Model 510.xxxP Battery Operated Propagation and Irrigation Controller

Installation, Programming and Operating Instructions

Features

- Weekly or cyclical program
- Four start times per day in weekly mode and up to every 1 minute in cyclical mode
- Irrigation duration – from 1 second to 12 hours in 1 second increments
- Water budget from -95% to +95% in 5% increments
- Semi-automatic or manual operation
- Rain delay up to 30 days
- Simple, four button rubber keypad programming
- Withstands harsh climatic conditions
  ◦ Completely waterproof
- Can be mounted on a valve or on valve box wall
- Available with 3/4"-20 threaded solenoid, 3/4" and 1" valves
- Available with rain sensor connection
- Operates using 2, 9-volt alkaline batteries
- 2 year maximum battery life

IRRIGATION PRODUCTS

TABLE OF CONTENTS

INTRODUCTION

Thank you for purchasing the 510.xxxP battery operated propagation irrigation controller.

Please take the time to read through the enclosed instructions and follow them step by step. If you have any questions, please call our Technical Service Line: 1-800-322-9146.

## 1. SPECIFICATIONS

OPERATING SPECIFICATIONS

- 7-day calendar
  - ∘∘ Station run time: In 1-second increments and up to 24 hours
- Start time in Cyclical Mode: one start time every minute
  - ∘ In 1-minute increments up to 5 minutes
  - ∘ In 5-minute increments up to 15 minutes
  - ∘ In 15-minute increments up to 45 minutes
  - ∘ In 1-hour increments up to 23 hours
  - ∘ In 1-day increments up to 30 days
- Sensor: on/off
- Irrigation window allows for propagation at a defined part of the day

Open window:	AM or PM
Close window:	AM or PM

DIMENSIONS

- Height: 6" (15 cm)
- Width: 4" (10 cm)
- Depth: 2" (5 cm)

2. CONTROLLER PARTS IDENTIFICATION

1. Top Cover
2. Controller Display
3. Bottom Cover
4. Battery Compartment Cover
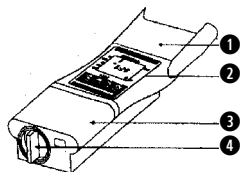
3. BATTERY INSTALLATION

Rotate the battery compartment cover handle counter clockwise to the "11 o'clock" position to remove the cover (see drawing). Install two 9-volt alkaline batteries onto the terminal clip. Insert into battery compartment and reinstall the cover. The controller display appears briefly followed by a water droplet on the lower left side of the display. The droplet will flash momentarily and shut off. When the display flashes "12:00", the controller is ready to be programmed.
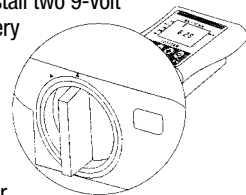

IMPORTANT: To replace the battery compartment cover, insert with the handle in the "11 o'clock" position and then rotate the cover 1/4" clockwise to avoid possible cover guide pin breakage.

4. VALVES OR WALL MOUNTING

4.1. VALVE MOUNTING

If the mounting plate [2] is attached to the controller, remove it.

1. Insert the mounting coupling [1] into the mounting plate, aligning the words "top", which are stamped on both the coupling, and the plate.

2. Press the mounting plate, with the mounting coupling inserted, against the back of the irrigation controller.
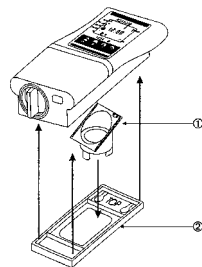
4.2. WALL MOUNTING

The controller mounting plate [2] can be mounted on a wall using two screws (not included), in that case the mounting coupling [1] is not used. Please be aware that the length of the controller connecting cable limits the distance between the controller and the solenoid.

5. INSTALLATION OF MODEL 510.000P

510.000P controller converts most two-way AC solenoid valves with 3/4"-20 thread. Use adapter model POO-997 to adapt into RAIN BIRD valve series GB, EF, DV, PE, PGA and EFB.

1. Shut off the mainline to the valve.

2. Remove the AC solenoid and plunger from the valve.

3. Remove the "O" rings from the valve solenoid thread (if used).

   3.1 **WEATHERMATIC valves:** remove "O" ring (part #14) from the solenoid cavity and place around the male thread of the DIG DC solenoid.

   3.2 **RAIN BIRD valves:** remove the solenoid and use the adapter model P00-997 to convert RAIN BIRD solenoid thread to 3/4"-20.

   3.3 **IRRITROL valves:** lift and remove the manual bleed handle and "O" ring (if present). For 3/4" and 1" models with flow-control, use extension model P00-999.

   3.4 **SUPERIOR valves:** remove the SUPERIOR solenoid and "O" ring. Place one 1/2" ID x 11/16 OD "O" ring inside the solenoid cavity (not included).

   3.5 **BUCKNER valves:** remove the solenoid and "O" ring. Place the BUCKNER "O" ring around the bayonet thread. Make sure that the manual bleed lever on the valve (if available) is closed. Do not move the manual bleed lever after installing the DIG solenoid assembly, it can damage the bayonet and the valve will stay open.

4. Place "O" ring #2 in the center of the threaded bayonet adapter (see Figure 1).

5. Thread the DIG bayonet assembly and hand tighten into the valve solenoid port.

6. After installing the bayonet assembly into the valve, remove the solenoid from the bayonet adapter and make sure that "O" ring #1 is properly in place, then reattach the solenoid with a 90° clockwise turn.

7. Turn the water supply on and pressurize the system. Make sure that the valve is operating correctly (the valve will open momentarily and shut off)

8. Use the manual lever on the solenoid to test the valve by turning it to the left to open and to the right to close (see Figure 3). If the valve opens and closes, turn the lever to the automatic position (center).
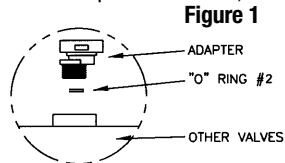
9. Program the controller (see #10 Programming).

Figure 1

ADAPTER
"O" RING #2
OTHER VALVES

6. INSTALLATION OF MODEL 510.075P, AND 510.100P

The 510.xxxP controller can be installed in-line and below grade (see Figure 2).

NOTE : Make sure the flow direction arrow is pointed away from the water source. Never use the controller unit as a handle for tightening the valve to the pipe.

1. Shut off the mainline to the valve.

2. Before installing the controller to the irrigation system, flush the mainline. Then remove the solenoid (see Figure 4) from the valve with a 90° counter-clockwise turn. Be careful not to lose the seal (O-Ring #1).

3. Install the valve paying attention to the correct water flow direction as indicated by the arrow on the valve.

4. After installing the valve, reattach the solenoid with a 90° clockwise turn. Be sure to place the seal (O-Ring #1) in its proper location.

5. Turn the water supply on and pressurize the system, making sure that the valve is operating correctly (the valve will open momentarily then shut off).

6. Use the manual lever on the solenoid to test the valve by turning it to the left to open and to the right to close. If the valve opens and closes, return the lever to the automatic position (center).

7. Program the controller (see programming #10).

NOTE : If controller installation is used with swivel manifold fittings make sure to hand tighten the swivel cap to the PVC male adapter. If using PVC fittings wrap all fittings with teflon tape. **Do not use thread paste on the valve as this will cause damage and void the warranty.**
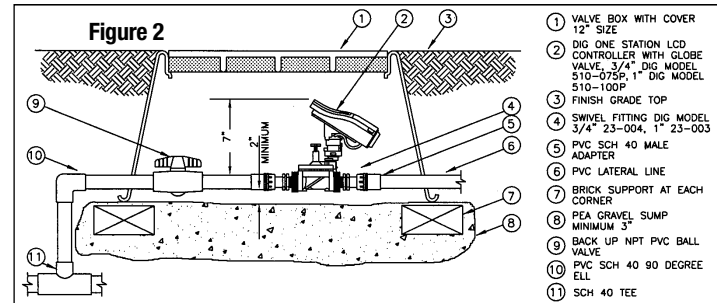

Figure 2

① VALVE BOX WITH COVER 12" SIZE
② DIG ONE STATION LCD CONTROLLER WITH GLOBE VALVE, 3/4" DIG MODEL 510-075P, 1" DIG MODEL 510-100P
③ FINISH GRADE TOP
④ SWIVEL FITTING DIG MODEL 3/4" 23-004, 1" 23-003
⑤ PVC SCH 40 MALE ADAPTER
⑥ PVC LATERAL LINE
⑦ BRICK SUPPORT AT EACH CORNER
⑧ PEA GRAVEL SUMP MINIMUM 3"
⑨ BACK UP NPT PVC BALL VALVE
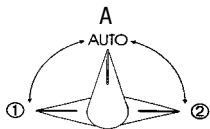⑩ PVC SCH 40 90 DEGREE ELL
⑪ SCH 40 TEE

7. MANUAL-MECHANICAL OPERATION

The valve can be manually opened and closed independent of the controller operation. Manual operation is useful when immediate irrigation is required, without the delay of controller programming.

The 3-position manual lever (see Figure 3) is located on the solenoid the manual lever, and functions as follows: Open [1], Automatic Operation [A], Closed [2].
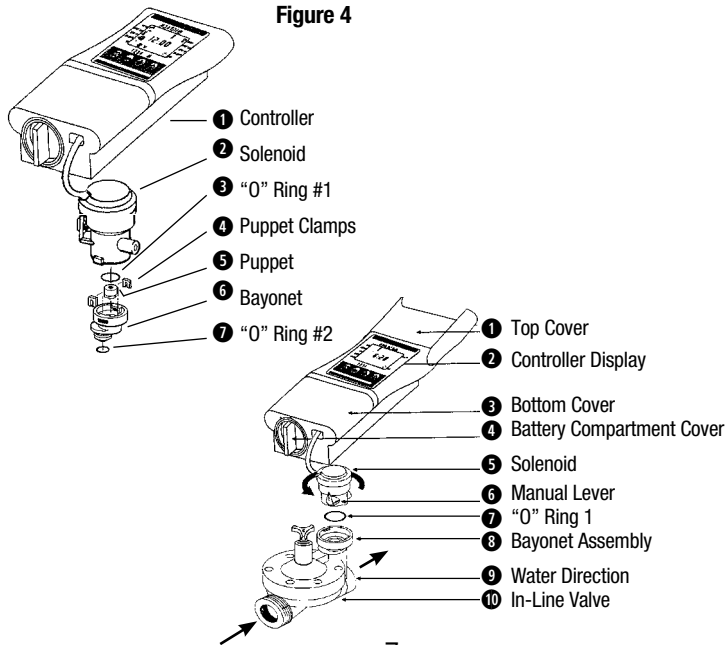
NOTE : For automatic operation, the valve handle must be in the middle [AUTO] position.

Figure 3

8. PARTS IDENTIFICATION

Figure 4

❶ Controller
❷ Solenoid
❸ "O" Ring #1
❹ Puppet Clamps
❺ Puppet
❻ Bayonet
❼ "O" Ring #2

❶ Top Cover
❷ Controller Display
❸ Bottom Cover
❹ Battery Compartment Cover
❺ Solenoid
❻ Manual Lever
❼ "O" Ring 1
❽ Bayonet Assembly
❾ Water Direction
❿ In-Line Valve

9. CONNECTING A RAIN SENSOR

1. Select a rain shut off device that is "normally open" or capable of being configured to be normally open. (i.e. HUNTER MINI CLIK N.O. and RAIN BIRD RSD BEx.)

2. Carefully strip the sensor lead back about six inches exposing the black and red wires inside, strip the tip of each wire back about 1/2".

3. Connect the controller's black sensor wire to the "N.O." (normally open) wire from the sensor.

4. Connect the controller's red sensor wire to the remaining wire from the sensor.

5. Do not strip or cut wire if a sensor is not used.

6. When sensor is active, ⌇ appears on the display.

7. Follow the sensor manufacturer's instructions for calibrating the sensor.

Figure 5

Red
Black
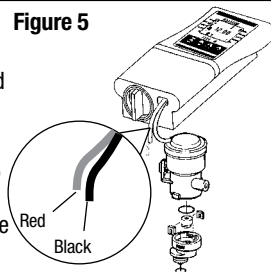
10. PROGRAMMING

This section explains the programming features, use of buttons and the steps necessary to assign irrigation schedules. To program the controller use the left button to select the desired programming mode, the right button to enter the mode and the plus minus buttons to change the value.

Note: Only a flashing character can be changed.

DIG controllers are programmed with the aid of four buttons:

Use to select the desired programming mode

Use to lower the value of the selected parameter (e.g. deducts an hour)

Use to raise the value of the selected parameter (e.g. adds an hour)

Use to select the parameter to be changed (hour, minute, etc.). To implement the changes, the selected parameter must be flashing.

If no changes are implemented, the controller will always revert to the main screen.

11. SETTING CURRENT TIME AND DAY OF THE WEEK

To enable the controller to operate properly, the current time and current day of the week must first be set. The steps below explain how to set the day and time.

Press ⟳ and the hour digit will flash. Use the ⊕ or ⊖ to set the current hour (note AM and PM designations). Press ⟳ and the minute digit flashes. Set the current minute using ⊕ or ⊖. Press ⟳ and a flashing arrow will appear under "M" for "Monday". Use the ⊕ or ⊖ to move the arrow to current day. Press ⟳ to proceed to the next step.

Note: If the last data entered stops flashing, press ⟳ again to resume programming.
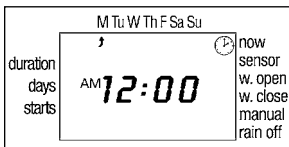
12. TIME FORMAT (SWITCHING BETWEEN AM/PM AND 24 HOUR)

The default time format is AM/PM. There is also a 24 hour time format option. It is a simple process to switch between the two formats.
Press ⟳ several times until ⏱ appears.
Press ⟳ and the hour digit will flash. Press the ⊕ and ⊖ simultaneously. The clock reading switches from AM /PM to a 24 hour time display or vice versa.

NOTE: The time display format can be switched at any step in the programming process.
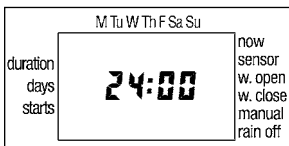
13. SETTING THE WATERING TIME (DURATION)

This setting determines the length of time that the valve will remain open.

Press ⟳ until ⧗ appears. Press ⟳ and the hour/minute digits flash. Set the desired number of hours by pressing ⊕ or ⊖. Press ⟳ again and the minute digits flash. Set the desired number of minutes by pressing ⊕ or ⊖. Repeat the same steps for seconds. Press ⟳ to proceed to the next step.
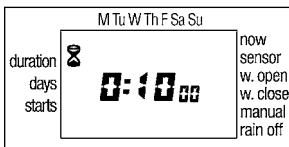
14. SELECTING WATERING FREQUENCY

This setting determines which days the controller will operate. Choose either "A) Watering According to the Days of the Week" or "B) One-time Irrigation" or "C) Cyclical Irrigation".

Press ⟳ until ⧖ appears. Press ⟳ and a flashing arrow appears at the top of the display, under Monday. At this stage set one of 3 options:
A) Watering according to the days of the week
B) One time only watering or cyclical watering
C) Cyclical irrigation

A) WATERING ACCORDING TO THE DAYS OF THE WEEK.

To select a watering according to the days of the week, move the flashing arrow to the desired day of the week by pressing ⟳. Press ⊕ and the arrow under the selected day stops flashing. In a few seconds the arrow moves one position to the right, and flashes under the next day of the week. You can select additional days of the week in the same manner. Press ⟳ to proceed to the next step.

To cancel a scheduled watering day press ⟳ and move the arrow under the selected day. Press ⊖ under the selected day, the arrow will disappear and the flashing arrow will move one position to the right, and appear at the next day of the week. Cancel additional scheduled irrigation days in the same manner.
Press ⟳ to proceed to the next step.
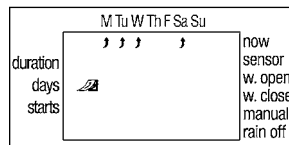
B) ONE-TIME IRRIGATION IN CYCLICAL MODE

This option is used to program the controller to operate the irrigation system one time only, for the irrigation period as set in watering time (durations).

Press ⟳ until ⧖ appears. Press ⟳ several times (for all the days of the week) until ⧂ appears, and **OnCE** flashes on the display.
NOTE: In cyclical mode only 1 start time per day is available.

C) CYCLICAL MODE TO WATER EVERY X DAYS

Press 🔄 until 🔋 appears. Press ⊙ several times (to advance all the days of the week) until 🔵 appears, and **OnCE** flashes on the display. With the display flashing, press ⊕ or ⊖ . The number of minutes, hours or days between watering appears on the display. For example if "every 15 minutes" is selected, the programmed watering duration will activate every 15 minutes during a 24-hour period (see #21 on page 15 for irrigation window with this program).

To change the number of minutes press ⊕ or ⊖. Press 🔄 to proceed to the next step.
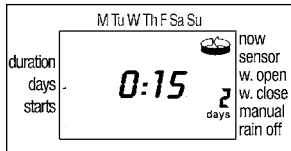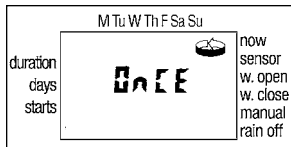
15. SETTING A START TIME – WATERING ACCORDING TO DAYS OF WEEK

In this step, up to 4 separate irrigation start times can be programmed in the weekly mode (watering according to the days of the week).

Press 🔄 until START I appears. The word OFF (or the last start time entered) appears. Press ⊙ the word OFF flashes. Press ⊕ or ⊖ to set the desired start time hour (note AM and PM). Press ⊙ the minute will flash. Press ⊕ or ⊖ to set the desired start time minute.
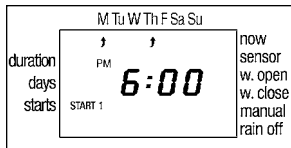
Press 🔄 to set START II and repeat the same steps for start times number 2, 3 and 4 as needed.

To cancel one of the start times select it by pressing 🔄. Then press ⊙ and the hour digit flashes. Press the ⊕ or ⊖ until the word OFF appears.

## 16. SETTING A START TIME – CYCLICAL OR ONE-TIME WATERING (WITH OPTION TO DELAY VALVE START TIME)

This program is used to pre-set the valve start time (only one start time available) and the number of days to delay the valve start time. The number of day(s) to delay option will appear on the display to the right of the irrigation start time above the word "days".

In this feature 0 days = program starts today; where 1 = program starts tomorrow, etc. (start can be delayed for up to 30 days delay).

Press 🔄 until START I appears or the last opening time entered appears on the display.

Press ⊙ and the hours and the AM/PM digits flash. Set the desired opening hour by pressing the ⊕ or ⊖ (note: AM and PM designations appear to the left of the hour digits). Press ⊙ and the minute digits flash. Repeat the same steps for setting the minutes. To delay watering press ⊙ again. The number above "days" flashes. Press ⊕ or ⊖ to change the number of days to delay the start time from today.

NOTE: Start time must be later than the current time for the valve to open today (and delay set to 0 days).
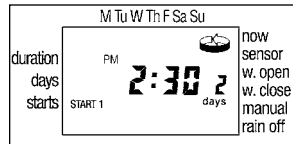
17. MANUAL OPERATION VIA THE CONTROLLER (SEMI-AUTOMATIC)

This option turns on the valve at any time and operates the system for the defined irrigation period. The valve will automatically close at the end of the irrigation period. The originally programmed irrigation schedule continues to function at the times set.

NOTE: In order to use semi-auto feature the controller must be programmed with the current day & time, duration, watering day & start time.

There are 2 ways to use the "semi-auto" feature.
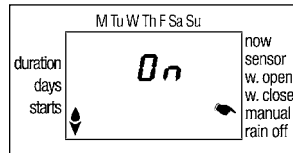
Method 1: From the now screen (🕐) press and hold down the ⊕ button for a few seconds. A water droplet icon and a 🌢 appears in the display with the countdown of the remaining irrigation duration appearing a few seconds later. The valve will open and continue to water

for the pre-programmed duration. If watering needs to be stopped before the full duration; simply press the ⊕ button again.
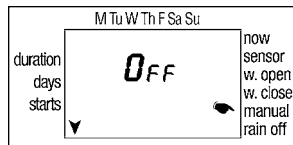
Method 2: Press 🕒 until 🌢 appears. Press ⊕ to open the valve. The word ON is displayed and a water droplet appears on the lower left side of the display. After 5 seconds, a count down of the remaining irrigation duration appears.

To close the valve manually before the end of the manual cycle press 🕒 until ON appears again. Press ⊖ to close the valve.

18. "RAIN OFF" (SHUTDOWN)

This option is used to temporarily suspend the controller operation. The irrigation schedule remains stored in the controller memory, but is not implemented until the suspension is canceled. The suspension option disables the valve.

Press 🕒 until 🕐 appears. Press and hold down ⊖ for 5 seconds when 🌂 appears flashing. The controller is now suspended. To restore control to the controller, press 🕒 until 🕐 appears, and then press and hold down the ⊖ until the 🌂 disappears.
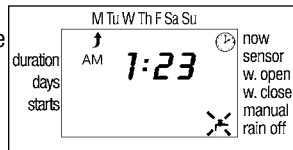
RAIN OFF can be used while a valve has been activated.

If an attempt is made to operate the valve manually while the controller has been suspended, or if the valve is programmed to open, the word "rain" appears, and the valve will not open.

19. BUDGET

Watering durations may need to be increased in hot weather and decreased in cool or wet weather. This can be done without affecting programmed schedules by specifying a percentage increase or decrease.
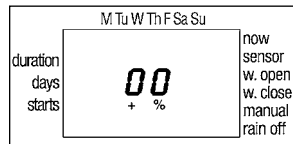
Press 🕒 until 🕐 appears, wait until no digit is flashing. Press ⊕⊖ simultaneously until 00+% is displayed. Press ⬙ and the 00 flashes. Press ⊕ or ⊖ to increase or decrease the percentage as necessary (in 5% increments from -95% to +95%). Displayed on the now (🕐) screen is **+%** or **–%** when a budget choice is entered.

20. SENSOR OPERATION

1. Press 🕒 until *OFF* and 🔔 appears next to the word SENSOR.

2. Press ⊕ to activate the sensor, *OFF* will change to *ON*.

* With the sensor circuit closed (i.e., the sensor detects the existence of a defined program lockout condition) the 🔔 symbol flashes on the display. In this situation, irrigation will not take place through the valve.

3. Press ⊖ to disable the sensor. The word *ON* changes and *OFF* appears on the display.
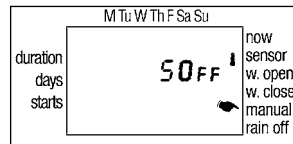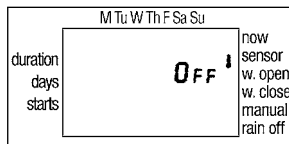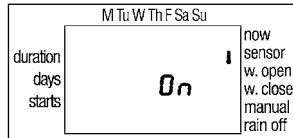
21. IRRIGATION WINDOW IN THE CYCLICAL PROGRAM MODE

The irrigation window is an advanced feature which enables cyclical irrigation program operations (see #15-C) to take place only during a defined part of the day (window). The irrigation window is defined as a part of a day (up to 23 hours), in the cyclical irrigation mode only.

This function is useful when propagation or cooling is required during the hot hours of the day. For example, open window 9 am, closed window 4 pm.

Make sure that 🥏 appears on the display.

1. Press 🔁 until ⚒️ appears on the display next to W.OPEN, with the word OFF or last OPEN WINDOW time setting displayed.
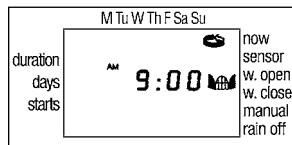
2. Press ↻ and the word OFF flashes on the display.

3. Press ⊕ and ⊖ to set the desired OPEN WINDOW time (pay attention to the AM/PM designation).

4. Press 🔁 until 🔔 appears on the display next to W.CLOSE, with the 12 am or the last close window time setting displayed.

5. Press ↻ and the 12 am flashes on the display.
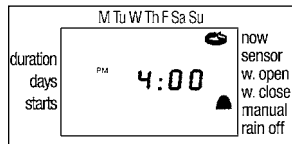
6. Press ⊕ and ⊖ to set the desired CLOSE WINDOW time (pay attention to the AM/PM designation).

7. Irrigation will not occur until the next window opens.

To disable the irrigation window function

1. Press ↻ until ⚒️ appears next to OPEN WINDOW, with the last OPEN WINDOW time setting displayed.

2. Press ↻ and the irrigation window open time flashes on the display.

3. Press ⊖ until OFF appears next to ⚒️.
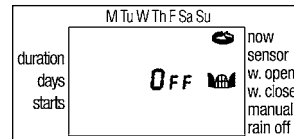
VALVE IN OPERATION

A 🔧 icon will appear. If the 🔧 flashes, the valve has not opened, the possibilities are:

• Valve is in "short mode". The 🔧 icon will flash once every 1/2 second (120 times every minute).
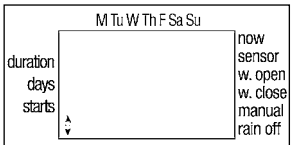
During "manual" operation via the irrigation controller "no Prog" appears on the display (under manual operation) indicating that no time duration has been set for the valve. In this case, automatic opening of the valve is disabled.
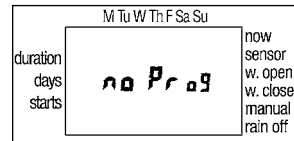
23. FLASHING LOW BATTERY WARNING

When the batteries are low, a flashing battery icon appears. In this state, the batteries still enable valve operation, but must be promptly replaced.

After replacing the batteries, press any button to resume controller operation.

Programmed data is retained if batteries are replaced within a 30 second time period

HINT: Simply replace one battery at a time.

24. CONSTANT LOW BATTERY WARNING

When the batteries are low and not replaced in a timely manner, the battery icon is displayed. All other display elements disappear and all valves are closed. Replace batteries promptly, and press any button to resume controller operation. Programmed data is retained if batteries are replaced within a 30 second time period.

M Tu W Th F Sa Su

duration
days
starts

now
sensor
w. open
w. close
manual
rain off

25. MAINTENANCE AND TROUBLESHOOTING AND REPAIRS

• Batteries should be removed if the irrigation controller will not be operated for a prolonged period.
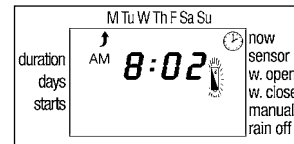• Under normal usage, batteries (alkaline) will last for a minimum of 1 year, maximum of 2 years.
• It is good operating practice to replace old batteries with new ones at the start of the irrigation season.
• Recommended operating water pressure range: 7-80 PSI.
  Operating pressure range 7-150 PSI.

PROBLEM
Valve does not open during automatic operation or during "manual" operation via irrigation controller
  CAUSE: Manual Lever not in AUTO position
    SOLUTION: Place Manual Lever in AUTO position
  CAUSE: Weak batteries
    SOLUTION: Replace batteries
PROBLEM
No display
  CAUSE: Weak batteries
    SOLUTION: Replace batteries
PROBLEM
Valve does not close despite clicks heard during activation
  CAUSE:Manual Lever not in AUTO position
    SOLUTION: Place Manual Lever in AUTO position
  CAUSE: "O" Ring #2 is missing between the valve and the valve coupling
    SOLUTION: Install a new "O" Ring #2
  CAUSE: Outlet flow may be too low (minimum flow .5 GPM or 30 GPH)
    SOLUTION: Increased flow rate by adding drip emitters or micro sprinkler
  CAUSE: Valve is installed backwards
    SOLUTION: Reverse valve
  CAUSE: Solenoid orifice is blocked
    SOLUTION: Flush and clear port
  CAUSE: Poppet is missing
    SOLUTION: Replace poppet
PROBLEM
Water leakage from the solenoid-valve coupling connection
  CAUSE: "O" Ring #1 is missing (see Figure 1)
    SOLUTION: Install a new "O" Ring #1
PROBLEM
Valve does not fully close
  CAUSE: Debris stuck in diaphragm
    SOLUTION: Remove bonnet and diaphragm and clean diaphragm

26. WARRANTY

    DIG CORPORATION warrants these products to be free from defects in material and workmanship for a period of three years from date of purchase. This warranty does not cover damage resulting from accident, misuse, neglect, modification, improper installation or subjection to line pressure in excess of 150 lbs. Per square inch. This warranty shall extend only to the original purchaser of the product for use by the purchaser. This warranty shall not cover batteries or any malfunction of the product due to battery failure. The obligation of DIG CORPORATION under this warranty is limited to repairing or replacing at its factory this product which shall be returned to the factory within three years after the original purchase and which on examination is found to contain defects in material and workmanship. DIG CORPORATION SHALL IN NO EVENT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND; THE SOLE OBLIGATION OF DIG BEING LIMITED TO REPAIR OR REPLACEMENT OF DEFECTIVE PRODUCTS. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

    Unattended use for prolonged periods without inspection to verify proper operation is beyond the intended use of this product, and any damage resulting from such use shall not be the responsibility of DIG CORPORATION. There are no warranties which extend beyond the description on the face hereof. In the case of purchase of the product for use other than, for irrigation purposes, DIG CORPORATION hereby disclaims any implied warranties including any warranties of merchantability and fitness for a particular purpose. In the case of the purchase of the product for personal, family or household purposes, DIG CORPORATION disclaims any such warranties to the extent permitted by law. To the extent that any such disclaimer or implied warranties shall be ineffectual, then any implied warranties shall be limited in duration to a period of three years from the date of the original purchase for use by the purchaser. Some states do not allow limitation on how long an implied warranty lasts, so the above limitation may not apply to you.

    In order to obtain performance under this warranty, the unit must be returned to the factory, along with proof of purchase indicating original date of purchase, shipping prepaid, addressed as follows:

    DIG CORPORATION, 1210 Activity Drive, Vista, CA 92081. Repaired or replaced units will be shipped prepaid to the name and address supplied with the unit returned under warranty. Allow four weeks for repairs and shipping time. Repair of damaged units not otherwise within warranty may be refused or done at a reasonable cost or charge at the option of DIG CORPORATION.

    This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

TECHNICAL ASSISTANCE

Should you encounter any problem(s) with this product or if you do not understand its many features, please refer to this instruction manual first. If further assistance is required, DIG offers the following customer support:

TECHNICAL SERVICE USA
- **DIG's Technical Service Team** is available to answer questions from 8:00 AM to 5:00 PM (PST) Monday-Friday (except holidays) at 800-322-9146
- **Questions** can be e-mailed to questions@digcorp.com or faxed to 760-727-0282
- Specification documents and manuals are available for downloading at www.digcorp.com.

IRRIGATION PRODUCTS

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