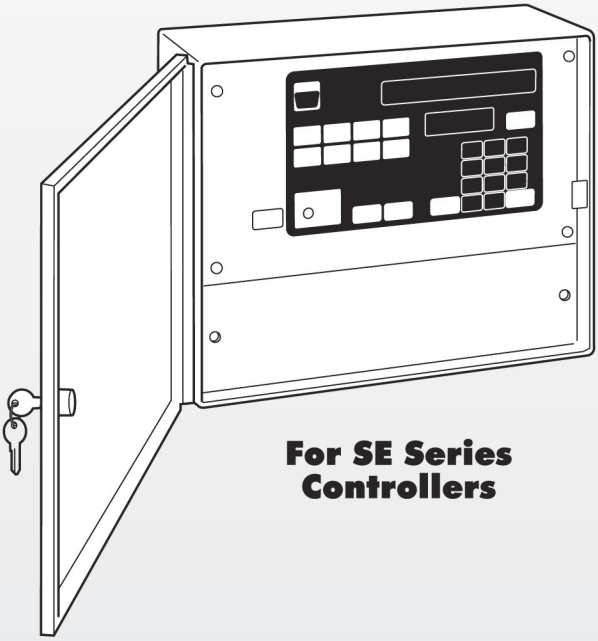
RME SENTAR II

User Manual



For SE Series Controllers

RAIN MASTER IRRIGATION SYSTEMS

Part # 500043 Rev.C

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RME SENTAR II

Congratulations . . . you have chosen one of the most advanced irrigation controllers available. Rain Master has taken great pride and patience in developing and building the most trouble-free controllers in the irrigation industry. Your RME SENTAR II has many high-end features. Features such as accurate, economical flow sensing, and Cycle and Soak programming are yours at the press of a button. In addition, your new RME SENTAR II controller maintains full support of independent pump and Normally Closed or Normally Open Master Valves. All this was designed to protect one of our most precious resources…water… as well as your bottom line!

To take full advantage of the many features available in your RME SENTAR II controller, please take a few minutes and read through your User Manual. For those who do not have the time, a Quick Reference sheet is provided. This sheet will allow you to perform many of the basic functions required in programming and operating your controller.

RME SENTAR II SPECIFICATIONS
PROGRAMMING CAPABILITY

- Four (4) independently controllable irrigation programs, with five (5) selectable start times, for a total of 20 possible irrigation cycles per day.
- Runtime(s) for each station can be set from 1 minute to 9 hours 59 minutes per station, in one-minute increments.
- Quick Station(s) programming to allow rapid programming of an entire block of stations, all with the same runtime.
- Water Days for each program can be based on a seven-day cycle or a skip-by-day cycle, which allows a program to skip from 1 to 30 days between watering cycles.
- Manually activated system Check/Syringe Cycle to sequentially run each station for a user selectable time, with a range from one minute up to nine minutes.
- Manually activated program cycle to execute a program independently of its programmed start time and water days.
- Manually activated station cycle to operate a single station for a selectable period of time from 1 minute to 9 hours 59 minutes.
- Programmable Master Valve to utilize and control a Master Valve on a per program basis.
- Configurable Master Valve Type to select either a Normally Open Master Valve or a Normally Closed Master Valve.
- Programmable pump independent of the Master Valve on a per program basis.
- Programmable stacking or non-stacking operation of the programs. In the event that programmed start times either within a program or between programs should overlap, or coincide, the controller can either be programmed to sequentially execute one program after the other program has completed (Stack Mode) or to simultaneously execute all programs as their programmed start times occur (No Stack Mode).
- Programmable delay time between station executions. The programmed delay time can be between 0 to 255 seconds (4 minutes 15 seconds). This capa bility allows slow-closing valves to completely shut off, before the next valve turns on.

Water Conservation Features

- Flow sensing and control.
- Percentage adjustment on a per program basis to allow an increase or decrease of all station runtimes within that program. The percentage will allow adjustment from 0 to 300% in 1% increments.
- Programmable rain shut off in order to delay the start of irrigation after a rain storm. The controller will not water during the programmed shut off period (from one to seven days). After the shut off period has expired the controller will return to the Automatic Mode of operation.
- Manual Rain Switch (AutomaticWatering – No Watering) provides a means

of quickly turning off all irrigation programs without disturbing the stored program(s). When the switch is placed in the No Watering position the display will show “RAIN OFF”.

- Connectivity for any one of the following: rain, moisture, or freeze sensor device. The enabling of these devices can be performed on a per program basis. When the sensor is “active” irrigation will stop and the display will indicate that the sensor is active. This feature allows non-irrigation programs to execute independent of these devices.
- Selectable Cycle and Soak irrigation programming or conventional programming on a per-program basis.
- Programmable cycle runtime, Max Cycle Time, and Soak time on a per station basis.
- Automatic minimization of the water window by intelligently scheduling station starts when other stations are satisfying their SOAK TIMES.
- Controller supports Quick Station programming in the Cycle and Soak programming mode.
- The controller provides a display of the total runtime of the program using the REVIEW feature of the controller. The Cycle and Soak feature intelligently displays the total runtime of the program, the controller considers all soak delays, optimized program features, water budget percentage and inter-station delays.
- Optimized water savings, all station run times are calculated and executed to the nearest second.

Convenience Features

- Easy to understand and use keyboard layout, provides ease of use during programming and review.
- Multiple displays provide a simple way of programming and information review.
- During program execution the controller will display the executing program number, the flow in GPM, and the station runtime countdown in hours, min utes and seconds.
- Programmable Controller Security Access code to prevent unauthorized use or modifications to be made of the controller's programs. This feature is enabled by entering a security access code from 1 to 4 digits in length.
- Review key to display all program parameters on a per program basis. Successive invocation of the key will display program parameters one by one. Depression and subsequent hold of this key will allow rapid review of program parameters.

Diagnostic and Fault Detection

- Programmable audible alarm. When enabled this alarm will “chirp” once every six seconds for either an electrical field wire fault or any flow fault condition. The alarm will continue until reset by the user.
- Automatic field wire fault detection enables the controller to sense a short in the field wire and instantly turn off that station. The display will report the fault condition any time a field wire fault occurs. Additionally an audible alarm will “chirp” (if enabled, once every six seconds) until it is reset. The controller will automatically advance the fault station to the next programmed station.

- Built-in self-test allows you to test various internal circuitries utilizing built-in test capability.
- Non-volatile memory to retain the program(s) and controller information during power outages or seasonal shut downs. This information is maintained indefinitely.
- A "real time" clock with non-volatile backup to maintain the actual date and time during power outages without the need of batteries. This eliminates the need to reprogram the controller every time there is a power outage.
- Advanced circuitry to automatically monitor internal voltages and reset on board microprocessor circuitry during power “brown-out” or error conditions.
- Automatic electronic fuse which resets intelligently based upon need. (No user fuses or circuit breakers to reset or fail.)
- Intelligent resumption of program execution after power outages to ensure that program starts are not lost. The controller intelligently schedules irrigation after any outage while preserving the original water window.
- Automatic detection of main line water breaks. Upon detection the controller will shutdown all active irrigation, energize a Normally Open Master Valve (if selected), condemn any future start times, and trigger audible and visual alarm indicators.
- Automatic detection of unscheduled water flow. Upon detection the controller will activate the Normally Open Master Valve (if selected), condemn any future start times, and trigger audible and visual alarm indicators.
- Automatic detection of upper stations flow limit. Upon detection the controller will turn off the fault station, advance the program to the next station, condemn the station from any future watering times, and trigger audible and visual alarm indicators.

FLOW CAPABILITIES

Flow Rate Monitoring

- Programmable flow to enable or disable the flow sensor features.
- Programmable flow sensor pipe sizes for standard Rain Master flow sensors (1.0, 1.25, 1.5, 2.0, 3.0, and 4.0 inch). Non-standard pipe sizes are also programmable.
- Inputs for connectivity to a flow sensor. The controller will read the frequency of the sensor by sensing each time a contact closure appears at the input. The controller will source +8 VDC to the sensor.
- Programmable main line flow limit from 1-999 GPM defines the maximum allowable flow during scheduled irrigation.
- Automatic detection of main line water breaks. Upon detection the controller will shutdown all active irrigation, energize a Normally Open Master Valve (if selected), condemn any future start times, trigger audible and visual alarm indicators.
- Programmable unscheduled flow limit from 0-999 GPM defines the maximum amount of flow which will be tolerated during unscheduled irrigation periods.
- Automatic detection of unscheduled water flow. Upon detection the controller will energize the Normally Open Master Valve (if selected), condemn any future start times, and trigger audible and visual alarm indicators.

- Programmable station upper flow limits from 0-500 GPM.
- Automatic detection of upper station flow limit. Upon detection the controller will turn off the fault station, advance the program to the next station, condemn the station from any future watering times, and trigger audible and visual alarm indicators.
- Programmable flow check delays between one and six minutes (one minute increments). This delay allows stations to stabilize each time a station is turned on/off before limit checks are applied.
- Automatic monitoring and display of measured station flow in Gallons-Per -Minute (GPM) from 0 to 999 GPM.
- Controller utilizes automatic LEARN mode for setting individual station flow limits for the entire controller. A global percentage adjustment from 5% to 80% is used to automatically factor upper flow limits for all stations once the nominal values have been measured.
- Single station flow limits can be setup based upon the measured nominal flow or a manually entered value (0-500 GPM).
- Intelligent upper-limit processing for concurrent station operation.
- A water usage meter indicates total water used by the controller. The water usage meter can be reset at any time.

AVAILABLE RME SENTAR II OPTIONS

- Ability to connect to a Rain Master Flow sensor or other flow sensor device.
- Built-in remote control capability for compatibility with all Rain Master remote control systems.
- Connectivity for a number of sensor types, including: rain, freeze, or moisture sensor device. The device can be enabled on a per program basis. This allows non-irrigation programs to execute independent of the sensor device.
- Availability in a variety of enclosure types including: standard cold roll steel enclosure with powder coat paint, extended size cold roll steel enclosure with station screw terminals, extended size stainless steel enclosure with station screw terminals.
- All extended size enclosures are available with optional heavy duty lightning protection.

CERTIFICATION AND WARRANTY

- Underwriters and FCC approved.
- Manufacturer's limited 5-year warranty.

ELECTRICAL SPECIFICATIONS

- Input power: 105-130 VAC, 50/60 Hz, 0.5 Ampere maximum, 0.1 Ampere idle.
- Output power: 24 VAC, 1.5 Amperes maximum total output or 36 VA maximum total output 1.0 Ampere per station or Master Valve.

Table 1 - Electrical Calculations

Valve solenoids are rated in either Amperes or VA. The term VA stands for Volt-Amps, which is obtained by multiplying the Amperes required by the 24 VAC operating voltage.

Most modern solenoids require approximately .25 Ampere, which is equivalent to 6 VA. This allows up to six solenoids to be energized at the same time.

EXAMPLE: You are using a Master Valve and Pump; you have configured the system to use the NO STACK option. This configuration would allow all four programs to run simultaneously, as depicted in Figure 2. Master Valve Wiring.

Four programs	(.25 A times 4)	1.00 Ampere
Master Valve	(.25 A times 1)	.25 Ampere
Pump using Rain Master RLY1	(.20 Amps)	.20 Ampere
Total Current		1.45 Amperes

NOTE:This configuration would not exceed the 1.5 Amperes maximum allowable limit.

If higher current solenoids are used or if more than one solenoid is connected to any one station output, caution should be used when operating in the NO STACK configuration mode.

MECHANICAL SPECIFICATIONS

- Heavy duty 18-gauge steel enclosure jet coated and powder coated to protect it for indoor and outdoor environments.
- Outdoor pedestal mount available for all models.
- Two convenient sized enclosures for easy installation of field wires.
- Outdoor pedestal mount available for all models.
- Extra heavy-duty lightning and surge protected models available for areas where lightning is a concern.

Shipping Weight: 14 pounds
Dimensions: 13.25 inches Wide x 12.1 inches High x 4.3 inches Deep

DOCUMENTATION

- RME SENTAR II User Manual - RMIS part number 500043
- RME SENTAR II Quick Reference Guide - RMIS part number 500065
- Grounding Instructions (Option)
- Multiple Controller Installation Instructions RMIS Technical Bulletin 018 (Option)

MOUNTING AND INSTALLATION

CONTROLLER PLACEMENT

WARNING: Do not drill holes in the controller's case. It has all the holes necessary for mounting it on a wall or pedestal. Drilling holes in the unit will cause metal chips to mix with the electronics and this will cause the unit to malfunction. If, for some reason, it is absolutely necessary to drill additional holes in the unit, carefully remove all the electronics prior to doing so.

Controllers are suitable for indoor/outdoor environment. It is lockable, dust-free and rain resistant. Outdoors the controller should be placed in a shaded and dry environment not subject to direct sprinkler spray or continuous heavy moisture. Additionally, a pedestal (PED 1) is available for outdoor controllers; contact your Rain Master distributor.

MOUNTING THE CONTROLLER

1. On an upright, flat and secure surface, place the mounting bracket at eye level and fasten securely.
2. Mate the bracket on the back of the controller to the mounted bracket and hang the controller.
3. Secure the bottom of the controller by placing a screw through the hole located in its back wall at bottom center.

CONTROLLER CONNECTIONS – AC POWER

1. Refer to Figure 1 - Power and Field Wiring.
2. Mount controller.
3. Place Rain Switch in “No Watering” position.
4. Remove lower panel.
5. Using #10-gauge or heavier copper wire, connect ground screw to ground rod or grounded water pipe using a ground rod clamp. The wire should be as short as possible with no sharp bends or kinks. If multiple controllers are being installed in the same location, use a ground rod for each and contact the factory for the RMIS pamphlet on proper ground ing techniques.
6. Thread condulet onto transformer.
7. Connect supply line grounded conduit to condulet.
8. Connect 120 V 50/60Hz supply line to transformer wires within the condulet
   Install gasket and cover onto condulet with 2 screws.
9. Follow all appropriate electrical wiring codes.
10. Replace the lower panel and place the Rain Switch in “Automatic Watering” position after field valve wiring is complete.

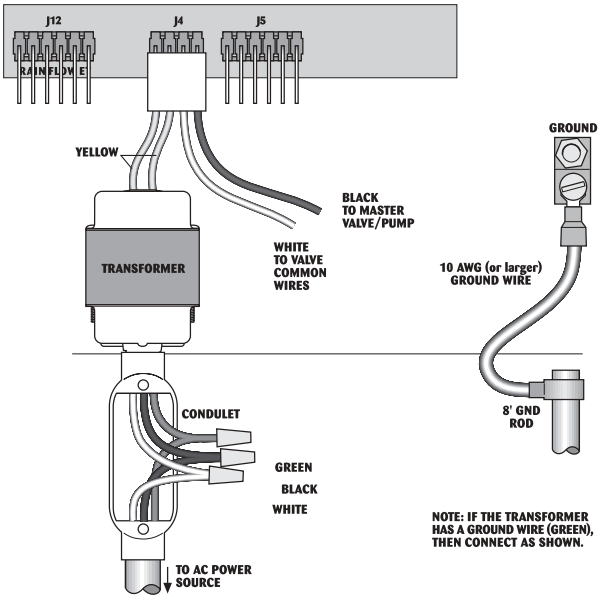

FIGURE 1. POWER AND FIELD WIRING

ELECTRICAL GROUNDING FOR THE CONTROLLER

Proper electrical grounding is required to ensure safety to you, as well as to protect the controller electronics in the event of electrical line surges or lightning. In areas where lightning is a common occurrence, it is strongly recommended to use the RME SENTAR II model SE-T.

Grounding Instructions

1. Mount the controller as close as possible to the grounding rod, so that the #10 grounding wire from the controller to the ground rod is as short as possible. Ensure the grounding wire is free of nicks and bends.
2. Use a grounding rod clamp to secure grounding wire to grounding rod. Be sure all surfaces are clean of oxides and dirt, and that all connections are solid and secure.
3. In areas of very dry soil or sand, it may be necessary to "Dope" the grounding rod. Contact your Rain Master distributor or Rain Master for grounding pam phlet, “RMIS Grounding”.
4. Should the 8' grounding rod not penetrate completely into the soil it is accept able to put it into the ground on a slight angle. It is important that the rod be a full 8' into the ground, with only enough of the rod showing to clamp the wire on. Should other grounding installation requirements be necessary, contact your distributor or Rain Master.

Note: It is important to check the resistance periodically to ensure it is not greater than 10 ohms. Contact your Rain Master Distributor for details.

CONTROLLER CONNECTIONS – VALVES AND FIELD WIRING

The controller utilizes quick disconnects and color coded wires. The wires are 24" long and each end must be stripped and attached to the corresponding field wire. RME SENTAR II ST and ST-T model controllers come equipped with terminals to which the field wires are directly connected. Unused wires should be taped off to prevent shorting.

The station numbers are labeled just above the quick disconnects behind the lower panel of the controller. Simply match the station's wire to the appropriate field wire. Note that the controller's COMMON wire is WHITE and the MASTER VALVE/PUMP is BLACK.

Should it be necessary to detach the Quick Disconnect blocks from the printed circuit board, hold the plastic assembly and pull down gently but firmly.

Note: When reattaching the Quick Disconnect, be careful to make sure that the lip at the top of the plastic connector is facing you as you push the connector onto the pins. Additionally, be sure to match the Quick Disconnect blocks with the corre sponding color as labeled on the bottom of the printed circuit board.

MASTER VALVE AND PUMP WIRING OPTIONS

The RME SENTAR II provides a variety of control options when selecting a Master Valve and Pump. Because the Pump and Master Valve can be assigned to any program, and the Master Valve can be either a Normally Open or Normally Closed configuration, virtually any system can be accommodated. For example, drip programs may be setup in one or more programs which don't use the Pump, while large rotors may be in a pump defined program. The following table summarizes the options which are available, the installation diagrams required to achieve these options, and the corresponding setup (programming of the RME SENTAR II using the SETUP key). For detailed information on SETUP, please refer to ADVANCED SETUP PROGRAMMING beginning on page 47.

Master Valve and Pump Wiring Options Matrix

Option	Normally Closed MV	Normally Open MV	Pump Used	Reference Wiring Figure	SETUP MV Usage per Program	SETUP MV Type	SETUP Pump Usage per Program
1*	✓	—	Never	2	1, 2, 3, 4	NC	None
2*	✓	—	Always	3 or 4	1, 2, 3, 4	NC	None
3	✓	—	Sometime	5	1, 2, 3, 4	NC	As Needed
4	—	✓	Never	2	1, 2, 3, 4	NO	None
5	—	✓	Always	5	1, 2, 3, 4	NO	1, 2, 3, 4
6	—	✓	Sometime	5	1, 2, 3, 4	NO	As Needed

*No setup programming required (factory default settings).

Note: Although Option 2 shows that a pump is in the system, the setup program ming indicates that the pump should not be programmed. This preserves Station 1 as a station output.

ELECTRICAL CONNECTIONS FOR A MASTER VALVE

The RME SENTAR II allows you to setup the Master Valve (MV) output as either a Normally Open or Normally Closed configuration. When used in the Normally Closed mode, the Master Valve line is a source of 24 VAC power. It is active whenever any station in the controller is on. For Normally Open Master Valves, the controller supplies 24 VAC only when either a Main Line Fault or Unscheduled Flow Fault occurs.

Normally Closed Master Valve Operation

If you have a Master Valve which requires activation to open, and no pump, connect the Master Valve solenoid to the MV and Valve Common terminals as shown in Figure 2. If more than one controller is going to control the Master Valve, the Controller must be isolated from each other. Contact RMIS for the pamphlet on "Multiple Controller Installations". During setup, select the NC (Normally Closed) Valve type for all programs (1, 2, 3, 4).

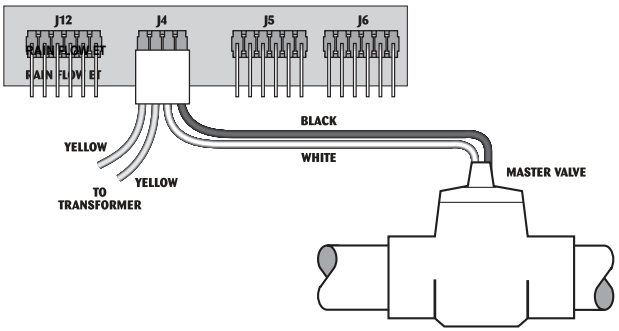

FIGURE 2. MASTER VALVE WIRING (EITHER NORMALLY OPEN OR NORMALLY CLOSED)

Simultaneous Normally Closed Master Valve and Pump Operation

If you have a Master Valve which requires activation to open, and a pump which is always needed whenever irrigating, connect both the Master Valve solenoid and pump starter to the MV and Valve Common terminals as shown in Figure 3. If the pump starter operates on 24 volts AC and the combination of the Master Valve Solenoid and Pump Starter require more than 1 amp, you will need an isolation relay (Rain Master part: RLY1 or equivalent) and an additional source of 24 VAC (see Figure 4). During setup, select the NC Valve type for all programs which require the Master Valve and Pump. DO NOT select pump operation.

If the pump starter requires 120 VAC, you will also need an isolation relay (RLY1).

If more than one controller is going to control the Master Valve and pump, the controller must be isolated from each other. Contact RMIS for the pamphlet on "Multiple Controller Installations."

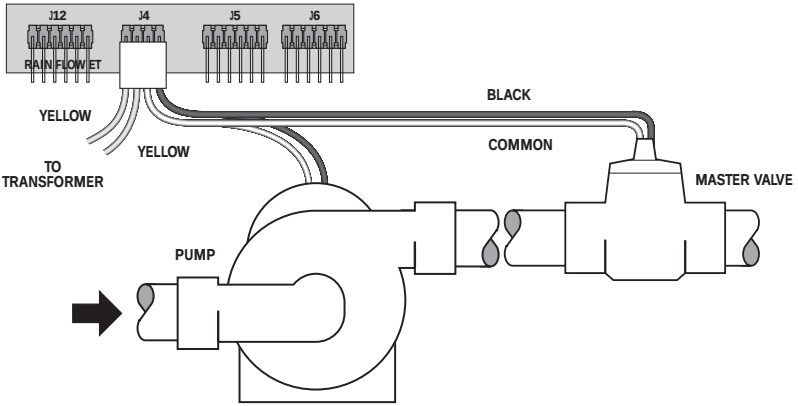

FIGURE 3. SIMULTANEOUS NORMALLY CLOSED MASTER VALVE AND PUMP

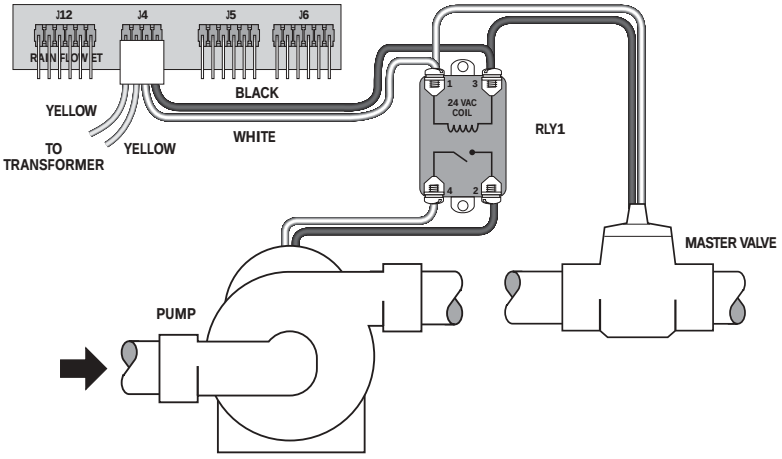

FIGURE 4. SIMULTANEOUS NORMALLY CLOSED MASTER VALVE AND PUMP CONNECTION WITH ISOLATION RELAY

Independent Normally Closed Master Valve and Pump Operation

If you have a Master Valve which requires activation to open, and a pump which is sometimes needed when irrigating, connect the Master Valve Solenoid to the MV and Valve Common terminals and the pump starter to Station 1 as shown in Figure 5. If the pump starter DOES NOT operate on 24 VAC or the combination of the Master Valve Solenoid and pump starter require more than 1 Amp, you will need an isolation relay (Rain Master part: RLY1 or equivalent) as shown. During SETUP, select the NC (Normally Closed) Valve type for all programs which require the Master Valve and select Pump Operation for all programs which require it.

If more than one controller is going to control the Master Valve or pump, the controllers must be isolated from each other. Contact RMIS for the pamphlet on multiple controller installations.

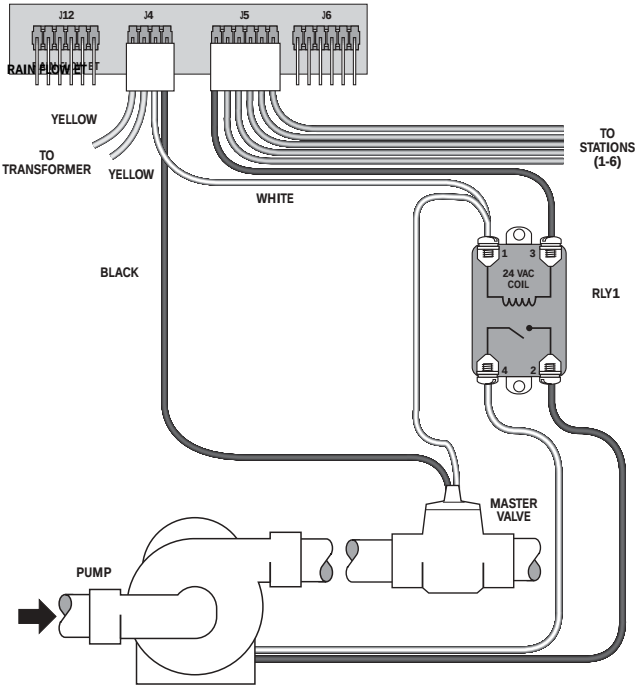

FIGURE 5. INDEPENDENT NORMALLY CLOSED MASTER VALVE AND/OR PUMP CONNECTION WITH ISOLATION RELAY

Normally Open Master Valve

If you have a Master Valve which is always open until energized, connect the solenoid to the MV and Valve Common terminals as shown in Figure 2. During setup, select valve type NO (Normally Open). The Master Valve will only be activated when the controller detects a Main Line Break or Unscheduled Flow condition. In this case, a fault condition will exist until manually cleared.

Normally Open Master Valve and Pump Operation

If you have a Master Valve which is always open until energized and a pump, connect the solenoid to the MV and Valve Common terminals and the Pump to Station 1 as shown in Figure 6. During setup, select valve type NO (Normally Open). The Master Valve will only be activated when the controller detects a Main Line Break or Unscheduled Flow condition. In this case, a fault condition will exist until manually cleared. Also during Setup, assign which programs (1-4) require the pump to operate.

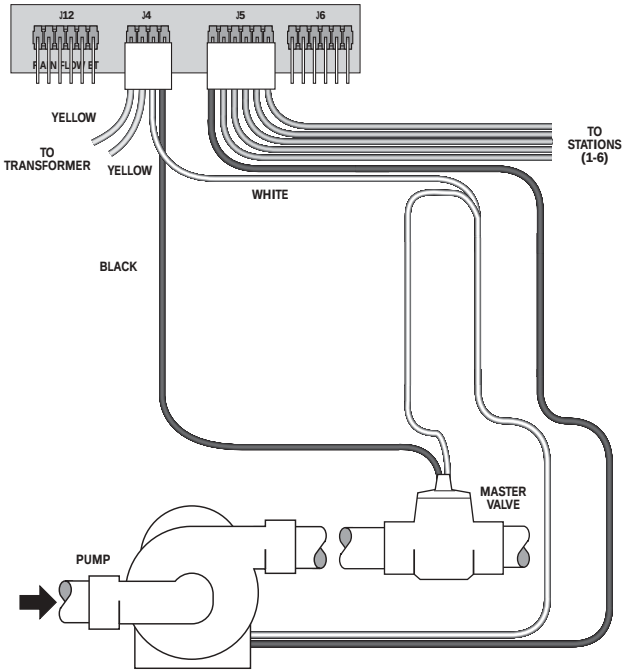

FIGURE 6. NORMALLY OPEN MASTER VALVE AND PUMP

FLOW SENSOR INSTALLATION

Refer to Figure 7. Install the Flow Sensor in the Main Line as shown, making sure that there are at least 10 pipe diameters upstream and 5 pipe diameters downstream of the sensor from any valve, reducer, elbow, or other obstruction or device which may cause turbulence in the water flow. Observe the proper direction of flow according to the flow arrow on the sensor. Install a valve box around the sensor and make the electrical connections inside the box. Use waterproof nuts over the splices.

The use of Rain Master EV-CAB-SEN or other shielded cable is required to ensure proper operation. Polarity must be observed when connecting the sensor to the controller.

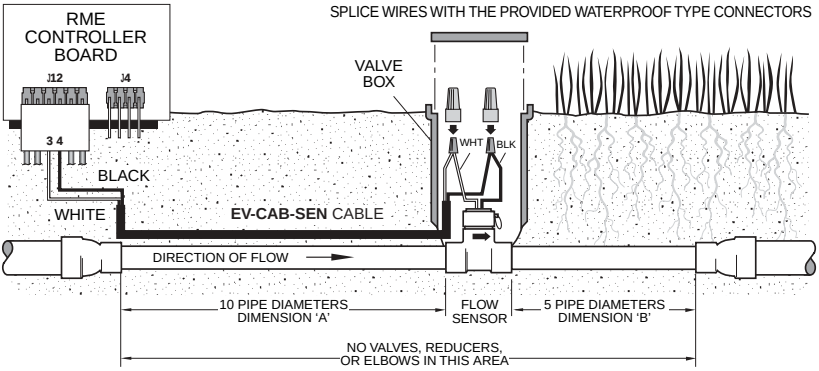

FIGURE 7. TYPICAL CONNECTIONS FOR FLOW SENSOR

Upon completion of the physical installation of the flow sensor, complete the wiring connection from the flow sensor to the SENTAR II controller by following the procedure below.

1. TURN THE POWER OFF AT THE CONTROLLER
2. At the Flow Sensor:
   Connect the BLACK wire of the Flow Sensor to the BLACK wire of the"EV-CAB-SEN", sen sor cable.Connect the WHITE wire of the Flow Sensor to the WHITE wire of the "EV-CAB-SEN", sensor cable.
   *Use the weatherproof connectors provided with the Flow Sensor to make the splice.
3. At the controller:
   Connect BLACK wire of "EV-CAB-SEN" to "FLOW-" of the RME SENTAR II (pin #4)
   Connect WHITE wire of "EV-CAB-SEN" to "FLOW+" of the RME SENTAR II (pin #3)
4. Turn POWER ON at the Controller.
5. Set the pipe size for the Flow Sensor at the controller based on the type and size of the Flow Sensor installed.

SENSOR WIRING

Most sensors, either Rain or Moisture type, are generally 2 or 3 wire.
The 2 wire sensors are connected to pin 1 and 2 on the sensor connector block (See Figure 8).

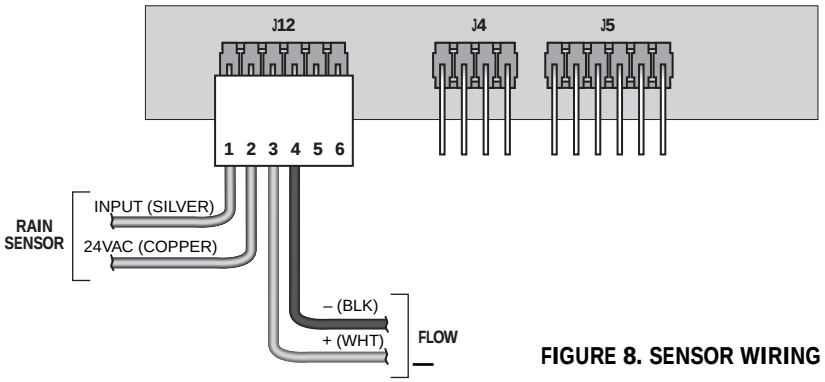

FIGURE 8. SENSOR WIRING

TAPPING WIRES TO LOCATE VALVES IN THE FIELD

DON'T – turn a station on and tap a wire to the controller's station terminal/wire to see what valve in the field is connected to it. This is damaging to both mechanical and solid state controllers and will cause the controller to go into a field wire fault detection mode. The simple method shown below is safe and will work for both types of controllers.

1. Use Manual Station to turn on Station 1, perhaps for 1 hour.
2. Flip the Rain Switch to the “No Watering” position.
3. Touch the wire from the unknown field valve to the controller's Station 1 terminal/wire.
4. Flip the Rain Switch to the “Automatic Watering” position and the valve on that wire will be activated.
5. When you know what valve it is, flip the Rain Switch off before removing the field wire from the controller's station terminal/wire.
6. Choose the next field wire and start the process over at Step 2.
7. When all done, turn off Station 1.

AC POWER FAILURES

In the event of an AC power failure, all irrigation stations are turned off and the display goes blank. The RME SENTAR II controller is equipped with non-volatile RAM (NVRAM) in order to protect user entered programs as well as important setup information during power loss.

This data will be retained for an indefinite period of time regardless of the length of the power outage. Additionally, your RME SENTAR II is also able to maintain the time and date for a period of up to 30 days (continuous) without the use of any type of battery. If the power is off for longer than 30 days, the user will be notified by a flashing time display, when power is reestablished. The correct time can then be re-entered using the SETUP function.

Regardless of the number of power failures, the date and time will be maintained for up to 30 days.

In the event that a program is executing or a scheduled start time is missed when a power failure happens, the controller will intelligently resume execution where it would have been if the outage had not occurred. The RME SENTAR II will complete its program execution preserving the original water window.

REMOTE CONTROL CAPABILITY

All Rain Master controllers feature patented built-in remote control capability which allows you to operate the controller for a distance of 1 mile in congested areas via a hand held transmitter. Consult the Remote Manual for operating instructions.Never connect anything but a Rain Master remote control receiver to the controller's front panel remote control connector or damage will result. Connecting to any other remote control device to any portion of the Rain Master controller will void all warranties and may cause damage.

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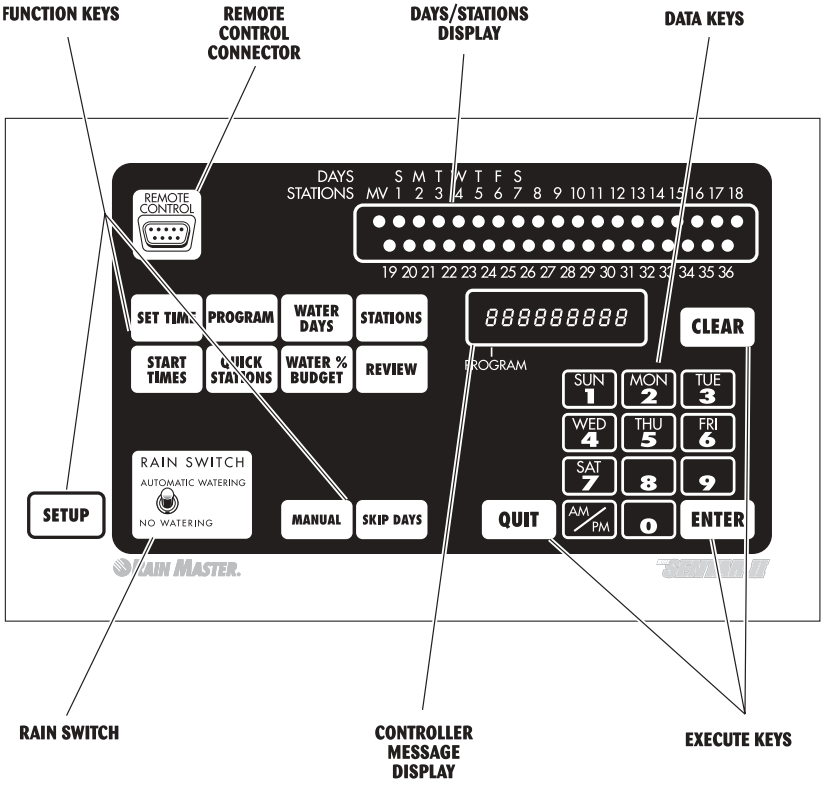
KEY OPERATIONS

There are three types of keys on the face of the controller. The diagram below shows the location of each group of keys. A detailed explanation of each key is given on the following pages.



FUNCTION KEYS

These keys (tan color) perform a specific function.

SETUP

Allows you to perform the following setups:

- Program a Master Valve to any or all programs.
- Program the type of Master Valve to be either a Normally Closed Master Valve or a Normally Open Master Valve.
- Program a Pump to any or all programs.
- Program Stacking or Non-Stacking of programs
- Program time delay between station(s) from 0 - 255 seconds (4 mins. 15 secs.)
- Program a Security Code
- Program a sensor to any or all programs
- Program audible alarm warning
- Program any or all programs to be either a Cycle and Soak program or not.
- Program the Flow Sensor features to be enabled or not.
- Program the Pipe size for the Flow Sensor to be either 1, 1.25, 1.5, 2, 3 or 4 inches.
- Program the main line flow limit, which is the maxi mum flow when the controller is watering, to be from 01 to 999 GPM.
- Program the unscheduled flow limit, which is the maximum flow when the controller is not watering, to be from 0 to 999 GPM.
- Program the flow check delay, which is the amount of time the controller waits after any station changes before any flow limits are checked, to be from 1 minute to 6 minutes.
- Clear the total accumulated gallons and look at the total accumulated gallons.
- Program the flow percentage, which is a percentage that will be used to adjust all station flow limits, to be from 5% to 80%.
- Program a station flow limit for each station, from 0 to 500 GPM, either by explicitly setting a limit for each station or by running a watering profile during which the controller will LEARN each station's upper flow limit.

SET TIME

Allows you to set the current time and date in the controller.

PROGRAM

Allows you to select the program that is required (from 1 - 4).

WATER DAYS

Is used to select the water days that the program is to operate on.

STATIONS	Is used to select the stations and runtimes in each program. If the program is specified to be a cycle and soak one, via SETUP, then it is also used to set the maximum time and soak time for each station.
START TIMES	Is used to select the start time(s) for each program (up to 5 per program).
QUICK STATIONS	Is used when a block of stations with the same runtime is being programmed. If the program is specified to be a Cycle and Soak one, via SETUP, then it is used to program a block of stations with the same runtime, maximum time and soak time.
WATER% BUDGET	Is used to change the runtimes (from 0% to 300%) for each station on a percentage basis by program.
REVIEW	Is used to review all program information on each program in the controller. It is also used to look at the total gallons used.
MANUAL	Is used to manually turn on a program, station, or to check all stations. Additional uses include locking and unlocking the controller once a security access code has been entered via SETUP, and advancing to the next station when execut ing a program.
SKIP DAYS	Is used to select the Skip By Day method of Water Days entry.

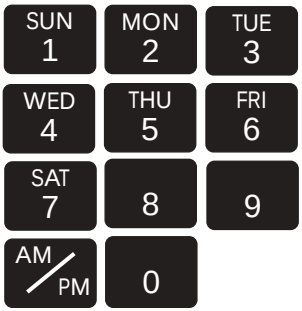
EXECUTE KEYS

These keys will execute the function that has been selected to be programmed.

ENTER	All DATA KEY input must be followed by the ENTER key to be accepted by the controller.
CLEAR	Allows you to clear a selected function out of a program. This key will also put the controller in the programmable rain mode.
QUIT	Is used to complete a function after it has been executed and will return the controller to the automatic mode. This key may be pressed to exit any function.

DATA KEYS

These keys are used to select days of the week when entering time and day, and are used to select numbers such as runtimes, delay times etc.
The number 1 key is also a toggle ON/OFF key when used in the Setup mode.



WORDS AND TERMS USED IN THE DISPLAY

= Hello will be displayed when the controller is powered up for the very first time. When Hello is displayed there are NO user programs in the controller. If left in the HELLO mode the controller will begin to water every station for 10 minutes, starting 6 hours after the HELLO has been displayed. The 10 minute per station watering shall repeat every 24 hours.

Hitting any key exits HELLO mode, and removes the default watering program.

UNDER SETUP

= Master Valve.

= Master Valve type is Normally Closed (NC).

= Master Valve type is Normally Open (NO).

= Pump.

= Ensures that programs run one after another, even if their start times overlap.

= Run programs at their scheduled start times. In the event that start times overlap, multiple programs will run concurrently.

= Time delay between stations (0-255 seconds).

= Access or Security Code.

= Sensor input.

= An audible beep will be given off (o r not) if a fault is detected.

= Cycle and Soak.

= Flow sensor features are enabled (or disabled).

= Flow sensor is standard 1" pipe.

= Flow sensor is standard 1.25" pipe.

= Flow sensor is standard 1.5" pipe.

= Flow sensor is standard 2" pipe.

= Flow sensor is standard 3" pipe.

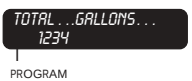
= Flow sensor is standard 4" pipe.

= Reserved for Rain Master use only.

= Main line flow limit (in GPM).

= Unscheduled flow limit (in GPM).

= Flow check delay (in minutes).



= The total gallons used since the last time it was cleared. (Display flashes “TOTAL”, “GALLONS”, then number.)

= Percentage adjust to all station upper flow limits.

= Upper flow limits for stations.

= This display appears in three different instances **(if flow sensing has been enabled).**

1. Flashes when an automatic program is executing.
2. In Manual System Check/Syringe Cycle.
3. Displays measured flow while the controller is going through watering profile to LEARN station upper flow limits.

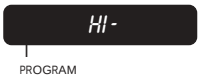
= Upper flow limit for a station in GPM. (Example shows station 1 upper flow limit of 200 GPM.)

= Measured flow (on left) and upper flow limit for the station (on right).

OTHER TERMS

= A Security Code has been entered and enabled. Requires reentry of the Access Code to unlock.

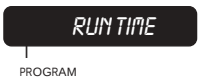
= Low, used in Quick Stations function.



= High, used in Quick Stations function.

= Length, used in station function and in Quick Station function.

= Controller is in Rain shut-down, used with the manual Rain Switch.



= Momentarily comes up before the runtime is to be entered in the station feature and quick station feature, if the program is Cycle and Soak.

= Momentarily comes up before the maximum time is to be entered in the station feature and quick station feature, if the program is Cycle and Soak.

= Momentarily comes up before the soak time is to be entered in the station feature and quick station feature, if the program is Cycle and Soak.

= Left, used in Skip Days function.

= No, used anytime to indicate invalid info.

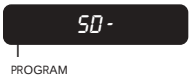
= Off, indicates the controller is off and will not water.

= Okay, indicates an acceptance of an option.

= Program (P) or station (S) used in Manual function.

= Program, used in Program function.

= Percentage, used in Percentage function.



= Skip days, (SD) used in the Skip Days function.

= Set time, used in the Set Time function.

= Station, used in the Stations function.

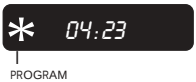
= Stations, used in the Review feature.

= Water days, used in the Water Days function.

= The controller has been placed in the programmable Rain Mode and will not water for 2 days. The Controller indicates the remaining days (1-7) before next water.

= The Rain Sensor associated with this program is in a wet condition, used in the Review feature.

= The Rain Sensor associated with this program is reading a dry condition.



= A program is running in the Automatic Mode but no stations are watering because the rain sensor is enabled and a wet condition exists.

= In Manual System Check/Syringe Cycle and the flow sensor features are not enabled.

= Flashes at about 1 second rate during power up (only if power up takes a long time; power up usually takes several seconds but under very unusual circumstances can take several minutes).

= Either an overcurrent or short circuit has occurred on one or more stations, field wires or valve solenoids or a flow limit violation has occurred. Press REVIEW for more information.

= Shown when REVIEW is pressed during a fault condition and the problem is an overcurrent or short circuit in the station field wiring. The faulty station(s) will be shown in the LED lights.

= Shown when REVIEW is pressed during a fault condition and the problem is a station upper flow limit violation. The faulty station(s) will be shown in the LED lights. Subsequent press of the REVIEW key shows the measured flow in GPM at the time the fault was detected.

PROGRAM

= Shown when REVIEW is pressed during a fault condition and the problem is an unscheduled flow limit violation. Subsequent press of the REVIEW key shows the measured flow in GPM at the time the fault was detected.

PROGRAM

= Shown when REVIEW is pressed during a fault condition and the problem is a main line flow limit violation. Subsequent press of the REVIEW key shows the measured flow in GPM at the time the fault was detected.

AUTOMATIC MODE

The controller is in the Automatic Mode whenever the time is displayed, and the day of the week indicator light is lit.

Pressing QUIT will always return the controller to the Automatic Mode.

When a program is watering in the Automatic Mode, the station and program number will be displayed as a convenience. If the controller has been setup to enable flow sensing, the measured flow (GPM) will alternately appear in the display at a 1 second rate.

A ∗ in place of the program number, indicates a program is running but all stations are off because the rain sensor is enabled and a wet condition exists.
To advance to the next station in a program when a program is already watering,

Press: MANUAL

To stop and cancel a program that is watering,

Press: CLEAR QUIT

The controller returns to the Automatic Mode.

RAIN MODE

The controller has a Rain Switch. The switch MUST BE in the "Automatic Watering" position anytime watering is desired. In the "Automatic Watering" position, watering WILL occur if the controller is programmed to do so.

The switch should be placed in the "No Watering" position when no watering is desired, such as when it is raining, etc. In the "No Watering" position, no watering will occur and “RAIN OFF” will appear in the display to indicate that all programs are inhibited from watering. The user's program will not be disturbed

PROGRAMMABLE RAIN

This method is used in place of the Rain Switch when you know how many days you want the controller to stay off. It allows you to select the number of days, from 1-7, that the controller will stay in the programmable Rain Mode after which it will return to the Automatic Mode by itself.

EXAMPLE: You wish the controller to stay off for 6 days,

Press: CLEAR FRI 6 ENTER The controller will diplay 

Each night at midnight the controller will deduct one day until it finally returns to the Automatic Mode.

Note: No watering will occur when it goes back to the Automatic Mode if you have also placed the Rain Switch in the "No Watering" position.

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QUICK AND BASIC PROGRAMMING

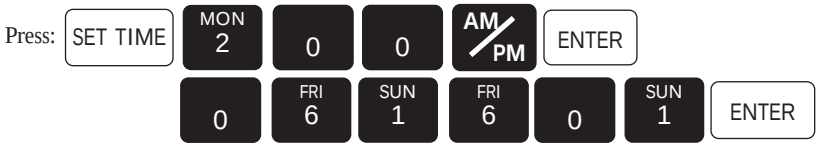
Before the controller will operate, some basic information must be programmed.

1. Set the Time of day and Date for the controller.
2. Establish a valid watering program:
    a. Choose the program number you wish to work with (1-4).
    b. Set the Water Days.
    c. Set the Stations and the Watering Time for each station.
    d. Set the Start Time(s) the program will begin to water on the chosen days.

SET TIME

This is used to set the current time of day and the current date.

EXAMPLE 1: The time is 2:00 PM, Saturday, June 16, 2001.



The controller returns to the Automatic Mode.

EXAMPLE 2: The time is 10:35 AM, Tuesday, December 12, 2002

The controller returns to the Automatic Mode.

PROGRAM

This is used to select the program(s) you wish to work with. Once selected, you need not change the program # until you wish to program or review information in a different program. There are 4 programs available for your use. They are referred to as 1, 2, 3, and 4. If desired, it is also possible to select and clear ALL information in a program using this function.

PROGRAM SELECTION

Select the program you wish to work with, either 1, 2, 3, or 4. While programming other functions, the selected program number is displayed as a convenience.

EXAMPLE: You wish to work with Program 2,

The controller returns to the Automatic Mode.

PROGRAM CLEAR

If desired, it is possible to both select and clear all information in a program.

EXAMPLE: You wish to select and clear all information in Program 1,

Press: PROGRAM | SUN 1 | CLEAR

The controller returns to the Automatic Mode.

WATERING DAY SELECTIONS

Watering days for Programs 1, 2, 3 and 4, may be set on a 7 day week or a Skip Days mode. Although you cannot do both within the same program, each program may be set to either mode.

EXAMPLE: Program 1 may be on a 7 day weekly basis but Program 2 might be on a skip days basis.

WATER DAYS

To select watering days based on a 7 day week. Watering will occur on the days selected each and every week. Selected days are shown in the top display. The Program # is shown in the display as a convenience.

EXAMPLE: You wish to water on Sunday, Wednesday and Friday,

Press: WATER DAYS | SUN 1 | ENTER | WED 4 | ENTER | FRI 6 | ENTER | QUIT

The controller returns to the Automatic Mode.

EXAMPLE: To remove a watering day, such as Sunday,

Press: WATER DAYS | SUN 1 | CLEAR

Press: QUIT

The controller returns to the Automatic Mode.

EXAMPLE: To review Water Days information,

Press: WATER DAYS (An LED light will light up for every day that watering is to occur.)

Press: QUIT

The controller returns to the Automatic Mode.

SKIP DAYS

This is used to establish the number of days between watering, from 1 to 30, and how many days are left till the first watering will begin. If information has been entered in the past, the Skip Day number will be shown in the display. The Program # is shown in the display as a convenience.

Note: 0 days left means the watering day is today.

Note: By using the Skip Days mode you can have a program water every 2nd, 3rd, 4th,... or 30th day as may be desired.

EXAMPLE: You wish to skip 2 days and water every third day, and to start it 4 days from now,

Press: SKIP DAYS | MON 2 | ENTER | WED 4 | ENTER

The controller returns to the Automatic Mode.

EXAMPLE: To clear all Skip Days information,

Press: SKIP DAYS | CLEAR | QUIT

The controller returns to the Automatic Mode.

EXAMPLE: To review Skip Days information,

Press: SKIP DAYS

and the Skip Day number is shown,

Press: ENTER (the number of days left before the next watering is shown.)

Press: QUIT

The controller returns to the Automatic Mode.

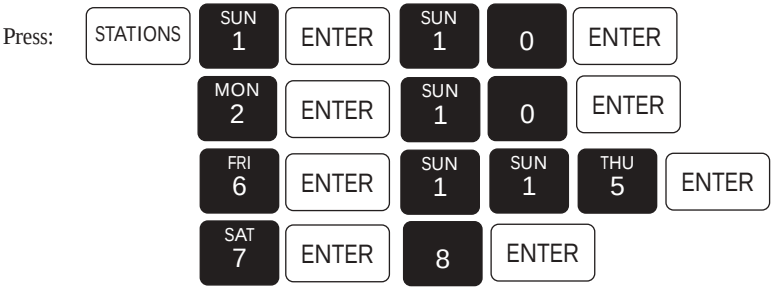
STATIONS AND WATERING TIMES

Any station may be placed in any program. Stations may be placed in more than one program at a time if desired. Within each program, each station can have a different runtime. Each program can individually be selected (via SETUP) to be either a conventional program or a Cycle and Soak program. Depending upon the selection, the RME SENTAR II will prompt for the appropriate information whenever the STATION key is pressed.

STATIONS (for a conventional program)

This is used to select the stations and set the runtime for each station. After entering the desired station #, the runtime for the station is then entered. Percentage is briefly shown at the beginning to remind you of its setting. Selected stations are shown in the top display. The Program # is shown in the display as a convenience.

EXAMPLE: You wish to set Station 1 for 10 mins., Station 2 for 10 mins., Station 6 for 1 hr. and 15 mins. and Station 7 for 8 mins,



Press: QUIT

The controller returns to the Automatic Mode.

EXAMPLE: To clear a station and its runtime, such as Station 7,

Press: STATIONS SAT 7 CLEAR

Press: QUIT

The controller returns to the Automatic Mode.

EXAMPLE: To review selected Stations information,

Press: STATIONS (An LED light will light up for every station that has a valid runtime.)

Press: QUIT

The controller returns to the Automatic Mode.

EXAMPLE: To review the runtime of a station, such as Station 6,

Press: STATIONS FRI 6 ENTER (the runtime length is displayed)

Press: ENTER to leave the runtime as is and continue reviewing,

Press: QUIT

The controller returns to the Automatic Mode.

QUICK STATIONS (for a conventional program)

This is used to rapidly program a block of stations which all have the same runtime. First the lowest station number is entered, then the highest and then the runtime. This length is applied to all the stations from the lowest through the highest. Selected stations are shown in the top display. Percentage is briefly shown at the beginning to remind you of its setting. The Program # is shown in the display as a convenience.

EXAMPLE: You wish to set all stations from 12 through 34 for 56 mins.

Press: 

The controller returns to the Automatic Mode.

CYCLE AND SOAK

A Cycle and Soak program can be used to eliminate runoff. Runoff occurs whenever the precipitation rate of the irrigation system exceeds the percolation rate of the soil. The Cycle and Soak program allows each individual station to be programmed to eliminate the wasteful effect thereby maximizing water savings. In a conventional program each station in the program will run for the full runtime and then the next station will run, etc.

Note: To configure a program for Cycle and Soak operation, refer to the Advanced Setup Programming for Cycle and Soak.

In a Cycle and Soak program, in addition to the runtime, there are two other times associated with each station; the maximum watering time and the soak time. The maximum watering time is the maximum time that the station can be on before runoff occurs. The soak time is the amount of time that the station must be off before it can come on again. This time allows the water to percolate into the root zone of the plant material. In a Cycle and Soak program the controller figures out a profile to run the stations that minimizes the total watering time for the program and intelligently schedules stations to run while other stations are satisfying their soak times. At the end of the profile each station will have run for its full runtime but the runtime may not be contiguous. For a particular profile, it may be that at times during the profile no stations will be on.

Cycle and Soak Station Parameters

Parameter	Minimum	Maximum	Increment
Runtime	1 Min	9 Hrs 59 Min	1 Min
Max Watering Time	1 Min	4 Hours	1 Min
SoakTime	1 Min	4 Hours	1 Min

STATIONS (for a Cycle and Soak program)

This is used to select the stations and set the runtime, the maximum watering time and the soak time for each station. After entering the desired station number, the runtime is entered followed by the maximum watering time, and finally the soak time. Percentage is briefly shown at the beginning to remind you of its setting. The percentage only applies to the runtime and not to the maximum watering time or soak time. Selected stations are shown at the top of the display. The program number is shown in the display as a convenience.

Note: If a pump is assigned to any program (via SETUP) then station 1 cannot be selected as it is reserved for the pump.

EXAMPLE: You wish to set Station 1 for a runtime of 1 hr and 5 mins., a maximum time of 35 mins. and a soak time of 45 mins. and station 6 for a run time of 2 hrs, a maximum time of 1 hr and a soak time of 20 mins. (You must have previously set, via SETUP, the program for which you are entering information, to a Cycle and Soak program.)

Press: STATIONS, SUN 1, ENTER (controller will momentarily display "RUN TIME")

SUN 1, 0, THU 5, ENTER (controller will momentarily display "MAX TIME")

TUE 3, THU 5, ENTER (controller will momentarily display "SOAK TIME")

WED 4, THU 5, ENTER

FRI 6, ENTER (controller will momentarily display "RUN TIME")

MON 2, 0, 0, ENTER (controller will momentarily display "MAX TIME")

SUN 1, 0, 0, ENTER (controller will momentarily display "SOAK TIME")

MON 2, 0, ENTER

Press: QUIT

The controller returns to Automatic Mode.

Note: If the same station appears in multiple Cycle and Soak programs, only one value for the maximum time is allowed across programs. The same holds true for soak times.

EXAMPLE: To clear a station and its runtime, such as Station 7,

Press: STATIONS SAT 7 CLEAR

Press: QUIT

The controller returns to the Automatic Mode.

EXAMPLE: To review selected Stations information,

Press: STATIONS (An LED light will light up for every station that has a valid runtime.)

Press: QUIT The controller returns to the Automatic Mode.

EXAMPLE: To review the runtime, maximum time and soak time of a station such as Station 6,

Press: STATIONS FRI 1 ENTER (the runtime is displayed)

Press: ENTER to leave the runtime as is and continue reviewing,

Press: ENTER to leave the maximum time as is and continue reviewing,

Press: ENTER to leave the soak time as is and continue reviewing,

Press: QUIT

The controller returns to the Automatic Mode.

QUICK STATIONS (for a Cycle and Soak program)

This is used to rapidly program a block of stations which all have the same runtime, maximum watering time and soak time. First the lowest station number is entered and then the highest and then the runtime and then the maximum watering time and then the soak time. Percentage is briefly shown at the beginning to remind you of its setting. The percentage only applies to the runtime and not to the maximum watering time or soak time. Selected stations are shown at the top of the display. The program number is shown in the display as a convenience.

Note: If a pump is assigned to any program (via SETUP) then Station 1 cannot be selected as part of the block of stations as it is reserved for the pump.

EXAMPLE: You wish to set all stations from 12 through 34 for a runtime of 1 hr and 56 mins and maximum time of 20 mins and a soak time of 15mins. (You must have previously set, via SETUP, the program for which you are entering information, to a Cycle and Soak program.)

Press: QUICK STATIONS, SUN 1, MON 2, ENTER, TUE 3, WED 4, ENTER

(controller will momentarily display "RUN TIME")

SUN 1, THU 5, FRI 6, ENTER

(controller will momentarily display "MAX TIME")

MON 2, 0, ENTER

(controller will momentarily display "SOAK TIME")

SUN 1, THU 5, ENTER

The controller returns to the Automatic Mode.

Note: The maximum time and/or soak time entered will be used for the stations in the block for all Cycle and Soak programs and not just for the one being entered.

PERCENTAGE

The Percentage function provides for simple water budgeting by providing an easy method of increasing/decreasing the runtimes of ALL stations in a program with one simple entry. It is particularly useful during abnormally dry, hot, cold or wet periods.

The Percentage is set to 100 in all four programs by default, therefore, unless changed, each station in a program will run for 100% of its programmed time. Percentage may be set from 0 to 300%, in increments as small as 1%, for Programs 1, 2, 3 and 4 independently.

For instance, setting the Percentage in a program to 161 will make the runtime of each station 1.61 times its programmed runtime. Setting the Percentage to 70 will make the runtime 0.70 times its programmed runtime.

Note: If Percentage is set to other than 100, the watering lengths of all stations in a program will be changed when you view them.

Note: For a Cycle and Soak program the Percentage only applies to the runtimes and not to the maximum watering times or soak times.

EXAMPLE: You wish to set a Percentage of 110 which will increase the watering times of all stations in a program by 10%,

Press: WATER% BUDGET | SUN 1 | SUN 1 | 0 | ENTER

The controller returns to the Automatic Mode.

EXAMPLE: To clear Percentage,

Press: WATER% BUDGET | CLEAR | QUIT

The Percentage is reset to 100 and the controller returns to the Automatic Mode.

EXAMPLE: To review Percentage,

Press: WATER% BUDGET

Press: QUIT

The controller returns to the Automatic Mode.

Note: Percent calculations which result in fractional portions of minutes will irrigate for the precise time. For example, assume a 5 minute runtime with a percentage of 50%. This station will irrigate for 2 minutes and 30 seconds.

START TIMES AND AUTOMATIC PROGRAM OVERLAP PROTECTION

There are five start times available for each of Programs 1, 2, 3 and 4. They are referred to as Start Time 1 – Start Time 5.

Additionally, the controller allows you to select (via SETUP) whether programs will be allowed to run one at a time (Stack) or run concurrently (No Stack) in the event that start times overlap with one another. Using Stack operation the controller ensures that only one program (e.g. one station) is allowed to be turned on at one time regardless of conflicting start times. The controller program(s) will wait for completion of the currently executing program before it will start the next program. The following examples describe Stack Operations:

EXAMPLE 1: If Program 1 is one hour long, due to the stations and watering times placed in it, and you set three of its start times to 7:00 AM, the program will water three times - from 7:00 to 8:00, 8:00 to 9:00 and 9:00 to 10:00 thereby providing two repeat cycles.

EXAMPLE 2: If Program 1 was again one hour long and was set to start at 7:00 AM Mon., and Program 3 was set to start at 7:30 AM on Mon. and Tue., then on Mon. Program 3 would begin at 8:00AM , when Program 1 ended, but on Tue. it would begin at 7:30 AM.

The Stack operation ensures that you will always get the number of watering cycles you desire and at the same time your system will never be under-pressurized because two programs are running simultaneously.

Note: The controller is shipped with Stack active, however, it may be programmed so that multiple programs can be run simultaneously. See Advanced Setup Programming.

START TIMES

This is used to set the start time for a program. The Program # is shown in the display as a convenience.

EXAMPLE: You wish the program to start watering at 7:10 AM and 4:30 PM,

Press: START TIMES | SAT 7 | SUN 1 | 0 | ENTER (The controller goes to Start Time 2.)

WED 4 | TUE 3 | 0 | AM/PM | ENTER (The controller goes to Start Time 3.)

Press: QUIT

The controller returns to the Automatic Mode.

EXAMPLE: To review Start Times,

Press: START TIMES (Start Time 1 is displayed).

EXAMPLE: To review Start Time 2,

Press: ENTER

Press: QUIT

The controller returns to the Automatic Mode.

EXAMPLE: To clear a start time, such as Start Time 2,

Press: START TIMES (Start Time 1 is displayed.)

EXAMPLE: To get to Start Time 2,

Press: ENTER (Start Time 2 is displayed.)

EXAMPLE: To clear Start Time 2,

Press: CLEAR | ENTER

The controller returns to the Automatic Mode.

REVIEWING PROGRAMS AND TOTALIZER

A unique feature of the RME SENTAR II controller is its Review feature. At the push of a key, all program information will be displayed. Successive pushes of the REVIEW key cause the information to advance. Another way of reviewing information is to press and hold the REVIEW key. As the key is held the information will automatically advance at a readable rate. Removing your finger causes the scrolling information to stop. Pressing QUIT at any time will return the controller to the Automatic Mode.

The information for the programs will start with information for the program selected (via the PROGRAM function key) and continue until Program 4. For instance if Program 1 is the selected program then information in Program 1 will be displayed first, followed by Program 2, 3 and 4 and if Program 3 is the selected program then information in Program 3 will be displayed first, followed by Program 4.

The information presented is as follows:

1. The total watering time for the program (displayed with H [hours] and M [min utes]). This is the actual watering time and takes into account all factors includ ing the percentage adjust, any delay between stations (set via SETUP) and any adjustments needed because the program is a Cycle and Soak program. The displayed value is rounded up; for example, a total time of 2 hours, 12 minutes and 14 seconds will be 2 hours and 13 minutes.

2. If the flow feature was enabled (via SETUP), and Program 1 was the last selected program, then TOTAL…GALLONS… will be displayed.

Note: When using the Review function, the total gallons screen records and updates measured gallons every 10 seconds. It can be used to check for unscheduled flow.

3. If the Rain Sensor has been Enabled (via SETUP) for this program then: SNSR-WET or SNSR-DRY will be displayed.

4. Start Times 1, 2, 3, 4 and 5 (displayed as START...TIME).

5. Water Days (displayed as W DAY).

6. Skip Days (displayed as SD) and the number of days left until the next watering (displayed as LFT).

7. Percentage (displayed as PT).

8. Stations and their actual runtimes (displayed as STATIONS). If the program is a Cycle and Soak program (as selected via SETUP), the maximum watering time and soak time will also be displayed for each station.

Note: The runtime shown for each station is the programmed length and will not be modified by the value you may have set for the percentage adjust function.

EXAMPLE: You wish to review program 3 only,

Press: PROGRAM | TUE 3 | ENTER

Press: REVIEW Continue to press:

Press: QUIT

The controller returns to the Automatic mode.

MANUALLY ACTIVATED FUNCTIONS WITH EXAMPLES

The Manual Mode offers four different features as described below:

MANUAL PROGRAM

This is used to run a program - assuming stations are in the program.

EXAMPLE: You wish to run Program 1,

Press: MANUAL | PROGRAM | SUN 1 | ENTER

(The display shows a 1 to indicate Program 1 is running. The active stations are displayed as well as the elapsed station runtime.)

The controller returns to the Automatic Mode.

EXAMPLE: To advance to the next station when the program is already watering,

Press: MANUAL

EXAMPLE: To stop the watering program that is currently running,

Press: CLEAR | QUIT

The controller returns to the Automatic Mode.

MANUAL STATION

This is used to run a selected station for a specified time.

EXAMPLE: You wish to run station 6 for 25 min,

Press: MANUAL | STATIONS | MON 2 | ENTER | MON 2 | THU 5 | ENTER

(The display shows station and watering time. As time elapses, watering time will count down. When time ends, the station shuts off and the controller returns to the Automatic Mode.)

EXAMPLE: To stop the watering station,

Press: QUIT

The controller returns to the Automatic Mode.

Note: If a pump is assigned to any program (via SETUP) then Station 1 is reserved for the pump, but it can still be turned on manually by specifying Station 1.

Note: If the Master Valve type is Normally Closed (as specified via SETUP) then the Master Valve will come on with the station. If the station being turned on is in

any program that has a pump assigned to it (via SETUP) then the pump (Station 1 output) will come on with the station.

MANUAL MASTER VALVE

This is used to run only the Master Valve for a selected time. The MV is designated as Station 0.

EXAMPLE: You wish to run the Master Valve for 4 min.,

Press: MANUAL | STATIONS | 0 | ENTER | WED 4 | ENTER

To stop:

Press: QUIT

The controller returns to the Automatic Mode

MANUAL SYSTEM CHECK/SYRINGE CYCLE

As a convenience for "walk throughs" and service work, and to measure the flow rate on a station, the controller has a system check feature built in. This will run each station, from the first to the last, for a selectable time of 1 to 9 mins.

EXAMPLE: To run a 3 min. System Check,

Press: MANUAL | TUE 3 DO NOT PRESS ENTER

If the flow features have been enabled (via SETUP) then the display will show the current measured flow rate in GPM and count-down elapsed time during the CHECK mode. If the flow features are not enabled then only the count-down elapsed time will appear in the display.

EXAMPLE: To advance one station at a time,

Press: MANUAL

EXAMPLE: To stop the System Check,

Press: CLEAR | QUIT

The controller returns to the Automatic Mode.

Caution: This mode sequentially runs every station in the controller. For example you have a 24 station unit but only use 23 stations, it will still apply power for Station 24 and while doing so will apply power to the Master Valve/Pump terminal. This

could be a problem for a system when you are using the Master Valve output to drive a pump because during the period that Station 24 is activated, the pump will be pumping against a closed system. If the system uses a master valve, it will be activated during the period that Station 24 is active and this could cause heating of the Master Valve's solenoid (if the valve depends on water flow to cool it). Therefore, if all stations are not used, cancel the System Check/Syringe cycle after the last used station has watered.

MONITORING STATION FLOW

There are three ways to observe the measured flow in gallons per minute (GPM):

1. The measured flow is automatically displayed when the controller is in the automatic mode and one or more programs are operating.

2. When a manual system check is performed, the flow is shown for each sta tion. (Refer to MANUAL SYSTEM CHECK for details.)

3. When in the SETUP function, measured flow can be observed on a per sta tion basis when utilizing the LIMITS subfunction. (Refer to the LIMITS SETUP feature in the ADVANCED SETUP PROGRAMMING section for more details.)

FAULT DETECTION OVERVIEW

The RME SENTAR II has the ability to detect and take corrective action for a number of field related failure conditions. The operator is informed of any fault condition when the display alternates with the following words:

FAULT..... PRESS ..... REVIEW

In addition to the display indication, the controller will chirp with an audible alarm once every six seconds signifying a fault occurrence.

Note: The audible chirp may be disabled via the SETUP function.

Pressing the REVIEW key reveals the specific fault type and momentarily suspends the audible chirp.

= The problem is a field wiring short circuit on a sta tion. The station lights illuminate to show which sta tion(s) were faulty.

= The problem is a main line flow limit violation. Pressing the REVIEW key again reveals the measured GPM at the time the fault occurred.

= The problem is an unscheduled flow limit violation. Pressing the REVIEW key again reveals the measured GPM at the time the fault occurred.

= The problem is a station upper flow limit violation. The station lights illuminate to show which station(s) are involved. Pressing the REVIEW key again reveals the measured GPM at the time the fault occurred.

Whenever a specific fault is displayed it can be cleared by pressing the CLEAR key. Alternatively, if CLEAR is not hit, the QUIT key will return the controller to the Automatic Mode without clearing the fault condition.

Refer to the fault type(s) defined below for specific information.

WIRING FAULT

The RME SENTAR II has been equipped to detect station short circuits which may occur due to improper field wiring or faulty valve solenoids. In the event a station draws excessive electrical current, the following action occurs:

- The offending station will be immediately turned off.
- The next scheduled station of the program will be started.
- FAULT…PRESS…REVIEW…appears in the display.
- The controller will continue to execute programs, however, any faulted station(s) will not be turned on again.

Note: If multiple stations are on simultaneously, and the controller detects an overcurrent fault, all running stations will be diagnosed as faulty.

Note: If a short circuit occurs at the normally closed Master Valve and the program has been setup to use a Master Valve, the controller will successively condemn all remaining stations in the program. Upon reviewing the fault, all stations of the program shall illuminate, indicating that the problem appears at the Master Valve.

User Action:

1. Excessive station current may be due to an inadvertent direct connection between the station wire and the common wire.

2. Check for exposed wiring in a flooded valve box.

3. Check for a faulty valve solenoid.

4. When corrective action has completed, the fault should be cleared.

FLOW MAIN FAULT

The main line flow limit for the controller has been exceeded.

- All present irrigation programs are terminated.
- FAULT…PRESS…REVIEW…appears in the display.
- If the Master Valve for the controller has been setup as a Normally Open (NO) Master Valve, then this terminal will be energized with 24 VAC (Master Valve is closed).
- All scheduled start times for future programs will be ignored (no programs will start).
- The controller remains in this state until the fault is cleared by you.

User Action:

1. Inspect the main line as well as major branches for failure.

2. Examine the main line limits to ensure they have been correctly established. If the controller has been setup for No Stack operation, multiple stations may be on at the same time. The main line limit should be larger than the sum of the flow totals of all simultaneously "ON" stations.

3. When corrective action has completed, the fault should be cleared.

FLOW UNSCHEDULED FAULT

The unscheduled flow limit has been exceeded. The controller tests for unscheduled flow whenever the controller is not performing any irrigation. With no irrigation, and a Normally Closed Master Valve, the typical installation should have no flow and the limit should be set to zero. For systems which have a Normally Open Master Valve and the possibility of supplemental watering due to quick coupler manual devices, you have the option of setting a non-zero value which shall be allowed when the controller does not have any active stations. If this value is exceeded the unscheduled flow fault occurs.

- All present irrigation (running programs) are terminated.
- FAULT…PRESS…REVIEW…appears in the display.
- If the Master Valve for the controller has been setup as a Normally Open (NO) Master Valve, then this terminal shall be energized with 24 VAC (Master Valve is closed).
- All scheduled start times for future programs will be ignored (no programs will start).
- The controller remains in this state until the fault is cleared by you.

User Action:

1. The user should check for leaks, broken pipe(s), or physical damage.

2. Check the system for any stuck valves from a previous scheduled irrigation cycle.

3. Check that the unscheduled limit has been properly established. If quick cou pling devices were on at the time the alarm occurred, ensure that there is enough margins for the unscheduled flow limit.

4. When corrective action has completed, the fault should be cleared.

FLOW STATION FAULT

This fault occurs whenever the measured flow is more than the expected flow (upper station limit failure). Each time a station overflow condition is detected the following action occurs:

- The offending station will be immediately turned off.
- The next scheduled station of the program will be started.
- FAULT…PRESS…REVIEW…appears in the display.
- The controller will continue to execute programs, however, any faulted station(s) will not be turned on again.

Note: If multiple stations are on simultaneously, and the controller detects an over flow fault, all running stations will be diagnosed as faulty.

User Action:

1. Check for:
    a. Stuck valve (from a previous station)
    b. Broken pipes/heads
    c. Incorrectly established individual station limits
    d. Large variations in system water pressure

2. If station limits are suspected, proceed to the SETUP-LIMITS function to reestablish a stations nominal limit reading.

3. Compare the nominal reading and ensure that adequate margin exists (typical: 20% over nominal).

4. When corrective action has completed, the fault should be cleared by you.

ADVANCED SETUP PROGRAMMING

In addition to the many operating features available in your RME SENTAR II controller, there are a number of programmable features as well.

Pressing the SETUP key, you can program, review and modify the following functions. Successive presses of the SETUP key will allow you to advance to the next Setup feature. Some of the Setup functions will be skipped depending on what you have configured for previous Setup functions. The conditions for which a Setup function will be skipped are noted in the applicable paragraphs for those conditions.

Setup Options and Controller Defaults

Function	Option	Default
Master Valve Used	Uses, Does Not Use	1,2,3,4 (all programs enabled)
Type of Master Valve	NC, NO	NC
Pump	Uses, Does Not Use	(all programs disabled)
Cycle and Soak	Uses, Does Not Use	(all programs disabled)
Flow Sensor Features	On, Off	Off
Pipe Size (inches)	1, 1.25, 1.5, 2, 3, 4	1.5 inches
Main Line Flow Limit	1-999 GPM	500 GPM
Unscheduled Flow Limit	0-999 GPM	200 GPM
Flow Check Delay	1-6 minutes	2 minutes
Total Gallons	N/A	N/A
Flow Percentage	5-80%	20%
Station Upper Flow Limits	0-500 GPM	200 GPM for all stations

IMPORTANT: When entering setup information the display will change but the controller will not actually accept the information until ENTER or CLEAR (for those setup functions that accept CLEAR) is pressed.

MASTER VALVE (MV)

Using this feature allows you to program a Master Valve to be activated when program 1,2,3 or 4 is activated. If you have your Pump connected to the Master Valve output of the controller then use this feature to activate the pump when program 1,2,3 or 4 is activated.

EXAMPLE: You want a pump to go on when Programs 1 and 3 are running.

Press: SETUP — you will see 

Press: MON 2, WED 4 — This removes Programs 2 and 4 from activating the Master Valve.

you will see 

Press: ENTER

Subsequent pressing of 2 and 4 will add the Master Valve to Programs 2 and 4.

Note: The Master Valve will not be activated with the program if it is a Normally Open Master Valve type as selected in the next Setup option.

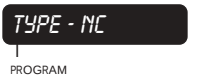
TYPE OF MASTER VALVE

This feature allows you to select either a Normally Closed or Normally Open Master Valve. A Normally Closed Master Valve is the most common type used in irrigation. If a Normally Open Master Valve is selected then it will not come on with any program but will come on when the controller detects a main line or unscheduled overflow condition.

Note: This Setup function will be skipped if you have not selected a Master Valve for at least one program (in the MASTER VALVE Setup function). In this case the controller will act as if you had selected a Normally Closed Master Valve: there fore if you are using a Normally Open Master Valve select the Master Valve for at least one program. Refer to wiring diagrams and explanations in the MOUNTING & INSTALLATION section before configuring this option

.

EXAMPLE: To select a Normally Open Master Valve,

Successively Press: SETUP — until you see 

Press: SUN 1 — until you see 

Press: ENTER, QUIT

The controller returns to the Automatic Mode.

PUMP

Using this feature will allow you to program a Pump to be activated when program 1,2,3, or 4 is activated. The controller uses Station 1 as the Pump output. This feature should only be used for the Pump, if it is connected to the Station 1 output of the controller. If the Pump is connected to the Master Valve output, then use the MV feature.

Note: Refer to wiring diagrams and explanations in the MASTER VALVE and PUMP WIRING OPTIONS before configuring this option.

A typical example for usage of this feature occurs when using a Normally Open Master Valve and Pump.

Note: If you select a Pump for any program, the controller will not allow you to include a Station 1 runtime in any program. If you have already programmed Station 1 into a program the controller will automatically remove it.

EXAMPLE: You want the Pump to go on when Programs 2 and 4 are running,

Successively Press: SETUP until you see PUMP (PROGRAM)

Press: MON 2 WED 4

This allows Programs 2 and 4 to activate the Pump.

you will see PUMP 2 4 (PROGRAM)

Press: ENTER

Subsequent pressing 2 and 4 will remove the Pump from Programs 2 and 4.

STACK or NO STACK

This feature allows you to run your programs one after another (Stack) or at the same time (No Stack). Where volume of water and pressure will allow, you have the option of running several stations from different programs at the same time.

Note: The maximum current draw cannot exceed 1 amp per station, and 1.5 amps for the controller.

EXAMPLE: You have a 30 station controller, and watering must be completed by 7:00 AM and cannot begin until 2:00 AM (5 hours total).
You can put:
Station 1 through 7 in Program #1
Station 8 through 14 in Program #2
Station 15 through 21 in Program #3
Station 22 through 30 in Program #4

Now set up your runtimes for each station, and the start time of 2:00 AM You must be sure not to have any program go over the 5 hours total runtime (this can be checked in Review Mode). You must also ensure your system can supply the volume of water required to supply 4 stations at one time.

EXAMPLE: To activate No Stack feature,

Successively Press: SETUP until you see STACK (PROGRAM)

Press: SUN 1 until you see NONSTACK (PROGRAM) (remember this is a toggle key when used in the Setup mode)

Press: ENTER QUIT The controller returns to the Automatic mode.

DELAY

This feature allows you to program a delay time between stations. A programmable delay can be useful to allow stations to reach a steady state condition before energizing the next station.

EXAMPLE: You want to have a 68 second delay time between stations being turned on,

Successively Press: SETUP until you see DELAY000 (PROGRAM)

Press: FRI 6 8 ENTER you will see DELAY000 (PROGRAM)

Press: QUIT

Note: Controller will accept and display from 0-255 seconds.

The controller returns to the Automatic Mode.

SECURITY CODE

Note: This feature should only be used where security is limited.

The RME SENTAR II controller has the capability to enter a password code which must be entered before any function(s) can be executed. This code can be up to 4 numbers long. Use a number that can be easily remembered, and have it written down should you forget.

Entering A New Security Code

EXAMPLE: You wish to enter the year you were born, 1960, as a code,

Successively Press: SETUP until you see CODE0000 (PROGRAM)

Press: SUN 1 9 FRI 6 0 ENTER

Press: QUIT

Note: 0000 is not a valid security code. 0000 means that the security code feature is not activated.

The controller will return to the Automatic Mode.

Enabling Security Code

EXAMPLE: Once you have completed operating or making changes to your con troller you can enable the Security Code:

Press: MANUAL ENTER ENTER

The controller returns to the Automatic Mode.

Should you forget to enable the Security Code, the code will automatically become enabled at midnight and no one will be allowed to operate the controller without first entering the security code.

Disabling Security Code (LOCKED Controller)

Once the Security Code feature has been enabled, it will be necessary to enter the Security Code each time you wish to operate or change your controller.

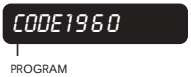
EXAMPLE: To disable the security code used in the example above,

Press: MANUAL ENTER SUN 1 9 FRI 6 0 ENTER

The controller returns to the Automatic Mode

Eliminating Security Code

EXAMPLE: To eliminate the Security Code completely, first disable the security code as described above, then:

Press: SETUP 6 times you will see 

Press: 0 9 0 0 ENTER

Press: QUIT

The controller returns to the Automatic Mode

SENSOR

Note: When this symbol ✻ appears in the beginning of the display screen, it indicates that the Sensor is reading "Wet", and one or more programs that are enabled for sensor operation have started. No stations, however, will water due to the wet condition.

The RME SENTAR II Controller has the ability to affect irrigation based on an external rain sensor or remote switch. This feature can be programmed on an individual program basis so that one or more programs will cease watering as long as the rain sensor is active.

The external sensor or switch must be of the type which is Closed when there is no rain detected, and opens when rain is detected or it is desired to suspend irrigation. Most commercial rain sensors are of this type. See the wiring instructions in the MOUNTING and INSTALLATION section.

EXAMPLE: You have program 4 set up to operate your outdoor lighting, however you also have a rain sensor connected to your RME SENTAR II.

Successively Press: SETUP until you see SNCR (PROGRAM)

Press: SUN 1 MON 2 TUE 3 ENTER you will see SNCR 123 (PROGRAM)

Press: QUIT The controller will return to automatic mode.

Once programmed in the above manner, the designated program(s) will not turn on any stations unless the rain sensor terminals labeled pins 1 & 2 are shorted together, either by an external switch or the appropriate rain sensor.

If any program is set up to be sensitive to the rain sensor then the status of the rain sensor can be determined by pressing the REVIEW key repeatedly or holding it down until the display shows the word SNSR- followed by WET or DRY. If Dry, the controlled program(s) will operate normally. If Wet, no irrigation will take place on those program(s). Additionally, when a program is scheduled to operate, an asterisk will appear in the leftmost location of the display. If the external sensor has detected rain, or the external switch is Open.

Note: The external sensor is independent of the Rain Switch on the front of the controller. Leave the switch in the Automatic Watering position.

EXAMPLE: To reinstate program 4 into the Sensor Mode,

Successively Press: SETUP until you see SNCR 123 (PROGRAM)

Press: WED 4 ENTER you will see SNCR 1234 (PROGRAM)

Press: QUIT

The controller returns to the Automatic Mode.

ALARM

The RME SENTAR II controller is equipped with an audible alarm feature which notifies the operator if a field wire or flow fault has been detected. The alarm is an audible "chirp" which occurs once every 6 seconds. It remains in effect until the alarm is cleared by you. With the alarm on, the chirp will be heard by anyone passing by the controller.

EXAMPLE: To program this alarm,

Successively Press: SETUP until you see ALARM OFF (PROGRAM)

Press: SUN 1 (Toggle Key) you will see ALARM ON (PROGRAM)

Press: ENTER QUIT

The controller returns to the Automatic Mode.

CYCLE AND SOAK

Using this feature allows you to select each program to be a Cycle and Soak program or not.

For a description of what a Cycle and Soak program means see the QUICK AND BASIC PROGRAMMING section of this manual under the heading of STATIONS AND WATERING TIMES.

EXAMPLE: You wish to make programs 1, 2 and 3 to be Cycle and Soak Programs,

Successively Press: SETUP until you see SOAK (PROGRAM)

Press: SUN 1 MON 2 TUE 3 ENTER you will see SOAK 123 (PROGRAM)

Press: QUIT

The controller returns to the Automatic Mode.

FLOW SENSOR FEATURES ENABLED/DISABLED

This Setup allows you to select the Flow Sensor features or not.

For a general description of how the flow features work, see the FAULT DETECTION OVERVIEW section of this manual.

Note: All the rest of the Setups after this one are related to the Flow Sensor features and will be skipped if the Flow Sensor features are not enabled here.

If you have a Flow Sensor connected to the controller and you wish to activate the Flow Sensor features,

Successively Press: SETUP until you see FLOW OFF (PROGRAM)

Press: SUN 1 until you see FLOW ON (PROGRAM)

(remember this is a toggle key when used in the Setup mode)

Press: ENTER QUIT

The controller returns to the Automatic Mode.

PIPE

In order to properly measure flow, the pipe size of the Rain Master flow sensor must be specified. Appendix A lists flow sensor part numbers versus pipe size.

You can select the following pipe sizes in inches: 1.00 inch cast bronze, 1.25 inch cast bronze, 1.50 inch PVC, 2.00 inch PVC, 3.00 inch PVC, and 4.00 inch PVC.

Each depression of the 1 key will toggle the display to the next pipe size, selection PIPEOTHR is to accommodate non-Rain Master flow sensors, contact factory for appropriate K and Offset values. When you have selected the pipe size you want, press ENTER.

Note: This setup function will be skipped if you have not enabled the flow features.

EXAMPLE: You wish to select a pipe size of 3 inches,

Successively Press: SETUP until you see PIPE 1.50 (PROGRAM)

Press: SUN 1 SUN 1 you will see PIPE 3.00 (PROGRAM)

Press: ENTER QUIT

The controller returns to the Automatic Mode.

MAIN LINE FLOW LIMIT

This feature allows you to program the main line upper flow limit. This is the maximum flow that the controller will allow whenever any station is on. If the controller has been setup for No Stack operation, multiple stations may be on at the same time. The main line limit should be larger than the sum of the flow totals of all simultaneously "on" stations.

Note: This Setup function will be skipped if you have not enabled the flow features.

EXAMPLE: You wish to select a Main Line Flow limit of 400 GPM,

Successively Press: SETUP until you see MAIN 500 (PROGRAM)

Press: WED 4, 0, 0, ENTER you will see MAIN 500 (PROGRAM)

Press: QUIT

The controller returns to the Automatic Mode.

UNSCHEDULED FLOW LIMIT

This feature allows you to program the unscheduled upper flow limit. This is the maximum flow that the controller will allow whenever no station is on. With no irrigation, and a Normally Closed Master Valve, the typical installation should have no flow and the limit should be set to zero. For systems which have a Normally Open Master Valve and the possibility of supplemental watering due to quick coupler manual devices, you have the option of setting a non-zero value which will be allowed when the controller does not have any active stations. If this value is exceeded the unscheduled flow fault occurs.

Note: This Setup function will be skipped if you have not enabled the flow features.

EXAMPLE: You wish to select an Unscheduled Flow limit of 25 GPM,

Successively Press: SETUP until you see UNSCH200 (PROGRAM)

Press: MON 2, THU 5, ENTER you will see UNSCH025 (PROGRAM)

Press: QUIT

The controller returns to the Automatic Mode.

FLOW CHECK DELAY

This feature allows you to program a delay after any change of stations for which no flow limits will be checked.

Whenever there is any change in which stations are on (any station gets turned on or off), the controller will not check for any flow limits from the time of the change until this delay has expired; this gives the system time to stabilize before any flow limit checking takes place.

The flow check delay can be set , from 1 to 6 minutes, in 1 minute increments.

Note: This Setup function will be skipped if you have not enabled the flow features.

EXAMPLE: You wish to set the flow check delay to 4 minutes,

Successively Press: SETUP until you see FDELAY 2 (PROGRAM)

Press: WED 4 ENTER you will see FDELAY 4 (PROGRAM)

Press: QUIT

The controller returns to the Automatic Mode.

TOTALIZER

This feature allows you to view and clear the total gallons used. (The Totalizer value can also be viewed by using the REVIEW mode.)

The total gallons is the total since the last time you cleared it.

Note: The total gallons will automatically be cleared when you select a new pipe size (via the Pipe Setup feature).

Note: This Setup function will be skipped if you have not enabled the flow features .

EXAMPLE: You wish to determine how many gallons you use in a month.

At the beginning of the month,

Successively Press: SETUP until you see TOTAL...GALS (PROGRAM)

Press: CLEAR you will see 0 (PROGRAM)

Press: QUIT

The controller returns to the Automatic Mode.

Note: If you hit SETUP while the words TOTAL/GALLONS are on the display you will miss this Setup feature because the controller will go to the next Setup feature.

Then at the end of the month:

Successively Press: SETUP until you see TOTAL...GALS PROGRAM

followed by 252567 PROGRAM

(this is your total gallons for the month)

.

Press: QUIT

Note: The totalizer will reset to 0, after 9,999,999 gallons.

The controller returns to the Automatic Mode.

FLOW PERCENTAGE

This feature can be used to globally establish station flow upper limits. The flow percentage can be set from 5 to 80%. This feature can be used in two ways:

1.Assume limits need to be established for a new system and you wish to have all station flow limits to be 15% above their nominal value.

Then

- •Set the flow percentage to 15%.
- •Run Automatic LIMITS (see next section) for all stations.
- •The new limits will be automatically saved (nominal measured flow + 15%) for each station.

2.Your system has been operational for some time. Occasionally, one or more stations seemingly at random fail the flow upper limit. Upon physical inspection of the station(s) everything appears fine. Upon further investigation it is determined that there are large fluctuations in the static water pressure. It is desired to bump all stations from their existing 15% (above nominal) to 25% (above nominal).

Then

- •Set the flow percentage to 25%.
- •All station limits will now be recalculated to provide another 25% over the initial nominal readings.

Note: This Setup function will be skipped if you have not enabled the flow features.

EXAMPLE: Assume the initial measured flow (nominal value) was 40 GPM for a station. Because the flow percentage was originally 15% then the station upper limit as retained in the controller is 46 GPM (1.15 x 40). Now, setting the new flow percentage of 25% yields a new station limit of 50 GPM (1.25 x 40).

Successively Press: SETUP until you see PERCENT 15 PROGRAM

Press: MON 2 THU 5 ENTER you will see PERCENT 25 PROGRAM

Press: QUIT

The controller returns to the Automatic Mode.

LIMITS

This feature will allow you to set the station's upper flow limits by either using the LEARN mode or by setting them explicitly. The next 2 sections explain each of these methods.

Note: This Setup function will be skipped if you have not enabled the flow features.

STATION LIMITS USING LEARN MODE

This feature allows the controller to LEARN and set the station upper flow limits.

Controller operation:

- Each station is turned on one at a time. The amount of time it is on is determined by the flow check delay time (1 to 6 minutes).
- The nominal flow reading is established by averaging the measured flow for the last minute in which the station is on.
- The station upper limit is calculated taking the nominal value and adjusting upward by the flow percentage (previously established).
- The new limit is saved in memory (non-volatile RAM).

Press ENTER and the controller will automatically set the upper flow limits by LEARNING them.

EXAMPLE: You wish to setup the controller to LEARN and automatically set all the station upper flow limits. You think 30% is a good amount to add to the upper limits over and above what the controller measures.

Successively Press: SETUP until you see PERCENT 20 PROGRAM

Press: TUE 3 0 ENTER you will see PERCENT 30 PROGRAM

Press: SETUP you will see LIMITS PROGRAM

Press: ENTER

The controller will now LEARN and set up all the upper station flow limits. It will take the Flow Delay time for each station. So, if you have a 36 station controller and your Flow Delay time is 2 minutes, it will take 72 minutes. (If you want the controller to skip to the next station at any time, press MANUAL and the station which was skipped will not have its limit changed). During this time the LED will display which station is watering and the flow in GPM will be on the display.

When the controller is done, you will see 

Press: QUIT

Note: While each station is watering, if you have selected a Normally Closed Master Valve, the Master Valve will come on also; if the station is in a program that has a Pump assigned to it, the Pump (Station 1) will also come on with the station.

Note: If you selected Pump for any program, Station 1 will be used for the Pump and the controller will not set an upper flow limit for Station 1.

The controller returns to the Automatic Mode.

SETTING STATION LIMITS

This feature allows you to directly set a station's upper flow limit to any value. It is an alternate to using the LEARN mode described above. In this feature each station limit is set one at a time.

To use this feature:

1. Successively press SETUP until you see LIMITS in the display.

2. Press the station number followed by ENTER.

3. You now have the opportunity to set the upper flow limit in one of 2 ways Pressing MANUAL will toggle between the 2 ways.

    - You can explicitly put in the limit followed by ENTER.

    - You can press MANUAL and the controller will start watering the station. During this time the flow rate will be displayed on the left and the limit will be displayed on the right. By pressing ENTER you can accept the flow rate as the limit (adjusted up by the flow percentage):

Note: The limit can be set from 0 to 500 GPM. The set limit will be rounded to the nearest 2, so if for instance you set the limit to 55, when you come back and look at it later it will be 54.

EXAMPLE 1: You wish to set the upper station flow limit of Station 15 to 44 GPM,

Successively Press: SETUP until you see 

Press: SUN 1 THU 5 ENTER you will see 15-200 PROGRAM

Press: WED 4 WED 4 ENTER you will see LIMITS PROGRAM

You can now continue to enter limits for other stations if you wish. When done,

Press: QUIT

The controller returns to the Automatic Mode.

EXAMPLE 2: You wish to review the upper station flow limit of station 15,

Successively Press: SETUP until you see: LIMITS PROGRAM

Press: SUN 1 THU 5 ENTER you will see 15-044 PROGRAM (indicating that the limit for Station 15 is 44 GPM)

Press: ENTER to leave limit as is.

Press: QUIT

The controller returns to the Automatic Mode.

EXAMPLE 3: You want to watch Station 7 watering and when you feel it has stabilized you want the flow (adjusted up by the flow percentage) to be used to set the upper flow limit. Your flow percentage has previously been set to 30%.

Successively Press: SETUP until you see LIMITS PROGRAM

Press: SAT 7 ENTER you will see 7-200 PROGRAM

Press: MANUAL

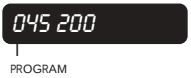
Station 7 will begin watering. To stop watering at any time, press MANUAL.

Note: If you have selected a Normally Closed Master Valve, the Master Valve will come on also. If Station 7 is in any program which has a pump assigned to it, then the Pump (Station 1) will come on also.

you will see 052-200 PROGRAM

The value on the left is the measured or (nominal) flow and the value on the right is a previously established limit (both in GPM). The flow display will update once every 10 seconds.

You now watch the display until you see that the flow has reached a stable value and you want to use that value (adjusted up by the flow percentage) for your limit.

Suppose the stable value is 45 GPM, then your display will be 

Press: ENTER you will see 

and your new limit will be 45 adjusted up by 30% which is 58 GPM.

EXAMPLE 4: You want to turn Station 7 on and monitor its flow without changing its upper flow limit.

Successively Press: SETUP until you see 

Press: SAT 7 ENTER you will see 

Press: MANUAL

Station 7 will begin watering and its flow will be displayed. The Master Valve and/or Pump may also be on depending on conditions as described in the previous example.

you will see 

The value on the left is the current flow and will update once every 10 seconds.

Station 7 will remain on and its flow will be monitored until you press MANUAL or QUIT.

When done monitoring,

Press: MANUAL you will see 

To begin watering again, press MANUAL for a second time.

Press: QUIT

The controller returns to the Automatic Mode.

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TROUBLESHOOTING

Symptom	Action
Display is blank	1.Ensure controller has power and all wires are properly connected. 2.Check secondary voltage of transformer for 24 VAC
No stations turn on automatically	1. Is the controller in Automatic Mode? If No - Press QUIT 2. Ensure the Rain Switch is in the "Auto Watering" position. 3. Does ✻ appear in left most position of display? Yes - Rain Sensor is enabled and is reading a wet condition (see SETUP) 4. Ensure that the Master Valve, Pump wiring and SETUP is correct (see page 9). 5. Activate Manual System Check (page 42) If station turns on, review programs: (page 39) • Water Days • Station Runtimes • Percentage Valid • Start Times
Display alternateswith FAULT…PRESS… REVIEW	A problem with either flow or station field wiring has occurred (see page 43).
A station remains on	Place Rain Switch in "No Watering" position. If station remains on then: • Check for dirt in valve's solenoid which will cause the solenoid to stick • Check for obstructions in valve, or torn diaphragm If station goes off then: • Check station's programmed watering time • Check program percentage
Flow reading "000 GPM" when water flowing	Check installation/connections Figure 6 on page 13.
Display never shows "XXX GPM" when water flowing	Flow not enabled. • Check Flow Sensor Setup on page 53

APPENDIX A

RAIN MASTER FLOW SENSOR PART NUMBERS

Use the following table to determine the part number for your pipe size.

Pipe Size (inches)	Rain Master Flow Sensor Part Number	Type
1.00	FS-B100	Cast Bronze
1.25	FS-B125	Cast Bronze
1.50	FS-150	PVC Schedule 80
2.00	FS-200	PVC Schedule 80
3.00	FS-300	PVC Schedule 80
4.00	FS-400	PVC Schedule 80

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RAIN MASTER LIMITED WARRANTY

Rain Master Irrigation Systems Inc. warrants to the first customer purchaser that this Rain Master brand product (the "product"), when shipped in its original container, will be free from defective workmanship, and materials and agrees that it will, at its option, either repair the defect or replace the defective product or part thereof at no charge to the purchaser for parts or labor for the time period set forth below.

This warrant does not apply to any appearance items of the product nor to any product the exterior of which has been damaged, or defaced, which has been subjected to misuse, abnormal service or handling, or which has been altered or modified in design or construction. (See additional exclusion below).

In order to enforce the rights under this limited warranty, the purchaser should ship or carry the product to a Rain Master authorized service depot, or send product prepaid to Rain Master at the address below (ensuring product is packaged correctly for shipment).

For nearest location, call Rain Master Service Center 1-805-527-4498.

This limited warrant described above is in addition to whatever implied warranties may be granted to purchasers by law.

(All implied warranties including the warranty of merchantability, and fit for use are limited to the period(s) from date of purchase set forth below).

Neither the sales personnel of the seller nor any other person is authorized to make any warranties other than those described above, or to extend the duration of any warranties beyond the time period described herein.

The warranties described above shall be the sole and exclusive warranties granted by Rain Master Irrigation Systems Inc. and shall be the sole and exclusive remedy available to the purchaser. Correction of defects, in the manner and period of time described herein, shall constitute complete fulfillment of all liabilities and responsibilities of Rain Master to the purchaser with respect to the product, and shall constitute full satisfaction of all claims, whether based on contract, negligence, strict liability or otherwise.

In no event shall Rain Master be liable or in any way responsible, for any damages or defects in the product which were caused by repairs or attempted repairs performed by anyone other than a Rain Master service dealer or center. Nor shall Rain Master be liable or in any way responsible for an incidental or consequential economic or property damage. Some states do not allow the exclusion of incidental or consequential damages, so the above exclusion may not apply to you.

This limited warranty does not apply to improper installation or grounding, acts of God, such as lightning and/or power surges, floods, earthquakes, hurricane, tornados, vandalism etc.

SENTAR II carries a 5 year limited warrant from date of purchase

All other Rain Master brand products carry a 2 year limited warranty unless otherwise specified.

SERVICE

Should it be necessary to require servicing of your controller, contact your local Rain Master distributor or contact Rain Master at 1-805-527-4498 for a listing of distributors in your area.
When sending a controller or a component of the controller back to be serviced, ensure it is properly protected with a soft packaging material, and that the box will withstand normal shipping abuses. Enclose a complete description of the type of problem that is occurring, and be sure to put your name, address and phone number where you can be reached.

WARNING: This equipment has been tested and found to comply with the limits for Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and , if not installed and used in accordance with the instructions manual, may cause interference to radio communications. Operation of this equipment in a residential area is likely to cause interference in which case the user will be required to correct the interference at his own expense.

The user is cautioned that changes and modifications made to the equipment without approval of the manufacturer could void the user's authority to operate this equipment

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