrigate at all.

7. ET Table

The ET table (Fig. 1) is where the controller stores daily ET numbers (measured in inches). The numbers in this table are used to determine the amount of irrigation to be applied by each station. The numbers in the ET table can be generated from the following sources:

1. Automatically generated from an ET Gage wired to the controller.
2. Automatically shared from another controller connected to an ET Gage using the Calsense Command CENTER software (controllers must have communication capabilities to share ET).
3. Historical ET which is automatically entered into the ET table when daily ET is enabled, and remains in the table until it is replaced by real-time ET from an ET Gage or manually edited by the user.
4. Manually edit the ET table.

The ET table stores the last 28 days of ET numbers. In the example on the following page, the ET table has a combination of historical ET, actual real-time ET and user edited ET. The letter next to each number indicates how the number got into the ET table:

- h - historical
- g - ET Gage
- e - edited

Prior to irrigation, the controller will read the number in the ET table and use it to recalculate the irrigation run times for each station.

8. Rain Table

The rain table (Fig. 1) is where the controller stores rainfall numbers (measured in inches). The numbers in this table can only be generated from a Rain Bucket wired to the controller, or shared, using the Calsense Command CENTER software, from a controller wired to a Rain Bucket. In Fig. 1 the rain table has a combination of numbers, the letter next to the value indicates what the value represents:

- o - original, this value is zero (no usable rain), it has no effect on irrigation run times.
- m - below minimum, the below minimum value is measured rain but it is not enough to offset irrigation run times.
- r - usable rain, this value is rain that is used to offset irrigation run times.

The usable rain in the Rain Table is used to reduce each stations irrigation run times. The amount of time each station is reduced is determined by the precipitation rate of each station and the amount of usable rain. Usable rain in the Rain Table is determined by the settings programmed at the Rain Bucket Setup screen (see page 7). When scheduled irrigation is set to occur, the controller will use up the usable rain first by the amount of time scheduled to irrigate for each station. Until the usable rain is used up, there will be no irrigation. This will continue until all of the rainfall is used up at which time the irrigation will start again.

ET AND RAIN TABLES							
ET Table : (from 10/29/2001 back)							
Mon	Sun	Sat	Fri	Thu	Wed	Tue	
h .16	g .18	g .20	g .19	g .19	g .18	g .17	
g .18	g .17	g .20	g .19	g .17	g .17	g .16	
g .14	g .13	g .11	g .15	g .17	e .21	e .21	
e .23	h .16						
Rain Table : (from 10/29/2001 back)							0.00
Mon	Sun	Sat	Fri	Thu	Wed	Tue	
o .00	o .00	m .06	o .00	r .23	r .18	o .00	
o .00	o .00	o .00	o .00	o .00	o .00	o .00	
o .00	o .00	o .00	o .00	o .00	o .00	o .00	
o .00	o .00	o .00	o .00	o .00	o .00	o .00	

Fig. 1

To view the ET & Rain Tables, Press the **MAIN MENU** Key, Press the **REPORTS** Menu Key to access the REPORTS screen, then Press the **ET & RAIN TABLES** Menu Key. The ET and Rain Table will appear (Fig. 1).

9. Daily-ET Setup

This section describes the steps necessary to setup the controller to use daily-ET. It explains what information you must enter, and where to enter the information. For the purpose of this guide it will be assumed that the controller is wired to an ET Gage. If the controller is not wired to an ET Gage, then bypass the following section which describes the setup of the ET gage.

ET Gage Setup

ET GAGE SETUP	
This controller is a -G and will count gage pulses from 8:00PM to 8:00PM.	
Put Gage Count into ET Table ?	NO
Log Each Pulse ?	NO
GAGE = .00 inches and is 99% Full	
Set Gage Full to 99%	→

Fig. 2

From the WEATHER SETUP screen, Press the **ET GAGE** Menu Key to access the ET GAGE SETUP screen (Fig. 2). This will only be available if the controller has the ET Gage interface installed (designated as a -G controller). After the controller has daily-ET enabled, it will use the ET table to calculate run-times. After the initial set-up of daily-ET, the ET table will only contain historical ET, based on the county and city you selected. After selecting YES for the "Put Gage Count into ET Table" setting, the controller will start to put real-time ET values, from the ET gage, into the ET table, replacing the historical values. Press the **PLUS** or **MINUS** Key to change the setting to YES, Press the **ARROW** Key to move the cursor to highlight the next setting.

The "Log Each Pulse" setting gives you the option of keeping a record of each ET gage pulse sent to the controller. This information

is located in the diagnostic log. This is helpful when first setting up the ET gage to make sure it is working properly, but can be set to NO after you are sure the ET gage is working properly.

The "GAGE = .00 inches and is 99% Full" is for your information only. It keeps track of how many inches of ET has occurred since 8:00 PM the previous night, and how much water is in the ET gage.

The **SET GAGE FULL TO 99%** Menu Key is used to reset the amount of water in the gage after the gage has been refilled during periodic maintenance has been performed on the ET gage.

Enable Daily-ET

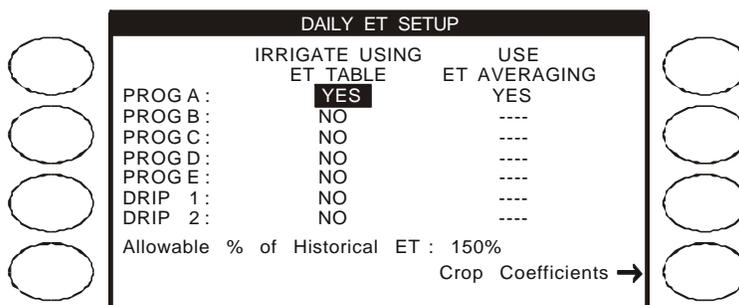


Fig. 3

Press the **MAIN MENU** Key, Press the **WEATHER** Menu Key to access the WEATHER screen, then Press the **ET** Menu Key to access the DAILY ET SETUP screen (Fig. 3). When the screen first appears all selections will be defaulted to NO and the screen will not appear exactly as shown, once YES is selected on at least one program the screen will appear as shown. Press the **ARROW** key to move the highlight to a selection, press the **PLUS** or **MINUS** key to change the setting.

Under the column labeled "Irrigate Using ET Table", a YES next to a program indicates that the program will use daily-ET to irrigate, a NO next to a program indicates the program is using minutes. Once YES is selected for a program, any station assigned to that program will now use daily-ET to irrigate. Under the column labeled "Use ET Averaging", a YES next to a program indicates ET averaging is enabled for that program, ET averaging is only available if the program is in daily-ET mode. With ET averaging ON the controller will not use each individual ET value in the ET table, instead it will use the average of the last 7 days of ET, in this way it will smooth out the long station run-times caused by OFF water days.

Press the **ARROW** Key to move the highlight to the "Allowable % of Historical ET" setting (Fig. 3), Press the **PLUS** or **MINUS** Key to change the setting. This setting controls the maximum allowable amount of ET that can be used to calculate station run-times. The default value is 150%, which means that if the real-time ET measured by the ET gage, exceeds 150% of historical ET, the controller will place an ET value in the ET table equal to 150% of historical ET instead of the actual real-time ET. This setting allows the user to control the maximum amount of total irrigation time for sites that have a limited water window. The water window is the time from when you can start irrigating to when you have to end irrigating.

Press the **CROP COEFFICIENTS** Menu Key (Fig. 3) to access the CROP COEFFICIENTS screen. Crop coefficients are used to adjust ET for a specific type of crop at different periods throughout the year. If you do not want ET to be modified, leave the selection at NO. If you select YES, by Pressing the **PLUS** or **MINUS** Key, you will then have the option of entering crop coefficient values for each month of the year, on each program in the controller. You must be familiar with crop coefficients to use this feature.

Select County and City

From the WEATHER SETUP screen, Press the **ET COUNTY/CITY** Menu Key to access the ET COUNTY AND CITY screen (Fig. 4). As explained earlier in this guide, historical ET is used as a back-up to real-time daily-ET, or it can be used as the source data to drive the program. In either case, you would want to use the historical ET for the area you are located in. The ET2000 controller stores historical ET information for 21 counties in California, and numerous cities within each of those counties. Select the area that most represents your location. You can also choose to enter your own ET numbers. The table of monthly ET for the area you have selected is for your information only. If you have selected to enter your own numbers, you will be allowed to edit the numbers under each month.

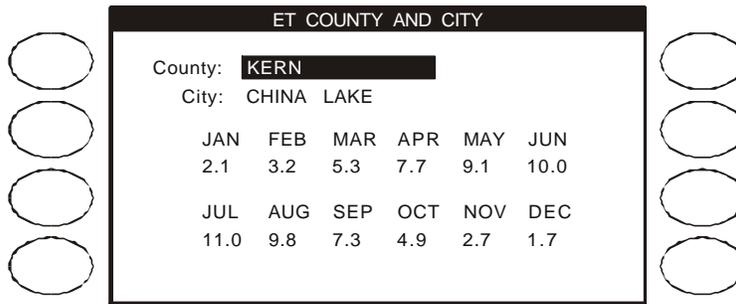


Fig. 4

Press the **PLUS** or **MINUS** Key to select the county, Press the **ARROW** Key to highlight the city, then Press the **PLUS** or **MINUS** Key to select a city within that county. When changes to settings are complete, Press the **BACK** Key to access the WEATHER SETUP screen again.

Set Flow Rates & Area

The final settings to complete the set-up of daily-ET, are the flow rate (measured in gpm's) and the area covered (measured in square feet) for each station.

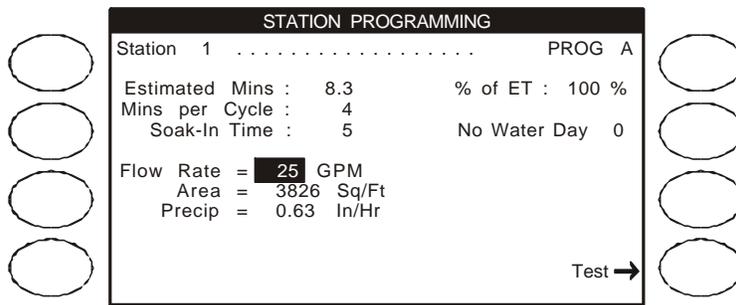


Fig. 5

This is done at the STATION PROGRAMMING screen. Press the **MAIN MENU** Key, Press the **PROGRAMS & STATIONS** Menu Key, then Press the **STATIONS** Menu Key, the STATION PROGRAMMING screen will appear (Fig. 5). Press an **ARROW** Key to move the cursor to the Flow Rate setting, press the **PLUS** or **MINUS** key to set the Flow Rate. Press an **ARROW** Key to move the cursor to the Area setting, Press the **PLUS** or **MINUS** Key to set the Area. As you make changes to the Flow Rate and Area settings, you will see the Precip setting (the station's precipitation rate) automatically re-calculated. Repeat this procedure for each station that is assigned to a program using daily-ET.

10. Rain Setup

This section describes the steps necessary to set-up the controller to use rain. To use this feature, the controller must be connected to a Rain Bucket, or have the ability to share rain data through the Calsense Command CENTER software.

Rain Bucket Setup

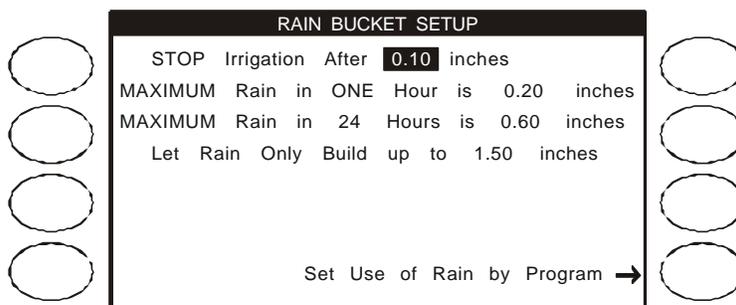


Fig. 6a

From the WEATHER SETUP screen, Press the **RAIN BUCKET** Menu Key to access the RAIN BUCKET SETUP screen (Fig. 6a). The 4 settings on this screen determine how much actual rainfall will be placed into the rain table, which are used to offset irrigation run times. On the following page is a description each setting.

- Stop Irrigation after: This setting determines how much rain must fall before the controller will start accumulating rainfall values in the rain table. It also determines when to halt any ongoing irrigation. In Fig. 6a, .10 inches of rain will have to fall before any rain data starts to accumulate in the rain table.
- Maximum Hourly Rain: This setting determines the maximum amount of rain that will be put in the rain table after a period of 1 hour of rain. In Fig. 6a, a maximum of .20 inches of rain will be put into the rain table, no matter how much rain falls in a 1 hour period. The amount of rain from this setting put into the rain table, will increase only until it reaches the next setting.
- Maximum 24 Hour Total: This setting determines the maximum amount of rain that will be put into the rain table in a 24 hour period. In Fig. 6a, a maximum of .60 inches of rain will be put into the rain table, no matter how much rain falls in a 24 hour period. The amount of rain from this setting put into the rain table, will increase only until it reaches the next setting.
- Let Rain Only Build Up to: This setting determines the maximum amount of rain that can be stored in the rain table. In Fig. 6a, the controller will stop storing rain data in the rain table if the Maximum 24 Hour Total reached 1.50 inches of rain.

The reason for these settings are to limit the values stored in the rain table. If limits were not put on rainfall, the values in the rain table could easily increase during an extended period of rain to cause irrigation to possibly be halted for many weeks. In most situations this would not be desirable. Press an **ARROW** Key to move the cursor to the desired setting, then Press the **PLUS** or **MINUS** Key to change the setting.

Rain Settings (without a Rain Bucket installed)

If a controller is not wired to a Rain Bucket, the RAIN BUCKET SETUP screen will only have one setting (Fig. 6b), this setting is described in the previous section. If you are not sharing rain data using the Calsense Command CENTER software, this setting will have no effect on irrigation. Press the **PLUS** or **MINUS** Key to change the setting.

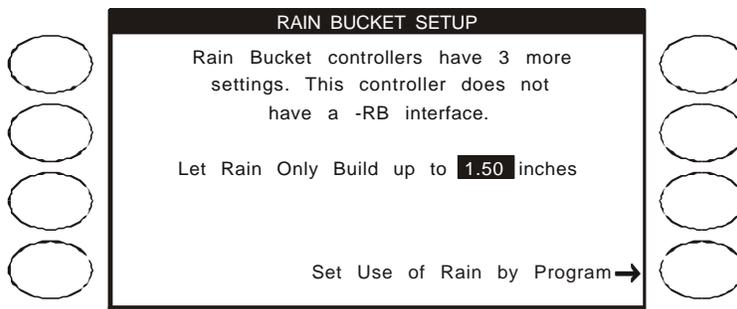


Fig. 6b

Enable Use of Rain by Program

This section describes how to enable the use of rain in the ET2000 controller. Each program can be set individually to either use or not use rain to offset irrigation run-times.

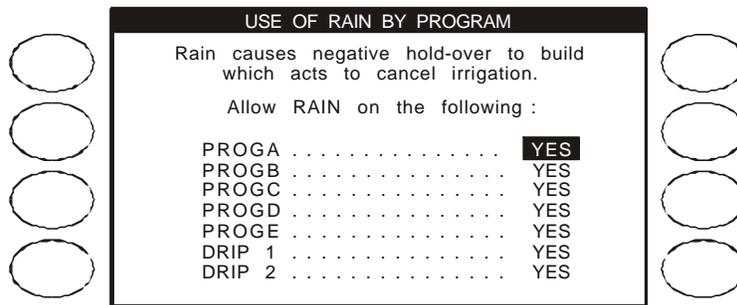


Fig. 7

From the RAIN BUCKET SETUP screen (Fig. 6b), Press the **SET USE OF RAIN BY PROGRAM** Menu Key to access the USE OF RAIN BY PROGRAM screen (Fig. 7). Here you have the option of enabling or disabling the use of negative hold-over (rain) for any of the controller's seven programs. If you select YES, negative hold-over will be used for that program to reduce irrigation run times. If you select NO, rain will have no effect on irrigation run times for that program. If there is no rain bucket installed and you are not sharing rain data through the Calsense Command Center program, these settings will have no effect on irrigation. Press an **ARROW** Key to move the cursor to the desired setting, Press the **PLUS** or **MINUS** Key to change the setting.

11. Station and Schedule Adjustments

Station Adjustments

Press the **MAIN MENU** Key, Press the **PROGRAMS & STATIONS** Menu Key, then Press the **STATIONS** Menu Key, the STATION PROGRAMMING screen will appear (Fig. 8).

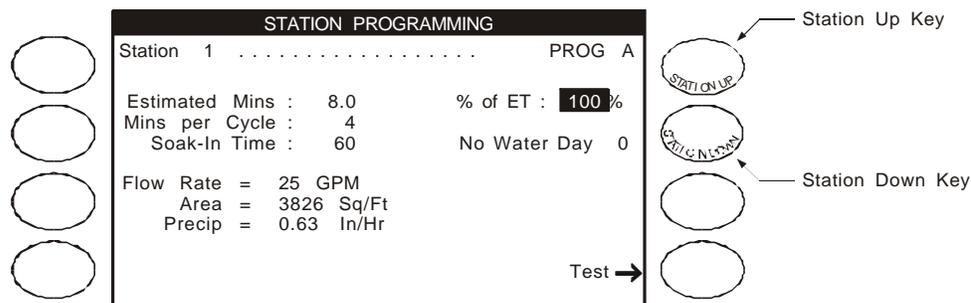


Fig. 8

After you have set-up the ET2000 for daily-ET, the STATION PROGRAMMING screen will appear as shown in Fig 8. To make changes to any of the station's settings, Press an **ARROW** Key to move the cursor to the desired setting, then Press the **PLUS** or **MINUS** Key to make a change to the setting. Press the **STATION UP** or **STATION DOWN** Key to select the desired station. The following describes each of the settings:

- Station: Indicates the current station number (station 1 in the example above).
- PROG: Indicates the program that the current station is assigned to (program A in the example above). A station can be assigned to only one program at one time.
- Estimated Mins: The Estimated Minutes is the amount of irrigation time calculated by the controller. This setting cannot be changed directly by the user. The time is calculated by the controller based on the precipitation rate for the current station, the amount of ET in the ET table, crop coefficients (if used), and the % of ET (described below). If any of these values are changed the Estimated Minutes will change.
- Mins Per Cycle: The Minutes Per Cycle is the maximum amount of irrigation time applied in a cycle. This setting should be the most water you would want the current station to apply at any one time, that is before water starts to "run-off". If the setting is less than the Estimated Minutes there will be multiple cycle starts until the total time applied equals the Estimated Minutes (the amount of time between cycle starts is determined by the Soak-In Time). If the Mins Per Cycle setting is more than the Estimated Minutes the run-time will be equal to the Estimated Minutes (the run-time will never exceed the Estimated Minutes). In the example above, station 1 will have two cycles of four minutes each with 60 minutes between each cycle.
- Soak-in Time: The Soak-in Time is the amount of time between multiple cycle starts (if there are multiple cycle starts). If there are no multiple cycle starts, this setting will be ignored by the program.
- % of ET: This is the individual station adjustment to daily-ET. This adjustment is used to fine-tune each stations run-time. It is one of the factors used in calculating the Estimated Minutes. As you make adjustments to this setting, you will see the Estimated Minutes change. Make small adjustments, 5% to 10% at a time, and allow a few days to pass before re-adjusting if necessary. Daily-ET only replaces the moisture that has evaporated since the last irrigation cycle, if for example you have a problem with a valve, and an area becomes stressed from lack of water, use the manual water feature to add water until the area is back to normal conditions.

The % of ET setting is used to adjust for factors such as different types of plant material (e.g. turf would generally have a higher adjustment factor than shrubs), soil conditions (e.g. sandy soils might have a higher adjustment factor than clay type soils because they don't hold moisture as long), terrain (e.g. the system at the top of a slope might have a higher adjustment factor than the system at the toe of a slope). If the % of ET adjustment ends up to be a large number from 100% (in either direction), you should re-evaluate your precipitation rate number.
- Flow Rate: The station's flow rate measured in gallons per minute (GPM).
- Area: The area covered by the station measured in square feet (Sq/Ft).
- Precip: The station's precipitation rate measured in inches per hour (In/Hr). The precipitation rate is calculated from the Flow Rate and Area settings.

Schedule Adjustments

Press the **MAIN MENU** Key, Press the **PROGRAMS & STATIONS** Menu Key, then Press the **START TIMES & WATER DAYS** Menu Key, the START TIMES & WATER DAYS screen will appear (Fig. 9).



Fig. 9

Press either **ARROW** Key to move the cursor to the setting you wish to change, Press the **PLUS** or **MINUS** Key to change the highlighted setting. When at the START TIMES & WATER DAYS screen the two top right Menu Keys have a special function, they are used to scroll to the different programs. The following describes each setting.

- PROG:** Indicates the current program. Program B is being programmed in the example (Fig. 9). The ET2000 Controller has 7 programs, A, B, C, D, E, Drip 1, and Drip 2. Programs A, B, C, D, & E have overlap protection, no station is able to irrigate at the same time as another station. Programs Drip 1 and Drip 2 are designed to be able to irrigate simultaneously with other stations, in this way the user can irrigate up to 3 stations at the same time by entering identical start times on Programs Drip 1, Drip 2 and any one of the remaining 5 Programs.
- Start Time:** This setting is the start time for scheduled irrigation on the current program. Program B has a 11:30 PM Start Time in the example (Fig. 9).
- Name:** A program description can be selected which describes the type of plant material and irrigation heads assigned to that program (this setting is optional).
- Days in Schedule:** The ET2000 can be set with a 7-Day Schedule (shown in Fig. 9), 14-Day Schedule, 21-Day Schedule or 28-Day Schedule.
- Water Days:** These settings are the days of the week in the schedule to irrigate. "on" represents a water day, "--" represents an off day.
- Hold-Over Time:** The hold-over time setting is used to force the controller to end a program's irrigation cycle at a specific time some manufacturers refer to this as stop time. If the irrigation cycle is forced to end before it has finished, any unfinished irrigation will be saved as hold-over time, the controller will then try to use up this hold-over time during subsequent irrigation cycles. If the controller has accumulated hold-over time, you can view it or delete it at the IRRIGATION DETAILS screen (see the ET2000 Users Manual for more information). This feature is used when you want to make sure that no irrigation will occur after a certain time in the morning. Each of the 7 programs in the ET2000 have an independent hold-over time setting.
- In the example (Fig. 9), Program B will begin at 11:30 PM, it will end at 7:00 AM. If any stations have unfinished irrigation time at 7:00 AM, it will be saved as "hold-over" for the next scheduled irrigation cycle.
- Finish Times:** Calculates the end-time of each programs scheduled irrigation cycle.

12. Water Use Budget

The Water Budget feature of the ET2000 Controller allows you to compare actual water usage with a water budget that has been programmed into the controller by the user. After a water budget has been programmed into the controller, the user will be alerted whenever the actual water usage (water usage is the total of scheduled, manual and test irrigation) exceeds the budget. The user then has the option of reducing run-times to stay within the budget or ignoring the alert. The OVER BUDGET alert is a passive alert, and is for your information only, it will not stop or reduce irrigation run-times. The OVER BUDGET alert will disappear when the user reduces run-times to a point where water usage will be within the programmed budget. Once the budget feature has been enabled, there will be three budget options to choose from :

Directly Enter the Monthly Budgets: This option allows you to enter a budget amount (in gallons) for each month of the year. The only other information necessary to complete the budget is the flow rate of each station, which is set at the STATION PROGRAMMING screen.

Enter a Yearly Budget: This option allows you to enter a total budget amount (in gallons) for the entire year. The controller will then divide the total amount into each month of the year based on the historical ET of the selected area. The other information necessary to complete the budget are the station flow rates (set at the STATION PROGRAMMING screen), and the County and City (set at the ET COUNTY AND CITY screen).

Calculate the Monthly Budgets: This option will have the controller automatically calculate a budget for you. The budget will be based on a percentage of the ET of the selected area, and the precipitation rate of each station on the controller. It will be necessary to enter each stations flow rate and area covered (set at the STATION PROGRAMMING screen), and the County and City (set at the ET COUNTY AND CITY screen).

Note : If a controller is programmed for daily-ET, all of the information required to program a budget (flow rates, area covered, County and City) will already be set in the controller.

Enable Water Use Budget

Press the **MAIN MENU** Key, Press the **WEATHER** Menu Key to access the WEATHER SETUP screen, then Press the **BUDGET** Menu Key, the WATER USE BUDGET screen will appear (Fig. 10). To enable the Water Use Budget Press the **PLUS** or **MINUS** Key to change the setting to YES.

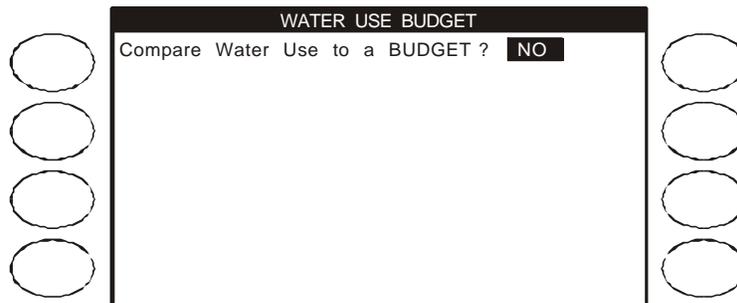


Fig. 10

Directly Enter Monthly Budgets

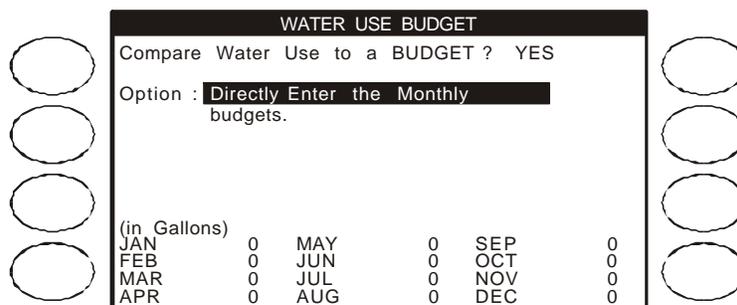


Fig. 11

After the Water Use Budget has been enabled (Fig. 11), Press an **ARROW** Key to move the cursor to the Option setting, Press the **PLUS** or **MINUS** Key and select the "Directly Enter the Monthly budgets" option. Press an **ARROW** Key to move the cursor to the JAN setting, then Press the **PLUS** or **MINUS** to set the budget amount for January, continue this procedure until all the months of the year have been set. Then return to the STATION PROGRAMMING screen and set the flow rates for each station.

Enter a Yearly Budget

WATER USE BUDGET

Compare Water Use to a BUDGET ? YES

Option : **Enter a Yearly Budget and have**
the controller divide it among
the months using your city ET.

Calculate : The monthly budgets from a
yearly budget of 0 gal →

(in Gallons)

JAN	0	MAY	0	SEP	0
FEB	0	JUN	0	OCT	0
MAR	0	JUL	0	NOV	0
APR	0	AUG	0	DEC	0

Fig. 12

From the WATER USE BUDGET screen, Press an **ARROW** Key to move the cursor to the Option setting, Press the **PLUS** or **MINUS** Key until “Enter a Yearly Budget” is selected (Fig. 12).

IF THE CONTROLLER IS NOT SETUP TO USE DAILY-ET:

Before entering and calculating a yearly budget, you must go to the STATION PROGRAMMING screen (see page 9) and set the flow rates for each station. After the flow rates have been set go to the ET COUNTY AND CITY screen (see page 6) and select the county and city, or enter your own monthly ET numbers. Then return to the WATER USE BUDGET screen (Fig. 12) and complete the setup of a budget as described next.

IF THE CONTROLLER IS SETUP TO USE DAILY-ET:

Press an **ARROW** Key to move the cursor to the Yearly Budget setting, Press the **PLUS** or **MINUS** Key to set the yearly budget amount, then Press the **CALCULATE** Menu Key. The yearly budget amount will be divided between each month of the year (based on the ET of the selected City and County), the results of the calculation will be shown for each month on the lower part of the screen. If the yearly budget amount or the county/city settings are ever changed, the **CALCULATE** Menu Key must be pressed again to re-calculate the new monthly budget amounts.

Calculate the Monthly Budgets

WATER USE BUDGET

Compare Water Use to a BUDGET ? YES

Option : **Calculate the Monthly Budgets**
using your city ET and station
square feet.

Calculate : The monthly budgets
at 80% of ET →

(in Gallons)

JAN	0	MAY	0	SEP	0
FEB	0	JUN	0	OCT	0
MAR	0	JUL	0	NOV	0
APR	0	AUG	0	DEC	0

Fig. 13

From the WATER USE BUDGET screen, Press an **ARROW** Key to move the cursor to the Option setting, Press the **PLUS** or **MINUS** Key until “Calculate the Monthly Budgets” is selected (Fig. 13).

IF THE CONTROLLER IS NOT SETUP TO USE DAILY-ET:

Before having the controller calculate a budget, you must go to the STATION PROGRAMMING screen (see page 9) and set the flow rates and area for each station. Next, go to the ET COUNTY AND CITY screen (see page 6) and select the county and city. Then return to the WATER USE BUDGET screen (Fig. 13) and complete the setup of a budget as described next.

IF THE CONTROLLER IS SETUP TO USE DAILY-ET:

Press an **ARROW** Key to move the cursor to the % of ET setting, Press the **PLUS** or **MINUS** Key to set the percentage amount, then Press the **CALCULATE** Menu Key. The monthly budget amounts will be displayed on the lower part of the screen. If any settings are changed (station flow rate, station area, city/county, % ET), the **CALCULATE** Menu Key must be pressed again to re-calculate the budget.

Use vs. Budget Report

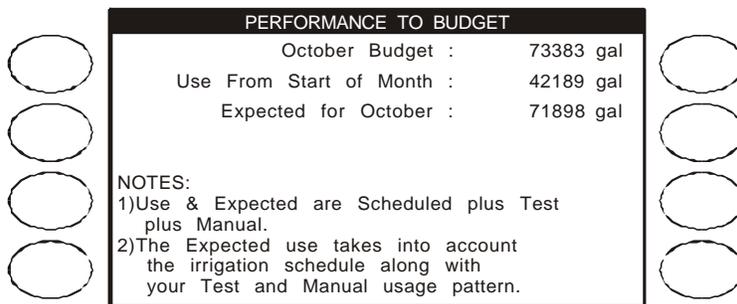


Fig. 14

When the water budget feature is enabled, you can view the PERFORMANCE TO BUDGET report (Fig. 14) at the controller anytime, to compare actual water usage with the current budget. The top line displays the current month and the budget amount for that month, the 2nd line displays the actual amount of water used since the 1st day of the month, and the 3rd line displays the projected water usage for the current month (based on the current irrigation schedule and actual water usage to date). If the expected (projected) water usage is more than the monthly budget amount, you can re-adjust the irrigation schedule to reduce your water usage and stay within the budget.

To view the PERFORMANCE TO BUDGET report, Press the **MAIN MENU** Key, the **REPORTS** Menu Key, then the **USE VS BUDGET** Menu Key.

13. 12-Month Schedule

The 12-Month Schedule feature of the ET2000 Controller allows you to pre-program an irrigation schedule for each month of the year. Each month can be programmed with different Start Times, Water Days and Number of Days in Schedule, also each station's Total Minutes, Minutes Per Cycle and Soak In Time settings can be different for each month of the year.

Enable 12-Month Schedule

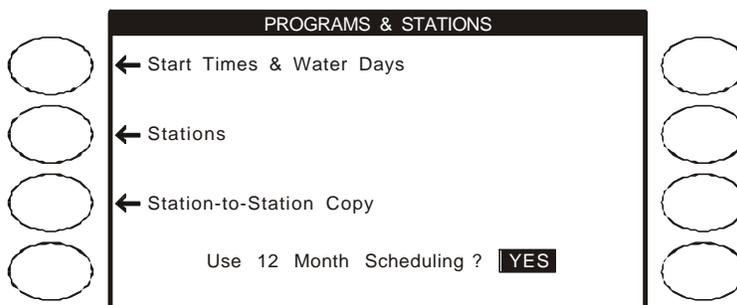


Fig. 15

Press the **MAIN MENU** Key, then the **PROGRAMS & STATIONS** Menu Key, the PROGRAMS & STATIONS screen will appear (Fig. 15). Press the **PLUS** or **MINUS** Key to change the 12-Month Scheduling setting to YES.

After 12-Month Schedule has been enabled it will be necessary to set the controller's programs with a Start Time and Water Days for each of the twelve months of the year (set at the Start Times & Water Days screen). It will also be necessary to set each station's Total Minutes, Minutes Per Cycle and Soak-in Time for each of the twelve months of the year (set at the Station Programming screen). The following page describes this procedure.

IMPORTANT NOTE : As soon as 12-Month Schedule is enabled, the controller will copy the current irrigation schedule to all twelve months of the year. All of the months will keep this schedule until you re-program each month's schedule. If you enable 12-Month Schedule before the controller has been programmed with an irrigation schedule, there will be no start times, water days or run-times on all twelve months of the year. Be sure an irrigation schedule has been programmed for all twelve months of the year.

Start Times & Water Days



Fig. 16

After 12-Month Schedule has been enabled, the Start Times & Water Days screen will appear as shown in Fig. 16. The current month will be shown in the title bar at the top of the screen, the two Menu Keys on the left side of the screen are used change to the desired month. The two Menu Keys on the right side of the screen are used to change the program. Press one of the **CHANGE MONTH** Menu Keys until the desired month is displayed, Press one of the **CHANGE PROGRAM** Menu Keys until the desired program is displayed, Press an **ARROW** Key to move the cursor to the desired setting, Press the **PLUS** or **MINUS** Key to change the setting. Repeat this procedure until all twelve months have been set. As explained on the previous page, the Start Time, Days in Schedule and Water Days are the settings that you can program to change from month to month. If a Hold-Over Time is set, it will be the same for all twelve months.

Station Programming

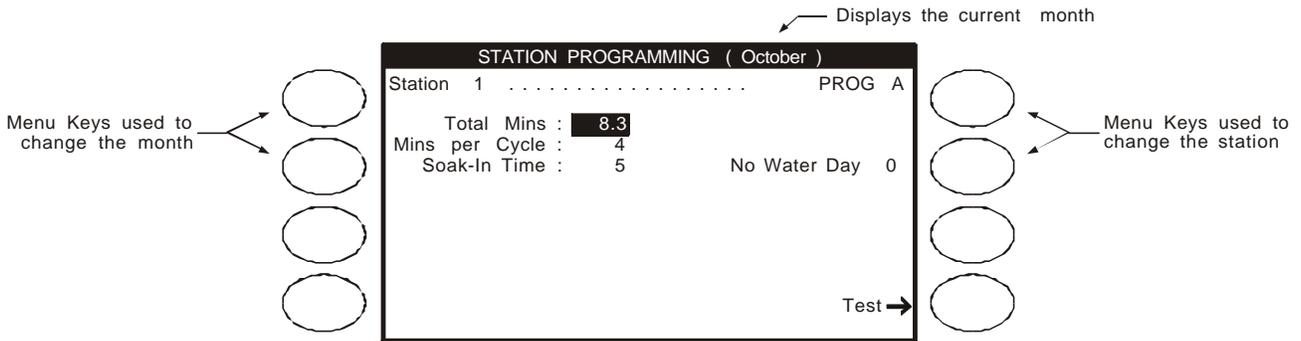


Fig. 17

After 12-Month Schedule has been enabled, the Station Programming screen will appear as shown in Fig. 17. The current month will be shown in the title bar at the top of the screen, the two Menu Keys on the left side of the screen are used change to the desired month. The Station Up and Station Down Keys are on the right side of the screen. Press one of the **CHANGE MONTH** Menu Keys until the desired month is displayed, Press the **STATION UP** or **STATION DOWN** Key until the desired station is displayed, Press an **ARROW** Key to move the cursor to the desired setting, Press the **PLUS** or **MINUS** Key to change the setting. Repeat this procedure until all twelve months have been set. As explained on the previous page, the Total Minutes, Minutes Per Cycle and Soak-in-Time are the settings that you can program to change for month to month.

14. How to Calculate Station Flow Rates

There are two methods to determine station flow rates if a Calsense flow meter is not installed on the system. The following describes each method.

Using Manufacturers Published Data

With the first method, you use a manufacturers catalog which has the flow rates listed for the type heads, and nozzle sizes on the system you are calculating. Simply total the flow rates for all the nozzles on the station.

Example:

A station has 8 half-circle pop-ups with a flow rate of 2 gpm each, 3 full-circle pop-ups at 4 gpm each and 4 quarter-circle pop-ups at 1 gpm each. The station's flow rate would be calculated as follows.

$$\begin{array}{rcl} 8 \text{ heads} \times 2 \text{ gpm} & = & 16 \text{ gpm} \\ 3 \text{ heads} \times 4 \text{ gpm} & = & 12 \text{ gpm} \\ 2 \text{ heads} \times 1 \text{ gpm} & = & \underline{2 \text{ gpm}} \\ \text{Total flow} & = & 30 \text{ gpm} \end{array}$$

Measuring Station Flow Rates

The second method may provide more accurate results. You will use the irrigation system's water meter to calculate flow rates. Use the following procedure :

1. Determine the units used by the water meter (gallons, cubic feet, etc.). Make sure no other water will be flowing while you are measuring flow rates. Also, if there is more than one water meter connected to the mainline, all of them must be turned-off except the one you are using to measure flow with.
2. Before beginning, turn on each station to make sure there are no broken heads or pipe. Breaks will cause incorrect flow readings.
3. Begin by turning on a station, let it run long enough to purge all the air out of the system. Then simultaneously, make note of the meter reading and start timing using a stopwatch. After 3 minutes has elapsed make note of the meter reading again. Subtract the starting meter reading from the ending meter reading, this will give you the amount of water used by the valve in 3 minutes. Continue this procedure until all stations have been measured.
4. To calculate the flow rate, divide the amount of water the station used (measured in gallons) by 3 minutes, this will give you the station's flow rate measured in GPM's.

Example #1 (if water meter units are in gallons) :

The starting meter reading is 312,121. After 3 minutes the ending meter reading is 312,378 gallons, the flow rate would be calculated as follows:

$$\begin{array}{l} 312,378 \text{ gallons} - 312,121 \text{ gallons} = 257 \text{ gallons} \\ 257 \text{ gallons} \div 3 \text{ minutes} = 85.6 \text{ gpm} \end{array}$$

Example #2 (if water meter units are in cubic feet or CF) :

The starting meter reading is 9,975 CF After 3 minutes the ending meter reading is 10,003 CF, the flow rate would be calculated as follows:

$$\begin{array}{l} 10,003 \text{ CF} - 9,975 \text{ CF} = 28 \text{ CF} \\ 28 \text{ CF} \times 7.48 \text{ gallons} = 209.4 \text{ gallons} \quad (1 \text{ CF} = 7.48 \text{ gallons}) \\ 209.4 \text{ gallons} \div 3 \text{ minutes} = 69.8 \text{ gpm} \end{array}$$

Example #3 (if water meter units are in hundreds of cubic feet or CCF) :

The starting meter reading is 12,321 CCF After 3 minutes the ending meter reading is 12,321.25 CCF, the flow rate would be calculated as follows:

$$\begin{array}{l} 12,321.25 \text{ CCF} - 12,321 \text{ CCF} = .25 \text{ CCF} \\ .25 \text{ CCF} \times 748 \text{ gallons} = 187 \text{ gallons} \quad (1 \text{ CCF} = 748 \text{ gallons}) \\ 187 \text{ gallons} \div 3 \text{ minutes} = 62.3 \text{ gpm} \end{array}$$