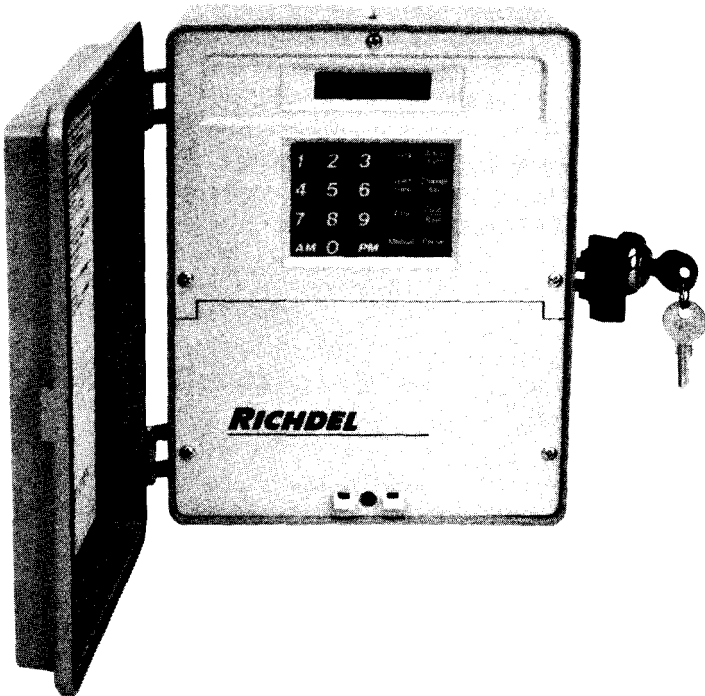


# ***RICHDEL***

TURF IRRIGATION PRODUCTS

## **600PR SERIES ELECTRONIC IRRIGATION CONTROLLER**



**INSTALLATION AND OPERATING GUIDE  
FOR ALL 604,606,608,612 MODELS**

## FEATURES

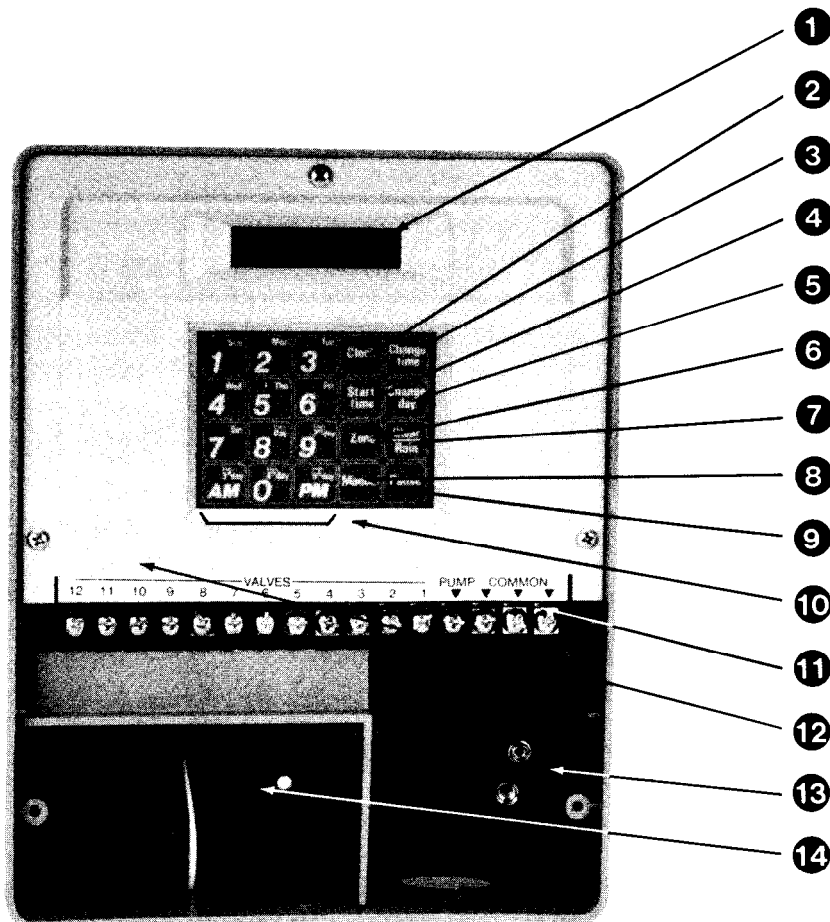
- \* **ZONE CONTROL:** Turns sprinkler valves on and off automatically in sequence, or individually.
- \* **MULTIPLE PROGRAMMING:** Allows you to water each of the watering zones on a separate schedule. Use any combination of weekdays or day intervals.
- \* **SELF-PROMPTING DISPLAY:** Makes it easy to set and review watering schedules – guides you every step of the way.
- \* **MULTIPLE START TIMES:** Let you water up to four times per day - ideal for new lawns.
- \* **EXTENDED WATERING PERIODS:** Allow you to water up to 13 hours a day per zone – ideal for drip irrigation.
- \* **PAUSE:** Makes it easy to interrupt watering cycles for yard activities.
- \* **MANUAL OPERATING MODE:** Lets you water manually when an automatic watering cycle is not in progress.
- \* **ELECTRONIC CIRCUIT BREAKER:** Prevents controller shutdown in case of short circuit in a valve; diagnostic feature displays malfunctioning valve number for easy repair.
- \* **PUMP START:** Automatically turns water pump or master valve on and off. (Requires a pump start relay, Model 435).

TO USE YOUR NEW CONTROLLER MOST EFFECTIVELY, PLEASE READ THIS MANUAL CAREFULLY BEFORE USE AND REFER TO THE MANUAL IF ANY DIFFICULTIES ARISE.

NOTE: For areas which are vulnerable to lightning strikes, or transient electrical surges caused by unstable power supply, consult your local supplier or contractor for additional protection devices which may be required. (SA120 for 60HZ or SA250 for 50HZ).

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- 1** **CONTROLLER DISPLAY**  
Shows time of day, day of week, zone being watered, watering run time. Also indicates programming errors and short circuits.
- 2** **CLOCK KEY**  
Allows you to set the time of day.
- 3** **CHANGE TIME KEY**  
Allows **you** to change all times, including clock, start times, and run times for each zone.
- 4** **START TIME KEY**  
Lets you set up to four watering times per day.
- 5** **CHANGE DAY KEY**  
Lets you change all the days on the clock and for each zone.
- 6** **ZONE KEY**  
Calls up the different zones on display to allow for programming and reviewing schedules.
- 7** **CLEAR/RAIN KEY**  
Terminates automatic watering in progress or allows you to prevent automatic watering from starting.
- 8** **MANUAL KEY**  
Waters all zones or a selected zone manually.
- 9** **PAUSE KEY**  
Temporarily interrupts a watering cycle in progress.
- 10** **DAY/NUMBER KEYS**  
Allow you to set watering days, clock, watering run times.
- 11** **TERMINAL SCREWS**  
Connect common wire, valve wires, and pump relay to the controller.
- 12** **INTERNAL TRANSFORMER**  
Enables controller to connect to a 120 volt source. (250 volt source on 50HZ units).
- 13** **BATTERY CONNECTOR**  
Connects to a 9 volt battery for emergency program back-up.
- 14** **WIRING CAVITY**  
120 volt connection. (250 volts on 50HZ units).

## INSTALLING YOUR NEW CONTROLLER

Install your new controller by following these six steps:

### STEP 1: SELECT THE LOCATION

- A. Select a protected location near a conventional 120 volt source.  
CAUTION: The controller should not be placed where it is exposed to a temperature exceeding 55° Centigrade (130° Fahrenheit), on a circuit controlled by a switch, or on the same circuit as a high power user; (refrigerator, air conditioner, etc.). Malfunctions may result.

### STEP 2: MOUNT THE CONTROLLER

- A. Mount the hanger kit (2 hangers and 2 screws) to the top/back of the controller.  
B. Remove the screws from the lower panel. Pull it out and then down to remove.  
C. Mount the controller on a wall or other solid area to approximate eye level using the mounting hangers. To secure the controller, use the screw hole located at the center bottom of the wiring cavity.

### STEP 3: WIRE THE VALVES

- A. Use water tight connectors at all valve connections.  
IMPORTANT: The power transformer is protected by an electronic circuit breaker. Do not connect a combination of valves requiring an inrush current of more than 1 AMP at 24 VAC. (Two valves maximum).

### STEP 4: CONNECT THE VALVE WIRES TO THE CONTROLLER

- A. Bring the valve wires up through the 1 1/4" conduit hole on the bottom of the controller.  
B. Connect the wire from valve number 1 to terminal screw on the controller marked "1", valve number 2 to terminal marked "2", and so forth.  
C. Connect the common wire to any of the three terminals marked "COMMON".  
D. If using a water pump or master valve, refer to page 11 for instructions and diagrams.  
E. Do not use wire larger than 14GA U.F. when connecting to the terminal strip.

### STEP 5: CONNECT THE TRANSFORMER

- A. Run the 120VAC power wires into the wiring cavity using the 7/8" conduit hole in the bottom of the controller. Connect the white wire as the common, the black wire as the power wire, and the green wire as the earth ground with standard wire nuts.

### STEP 6: CONNECT THE BATTERY

- Battery will keep program in memory during temporary power failures.
- A. Connect a 9 volt alkaline battery (not supplied) to the battery connector in the wiring compartment of the controller.  
B. Place the battery in the wiring compartment.  
C. Reinstall the cover panel and replace the screws.  
D. Replace battery at least once a year. More often if frequent power failures occur.

CAUTION: DO NOT ALLOW THE BATTERY CONNECTOR TO TOUCH THE CONTROLLER'S TERMINAL STRIP (DIRECTLY ABOVE THE WIRING COMPARTMENT). ALSO, DO NOT CONNECT OR DISCONNECT VALVE WIRES WHILE ANY ZONES ARE IN OPERATION.

NOTE: Check local codes to be sure wiring and installation will meet all requirements.

## 250 VOLT INSTALLATIONS FOR 50HZ INTERNATIONAL UNITS ONLY

### STEP 1: SELECT THE LOCATION

- A. Select a protected location near a conventional 250 volt source.

### STEP 5: CONNECT THE TRANSFORMER

- A. Run the 250VAC power wires into the wiring cavity using the 7/8" conduit hole in the bottom of the controller. Connect the white wire as the common, the black wire as the power wire, and the green wire as the earth ground with standard wire nuts.

FOLLOW ALL OTHER INSTRUCTIONS AS DIRECTED.

# PROGRAMMING YOUR NEW CONTROLLER

**Before programming, read all instructions thoroughly.**

## STEP 1: SET THE CLOCK TO THE CURRENT TIME AND DAY

The controller's clock features a 12-hour format – 12 PM represents noon; 12 AM represents midnight. The AM or PM setting changes at 12:00 so that 1159 AM progresses to 12:00 PM.



When the power is first turned on, the controller automatically displays "SUN" and a time of "4:00 PM". To change the time and day, follow these steps:

### A. To set the correct time:

Press **CHG TIME**. The display's clock digits will flash.

Press the appropriate numbered keys and then **AM EVERY 3RD DAY** or **PM EVERY 3RD DAY**. Be sure to set both hours and minutes. For example 4 o'clock must be entered as 4:00.

### B. To set the correct day of the week:

Press **CHG DAY**. Days of the week will appear on the display with "SUN" flashing.

Press the appropriate day key for today. The new day will then begin flashing.

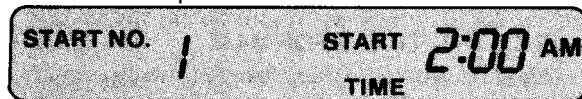
Press **CLOCK**. The correct time and day are now set, and the clock will begin running again.



Once you have pressed a function key (**CLOCK**, **CHG TIME**, **CHG DAY**), you have 30 seconds to make a controller entry or the display will automatically return to the original setting.

## STEP 2: SET THE TIMES OF DAY YOU WANT TO WATER

You can set your controller to water up to four times per day. To set your start times, follow these steps.



### A. To set your first start time of the day:

Press **START TIME**. The display will show "START NO. 1" with a time of "2:00 AM".

Press **CHG TIME**. The display's time digits will flash.

Press the appropriate numbered keys to set hours and minutes, then AM or PM.

Press **START TIME** again. The first start time is now entered and the second start time will be indicated with "OFF" displayed.

### B. To set the remaining start times:

Press **START TIME** again and repeat the procedure for each start time.

### C. If you don't want to use all four start times:

Set the extra start times to "OFF" by pressing the **START TIME** key, the **CHG TIME** key, the **CLEAR RAIN** key, then the **CLOCK** key.

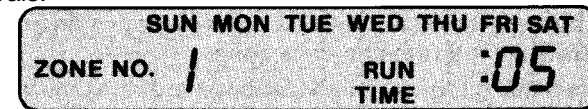


Leave enough time between start times to allow all zones to be watered. If a start time produces a watering cycle that runs into the next start time, the controller will automatically move the next start time ahead to allow completion of the current watering cycle. If a start time produces a watering cycle that runs past midnight, any other start times programmed to start before midnight will be cancelled. Start times can be entered in any order. Watering cycles progress by the time of day, not by start numbers. For example, START NO. 1 may actually be the last watering time of the day.

The start times are designed to start the controller the same time each day. No matter what series of zones are scheduled to water that day, the controller will always start at the same times. (Example: 2 start times are programmed to start at 4:00 AM and 3:00 PM. If zone one is scheduled to water on Monday, Wednesday and Friday it will start at 4 AM and 3 PM. If zone 2 is scheduled to water only on Saturday, it will water at 4 AM and 3 PM. If zone 3 is scheduled to water every other day, it will water at 4 AM and 3 PM, and so on).

## STEP 3: SET THE WATERING SCHEDULE FOR EACH ZONE

Each zone can be set with a run time ranging from off to 12 hours, 59 minutes. Zones can also be set to water on specific days of the week or day intervals.



### A. To program the watering schedule by the day of the week, follow these steps:

Press **ZONE** and "ZONE 1" is shown on display with a run time of ":05".

Press **CHG TIME** and the run time will flash.

Press the appropriate numbered keys to set the desired length of watering time, up to the maximum of 12 hours, 59 minutes.

Press **CHG DAY**. All of the zone's day options will appear across the top of the display, with "SUN" thru "SAT" flashing.

Enter the desired watering day by pressing one or more of the days of the week.

Press **ZONE**. The schedule for zone 1 is now entered into the controller's memory, and "ZONE 2" is displayed.

Repeat the procedure for each zone.

## CONNECT PUMP START RELAY OR MASTER VALVE



### B. To program the watering schedule by day intervals:

Press **ZONE** and "ZONE 1" is shown on display with a run time of ":05".  
 Press **CHG TIME** and the run time will flash.  
 Press the appropriate numbered keys to set the desired length of watering time, up to the maximum of 12 hours, 59 minutes.  
 Press **CHG DAY**. All of the zone's day options will appear across the top of the display, with "SUN" thru "SAT" flashing.  
 Enter the desired watering days by pressing **0 EVERY DAY**, or any combination **0 AM EVERY 2nd DAY**, **0 AM EVERY 3rd DAY**, **0 PM EVERY 4th DAY**, **0 PM EVERY 5th DAY**.  
 Press **ZONE**. The schedule for Zone 1 is now entered into the controller's memory and "Zone 2" is displayed.  
 Repeat the procedure for each zone.

### C. If you don't want to water a particular zone:

You must set it to "OFF" by pressing the **ZONE** key repeatedly until the zone to be set appears, then press the **CHG TIME** key, the **CLEAR RAIN** key, then press the **ZONE** key again.

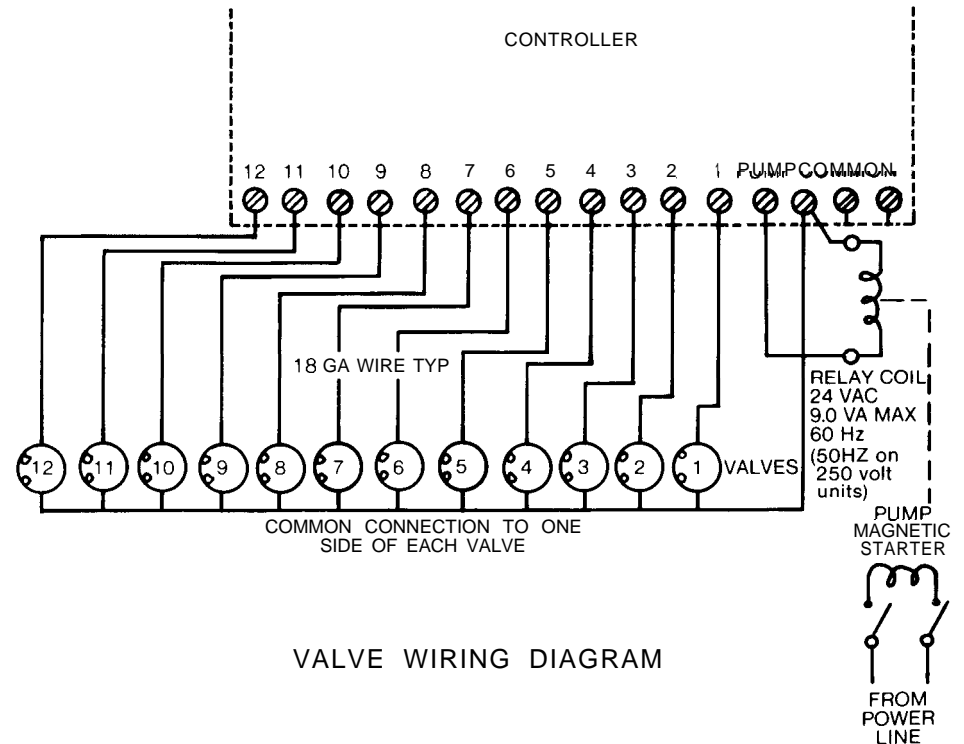


As each zone is watered, a "RUN TIME" message will flash and the watering run time will count down minute-by-minute until it reaches zero. At this point the display will switch to the next zone to be watered. This provides an easy way to find out how much watering time remains for a zone.

When using the day interval schedule, at the time you program in the day number, today becomes number 1. Example: If you select a watering cycle of once every 3 days, today will be day number 1 and will flash. Tomorrow will be day number 2, and the next day will be day number 3 - the day that zone will be watered.

- Bring two wires up through the same hole used for the valve wiring.
- Connect one wire to the terminal marked "PUMP".
- Connect the second wire to the terminal marked "COMMON".
- If a master valve is required, the two wires should then be connected to a master valve, rated at 24VAC and a current no greater than 9 VA.
- If a pump start relay is required, connect the two wires to an auxiliary relay with a coil rated at 24VAC and a current no greater than 9 VA. The relay's contact would then be wired so it would supply voltage to the pump's contactor. A qualified electrician can make these connections for you. A Richdel 435 Pump Relay can be connected to the two wires and will directly control a pump up to 2 HP at 240 volts.

NOTE: The controller's pump output will be turned on whenever a zone is watering, manually, automatically, etc.



VALVE WIRING DIAGRAM

## SPECIAL FUNCTIONS

### CLEARING ERRORS

If you make a mistake while setting hours, minutes, or watering days, simply press the **CLEAR RAIN** key to return to the original setting and then re-enter the correct information.

If you enter a watering run time greater than 12 hours, 59 minutes, the display will flash "ERROR" for 30 seconds. Press the **CLEAR RAIN** key and then re-enter the correct information. If you do not press the **CLEAR RAIN** key within the 30 seconds, the controller will revert to the previous run time settings.

### REVIEWING YOUR PROGRAMMED SCHEDULE

To review any start time or zone date – even while watering – repeatedly press the **START TIME** key or the **ZONE** key (depending upon which function you wish to review). The display will then cycle through the function. If no key is pressed for 30 seconds, the display will return to the controller's current operating mode.

### MANUAL WATERING

You can manually water all zones or a selected zone – except when an automatic watering cycle is in progress.

To **water all zones** (excluding zones set to "OFF"), simply press the **MAN** key twice. This will water each zone, in sequence, according to its programmed run time.

To **water a selected zone**, press the **MAN** key once. Then press the **ZONE** key repeatedly until the desired zone is displayed. Press the **MAN** key again to start watering that zone.

To **water a selected zone for a specific amount of time**, press the **MAN** key once. Then press the **ZONE** key repeatedly until the desired zone is displayed. Next, press the **CHG TIME** key and then the numbered keys to enter the new time. Then press the **MAN** key once more to start the zone watering. Changing the run time in the manual mode will not disturb your original program settings.

### INTERRUPTING THE WATERING CYCLE

Press **PAUSE** once to stop watering ("PAUSE" and "RUN TIME" messages flash); press **PAUSE** again to resume the watering cycle. If the controller is left in the "PAUSE" mode, the pause will remain in effect until midnight. The controller will then automatically begin with the first start time for the new day.

### TURNING OFF THE SYSTEM

When watering is not in progress, you can prevent automatic watering from starting by pressing the **CLEAR RAIN** key. A flashing "RAIN" message will appear on the display. To resume automatic watering, press the **CLEAR RAIN** key again.

The **CLEAR RAIN** key will also terminate any automatic watering currently in progress, but then resume automatic watering with the next start time. Manual watering is still possible when the controller is in the "RAIN" mode.

### CHANGING YOUR PROGRAMMED SETTINGS

You can make changes in the program settings for time and day, start times, and zones at any time – even while a watering cycle is in progress.

However, if you make a run time or day change on a zone currently watering, the change will not take effect until the next watering cycle. In other words, you cannot immediately **change** the program of a zone that is currently being watered. Likewise, changing a start time, clock time or clock day, will not affect watering already in progress.

### ELECTRONIC CIRCUIT BREAKER

If the controller detects a short circuit, the shorted valve/zone will automatically be turned off. The display will then show the shorted zone number while alternately flashing "FUS" (fuse) and "ERROR". The controller will continue to automatically water the other zones and the following watering cycles, with the **display** continuing to flash on the zone number with the short circuit.

After repairing the short, press **CLEAR RAIN** to return the controller and display back to its current operating mode.

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## VOLTAGE SPECIFICATIONS

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### DOMESTIC

Input	output
120 Volts AC	24 Volts AC
60 Hertz	1 AMP
18 Watts	

### INTERNATIONAL

Input	output
250 Volts AC	24 Volts AC
50 Hertz	1 AMP
18 Watts	

## TROUBLE-SHOOTING GUIDE

PROBLEM	POSSIBLE CAUSE
One or more valves do not water.	<ol style="list-style-type: none"> <li>1. Faulty solenoid.</li> <li>2. Poor wire connection.</li> <li>3. Possible break in wire.</li> <li>4. Valve flow stem is screwed down too far.</li> </ol>
Display is stuck on a zone and "FUS" is flashing in the display.	<ol style="list-style-type: none"> <li>1. Faulty solenoid.</li> <li>2. Poor or shorted wire connection.</li> </ol>
Continuous loss of program	<ol style="list-style-type: none"> <li>1. No battery.</li> <li>2. Weak or bad battery.</li> <li>3. Controller on a circuit controlled by a switch.</li> <li>4. Controller is on the same circuit as a high power user, (refrigerator, air conditioner, etc.).</li> </ol>
Zones turn on when they are NOT programmed to start.	<ol style="list-style-type: none"> <li>1. Start times and the total combined zone run times have overlapped.</li> </ol>
The clock has the correct time and the zones appear to be functioning properly, but none of the valves are on.	<ol style="list-style-type: none"> <li>1. The controller is in "RAIN" mode.</li> <li>2. The common wire is not hooked up.</li> <li>3. Valve flow stem is screwed down too far.</li> </ol>

**WARNING:** DO NOT LINK TWO OR MORE CONTROLLERS VIA A COMMON TRANSFORMER OR COMMON WIRE.

## ZONE LEGEND

ZONE	TIME	LOCATION
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		

**NOTES:**