WARNING:
Failure to read and follow the instructions contained within this manual could result in serious personal injury, and/or damage to the Hydro-Guard® Automatic Flushing Device.
1. Each person involved in the assembly, installation and/or maintenance of the Hydro-Guard Automatic Flushing Device must read this manual carefully and follow all instructions prior to performing any installation or maintenance procedures involving the Unit.
2. Verify the drainage path prior to installation to ensure that pedestrian and vehicular hazards will not be created by the installation and use of the Hydro-Guard Automatic Flushing Device (In areas in which freezing may occur, special attention should be given to this procedure).
3. Never assemble, disassemble, or perform Hydro-Guard maintenance unless the influent supply valve has been closed, verified and secured, and internal piping pressure has been relieved.
4. Always use all necessary safety equipment and follow all recommended procedures when installing, operating and maintaining the Hydro-Guard Automatic Flushing Device.
5. Replace worn or defective parts with OEM parts and check your battery twice a year.
6. Operate the Hydro-Guard Automatic Flushing Device only when fully installed and correctly assembled.

CAUTION:
The recommended optimal operating pressure for a Hydro-Guard® Automatic Flushing System is between 20psi and 120psi. In the event pressure may exceed 120psi it is recommended that a Pressure Regulating Valve be installed ahead of the Hydro-Guard flushing system.
Please read and retain this manual. It will be helpful for future reference, training, troubleshooting, and maintenance.

Site Evaluation
Each Hydro-Guard® installation is unique and will require a minimum of advance planning. Prior to the installation of the device, the drainage patterns for the intended installation location should be reviewed. The drainage pattern must permit discharged water to flow away from the Hydro-Guard Unit in the case of a backflow situation. In cold-weather applications, multiple nightly flushes are effective in managing discharge volumes and preventing the accumulation of ice.

INSTALLATION

Hydro-Guard® HG-1 Atmospherically Discharged Flushing Unit

1. Remove the Hydro-Guard® Unit from its packaging and inspect for possible damage during shipping.

2. Excavate a suitably-sized ditch ensuring it is connected on one side to the utility’s service line trench. Remove any debris that might create uneven pressure on the Unit. Compact the bottom of the hole in order to minimize settling after installation. Place #57 stone, then non-compacted clean bedding material within the bottom of the hole.

3. Slowly lower the Hydro-Guard® Unit into place, pressing it firmly into the noncompacted bedding material until it is fully seated.

4. Connect the utility’s water system to the Hydro-Guard® Unit by means of the 2” threaded connection. Ensure that the Unit is level before beginning the backfilling operation (The bottom of the ground plate should be approximately 1” above the final grade).

5. Backfill the hole around the Unit with clean fill and/or #57 stone. Backfilling should be accomplished in 6” compacted lifts. Check that the Unit is level.

6. Disinfect the Hydro-Guard® Flushing Device in accordance with the utility’s policy. DO NOT exceed the dosage and contact times recommended by the AWWA.

7. The Hydro-Guard® Automatic Flushing Device may now be programmed and placed into service.
Discharged water flushed from the Hydro-Guard® Unit should be routed away from the device into the surrounding environment. Proper preparation of the area around the device is essential. Use of sod or rock is recommended (See typical installation illustration on page 2).

Technical Data
• Operating temperature range of 32º to 120º F
• Operating Pressure: 7 to 200psi

NOTE: Where sustained pressures may exceed 120psi the installation of a pressure reducing valve (PRV) is recommended.

Battery Life
• Will vary based on number of cycles per year, operating pressure, and temperature. We recommend checking the battery every 6 months, but in many cases, you will get more life out of them.

HG-1 (Requires Handheld)

TBOS-II Programming Instructions
The TBOS-II handheld uses on screen prompts for intuitive programming. It will control current programming interface (T-2; dark gray case), as well as the previous model of programming interface (T-1 modules programmed by the TBOS-US handheld).

Features
• 1 to 24 possible flushing events daily, or on selected days weekly, 365-day calendar
• Flush duration 1 minute to 12 hours (1 minute increments)
• Preprogram and store up to 3 different schedules
• Rechargeable battery (low battery indicator shows both handheld and controller battery conditions) with recharging adaptor (9-volt lithium battery can be used in the built-in programming interface)

NOTE: In that the handheld was designed by its manufacturer to program flush systems, many displays use flush terminology. In the following instructions, in such cases the equivalent flushing terminology is shown in parentheses.

CAUTION: Leaving the infra-red connector connected to the built-in programming interface can significantly reduce the battery life of the 9-volt batteries in the programming interface and the rechargeable battery in the TBOS-II handheld.

TBOS-II Handheld Keys
HOME – press three seconds to turn handheld on.
ABC – press to choose from three available programs (to store a program when preprogramming, or uploading a program to controller).
LEFT and RIGHT ARROWS – move cursor left or right, also go back or forward one screen.
ON and OFF/+ and –/UP and DOWN ARROWS – Used to set flushing events on or off, move selector up and down on screen, or increase or decrease duration and other values.
OK – press to make selection final.

1. TBOS infra-red – accessible only when connected to programming interface via the IR cable: select to connect handheld to programming interface via infrared cable and access programs on it, or to transfer programs from handheld to programming interface.
2. Templates (TBOS-II) – select to program handheld without connecting to programming interface.
3. Settings – select to access and set time, date, and various other available user settings.

First Time Use
1. Press HOME key for three seconds to turn on handheld.
2. Press RIGHT ARROW key or the OK key to access “Settings”
3. Use DOWN ARROW to select and set the following:
   a) Date and Time
   b) Contrast of the screen
   c) Name of the handheld controller (can be assigned to a specific operator)
   d) Language (English, French, Spanish, Italian, Dutch, Portuguese, Turkish, etc.)
HYDRO-GUARD® HG-1 Flushing System

Programming Flushing Schedule

There are two ways to proceed:
- select “TBOS-II infra-red” if IR cable is connected to a TBOS-II programming interface to access, change or load programs there, or
- select “Templates (TBOS-II)” to create or change programs stored on the handheld to load onto a programming interface at a later time (IR cable not used).

NOTE: The home screen for “TBOS-II infra-red” shows battery condition for programming interface and ON/OFF state of any current operation in progress.

1. Press HOME key for three seconds to turn handheld on.
2. Press RIGHT ARROW key or the OK key to access “Settings”.
3. Use DOWN ARROW to select “Templates” and press OK.
4. Use DOWN ARROW to select “Programs” and press OK.
5. Use DOWN ARROW to select “Watering Days” (Days to Flush) and press OK.
6. Use UP/DOWN ARROWS to select one of the following:
   a) Custom Cycle (Week): use RIGHT/LEFT ARROWS to move to days of the week, use ON/OFF keys to highlight days on which to flush, then press OK to confirm days when selections are complete.
   b) Even Days: to Flush on even dates, press OK to set.
   c) Odd Days: to Flush on odd dates including 31st, press OK to set.
   d) Odd Days 31: to Flush on odd dated except 31st, press OK to set.
   e) Cyclical: to Flush every “X” days, set “X” using ON/OFF keys (X=1 to 31), press OK to set; then set start date “dd/mm/yyyy” using ON/OFF keys, press OK to set.
7. Use LEFT ARROW to navigate back to the program “Settings” menu.
8. Select “Start times”, press OK to set.
9. Use ABC to select program to be set up.
   a) Set hours and minutes for each start time (up to 8 per program) using ON/OFF keys, press OK to set each (hours are indicated using 24 hour clock).
      [When exiting this screen, start times will automatically sort into chronological order.]
10. Use LEFT ARROW to navigate back to the program “Settings” menu.
    a) Use DOWN ARROW to select “Valve Run Times” (Flush Duration), press OK to set.
    b) Use ON/OFF keys to select program A, B and/or C (one or more can be assigned).
    c) Then use ON/OFF keys to set flush duration (hours and/or minutes) for program just set, use LEFT/RIGHT ARROW keys to move between hours and minutes and + and – keys to set times (1 minute to 12 hours), press OK to set.

Transmitting Time, Date and Programs to Programming Interface, Clearing/Checking Programs, Manual Start

Connect handheld to programming interface using IR cable.

1. To transmit: from home screen, use DOWN ARROW to select “TBOS-II infrared” and press OK. TBOS-II handheld will receive data (settings) from built-in programming interface.
2. Once data receipt is complete press RIGHT ARROW to move to “Settings” menu.
3. From “TBOS-II infra-red” settings screen select “Transmit” and press OK again. When program to be transmitted appears, press OK to confirm.
4. To clear programs A, B, or C: from “TBOS-II infra-red” welcome screen, use DOWN ARROW to select “Clear Programs” and press OK, then select type of program to clear and follow prompts.
5. To check programs A, B, or C: from “TBOS-II infra-red” welcome screen, use DOWN ARROW to select “Programs” and press OK, then select what is to be checked and follow prompts.

Manual Flushing

Using TBOS-II handheld on the T-2 built-in programming interface (dark grey in color).

NOTE: Manual start cannot be initiated if there is no program in the programming interface.

1. To start manual flushing from “TBOS-II infra-red” welcome screen.
   a) Use DOWN ARROW to select “Manual Watering” (Manual Flush) and press OK.
   b) Select “Start Valve” (Open Control Valve) then using ON/OFF keys select “Valve 1” and press OK.
   c) Use ON/OFF keys to set the manual Flush Time (1 minute to 12 hours) and press OK to confirm. Flushing will start after a four (4) second delay.

Stop Manual Flush Sequence

1. Reconnect IR cable to built-in interface, then hold down HOME key on handheld.
2. Use RIGHT ARROW to select “TBOS-II infra-red” menu and select “Manual Watering.”
3. Select “Cancel Flush” to cease the manual flush sequence.
Programming
The NODE has the capability to hold 3 programs (A, B, C) and 4 start times per program. When programming, flashing portion of display can be changed by pressing + or – keys. To change something not flashing, press LEFT or RIGHT ARROWS until desired item is flashing.

Setting Date/Time
1. Press RETURN/ENTER key until CLOCK icon is displayed.
2. All 4 digits will be displayed representing the year. Use + or – keys to change year. Press RIGHT ARROW key to proceed to setting month.
3. All 4 digits will be displayed with two digits on left flashing representing the MONTH. Use + or – key to change month. Press RIGHT ARROW key to proceed to setting DAY.
4. Only two digits on right will be flashing, representing the DAY. Press + or – key to change day. Press RIGHT ARROW key to proceed to changing TIME.
5. The AM/PM/24 time setting is shown flashing. Press + or – key to change to AM, PM, or 24-hour time. Press RIGHT ARROW key to proceed to setting the HOUR.
6. All 4 numbers are shown with two numbers on the left flashing, representing the HOUR. Press + or – key to change the hour. Press RIGHT ARROW key to proceed to setting MINUTES.
7. All 4 numbers are shown with two numbers on right flashing, representing MINUTES. Press + or – key to change minutes. (Pressing RIGHT ARROW key will return to YEAR setting at step #2.)
8. Press RETURN/ENTER key to proceed to next programming function, or allow controller to return to idle mode.

Setting Flush Sequence
Start Times
1. Press RETURN/ENTER key until CLOCK icon is displayed.
2. The START TIME will be displayed flashing, along with the program letter (A, B, or C) and start time number (1, 2, 3, or 4) in the upper left of the display. Up to 4 different start times can be set for each program.
3. Use + or – key to change START TIME for program displayed. Each press of key will change start time in 15-minute increments.
4. Press RIGHT ARROW key to add an additional START TIME to program displayed. The start time number is shown in upper left corner of display.
5. Press PRG key to add START TIME to a different program.
6. Press RETURN/ENTER key to proceed to next programming function, or allow controller to return to idle mode.

Setting Flush Duration Times
1. Press RETURN/ENTER key until HOURGLASS icon is displayed.
2. The RUN TIME will be displayed flashing. Also shown is program letter (A, B, or C) and active station # (always #1—all other stations not used) on lower left side of display.
3. Press + or – key to change station RUN TIME from 1 minute to 6 hours.
4. Press RETURN/ENTER key to proceed to next programming function, or allow controller to return to idle mode.
HYDRO-GUARD® HG-1 Flushing System

Setting Flushing Days
1. Press RETURN/ENTER key until CALENDAR icon is displayed. The program letter (A, B, or C) will be displayed. Arrows point at specific days of week in which flushing will occur.
2. Press LEFT or RIGHT ARROW to scroll through days.
3. Press + key to activate that day for program displayed, or – key to cancel watering for that day. The arrow will show on flushing days for active program.
4. Press PRG key to set days to flush for a different program, if desired.
5. Press RETURN/ENTER key to proceed to next programming function, or allow controller to return to idle mode.

Manual Flushing
Manual flushing allows user to test the Hydro-Guard® unit or a program for a specified run time.

Make sure controller is in Idle Mode.
1. Press and hold RIGHT ARROW until HAND icon is displayed. The station number (always #1) will be displayed in lower left side of display along with RUN TIME.
2. Use the LEFT or RIGHT ARROW to select #1 station if not already displayed, and + or – key to set manual flushing time.
3. To manually activate a program, press PRG key. Program letter (A, B, or C) will show on screen. If a different program is needed, press PRG key until desired program is displayed.
4. To stop MANUAL FLUSHING cycle press – key until time is reduced to zero.
5. Press RETURN/ENTER key to proceed to next programming function, or allow controller to return to idle mode.

NOTE:
– Pressing + or – key when running in MANUAL FLUSH mode will modify FLUSH TIME for that station.
– Pressing the button when a station is running in manual watering will stop flush on the current station and advance to the next station.
– Pressing the button when a station is running in manual watering will stop flush on the current station and revert to the previous station.

Turn System Off
To turn off controller, press RETURN/ENTER key button until icon resembling water spray and OFF is displayed on screen. To return controller to auto programming mode, press RETURN/ENTER key. The controller will immediately return to auto programming mode and will display time and battery life indicator.

NODE Quick Check
This circuit diagnostic procedure can quickly identify “shorts” commonly caused by faulty solenoids or when bare common wire touches a bare station control wire. To initiate NODE Quick Check procedure:
1. From Idle Mode, press and hold +, –, LEFT ARROW, and RIGHT ARROW keys.
2. Display will show all segments. Release keys.
3. Press + key to initiate NODE Quick Check test.
4. Controller will then activate flushing unit for 1 second to verify operation.

Battery Life Indicator
Remaining battery life can be estimated from the battery life indicator shown on display. The NODE can operate using either a single 9-volt battery or using two 9-volt batteries. Using two nine volt batteries will yield approximately twice the battery life of a single 9-volt battery. The battery life indicator chart below shows an estimate of remaining battery life.

Full: 100-60% remaining battery life
Med: 60-25% remaining battery life
Low: 25-0% remaining battery life

Replace battery immediately!

Resetting Controller
Resetting controller will erase current program data and restart controller. A reset does not, however, delete a program saved to permanent memory using the Easy Retrieve Memory feature to save a preferred program.
1. From Idle Mode, press and hold –, RIGHT ARROW, and PRG keys.
2. After two seconds screen will go blank. Continue to hold keys.
3. 12:00 will flash on display. Release keys.
4. The controller may show a countdown from 10 to 1 on display, and then 12:00 am will be shown flashing when reset is complete. The controller can now be reprogrammed.
The HG-1 Unit is designed to operate unattended and with minimal need for service. In the event it is necessary to service the flushing unit’s control valve, solenoid, or any other below-grade component, or to load the Dechlorination Chamber please follow these instructions.

**Disassembly**
1. Shut off water supply to unit.
2. Use HG-A2023 Security Tool to unlock and remove protective Exterior Housing Cover.
3. Loosen, DO NOT remove, two stainless steel nuts in Bracket holding Dechlorination Chamber Covers in place.
4. Use HG-A104 Security Wrench to remove four security bolts from Erosion Controlling Ground Plate.
5. Lift upper assembly up and off pipe leading down into lower in-ground part of unit, taking care not to stretch wiring and poly-tube sampling line.
6. Remove the internal subassembly from the bottom plate assembly of the HG-1 by releasing the Cam-Lock handles at the base of the female side of the Cam-Lock.

**Reassembly**
1. Return internal assembly to proper location and lock the Cam-Lock handles in place on the female side of the Cam-Lock.
2. Pull up on internal assembly to be sure it is locked in place (recommendation: use a zip-tie to hold two Cam-Lock handles in position to assure they remain locked in place during operation of the unit).
3. Gently lift upper section, making certain to not stretch wires or poly-tube, and place it over pipe and lower it onto top of in-ground section of unit.
4. Line up four holes of Ground Plate with brackets of in-ground Protective Sleeve.

**CAUTION:** Do NOT rotate the plate more than 90° in either direction, which could stretch wiring or poly-tube.
5. Reinstall four Security Screws and use HG-A104 Security Wrench to tighten them securely.
6. Lower Dechlorination Chamber Bracket to original position and retighten two nuts securely.

**BATTERY REPLACEMENT**

**HG-1 Removable TBOS-II Controller**
1. Use HG-A2023 Security Tool to unlock and remove protective Exterior Housing Cover.
2. Unscrew protective cap from gray Programming Interface located at top of unit.
3. Extract battery harness and remove old battery (dispose of battery appropriately).
4. Connect fresh industrial grade 9-volt lithium or alkaline battery. Re-insert with harness into Programmer.
5. Screw protective cap back into place and hand tighten securely.
6. Use Handheld Controller to reset all programs and assure flushing sequence is correct prior to returning the HG-1 Unit to service.
7. Reinstall Exterior Housing Cover and restore water supply to unit.

**HG-1 Built-In NODE Controller**
1. Follow HG-1 Removable TBOS-II Controller steps 1 – 3 (left) to access on-board Programmer.
2. Connect fresh industrial grade 9-volt alkaline battery and reinsert it with harness into Programmer (an optional battery harness is provided for redundancy and extended battery life).
3. Screw protective cap back into place and hand tighten securely.
4. Confirm that desired flushing sequences are correct prior to returning the HG-1 Unit to service.
5. Reinstall Exterior Housing Cover and restore water supply to unit.
TROUBLESHOOTING THE PROGRAMMER

<table>
<thead>
<tr>
<th>PROBLEM</th>
<th>CAUSE</th>
<th>SOLUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controller does not flush as desired</td>
<td>Water at main water supply is shut off</td>
<td>Check main supply valve</td>
</tr>
<tr>
<td>Battery dead</td>
<td></td>
<td>Replace battery</td>
</tr>
<tr>
<td>Controller set to OFF</td>
<td></td>
<td>Set controller to desired program</td>
</tr>
<tr>
<td>Controller improperly programmed</td>
<td></td>
<td>Check program and clock settings</td>
</tr>
<tr>
<td>Blank display</td>
<td>Battery dead</td>
<td>Replace battery</td>
</tr>
<tr>
<td>Water does not turn off</td>
<td>Overlapping programming</td>
<td>Review all programming and edit any program that is in conflict with desired off schedule Clear all programming in memory and reset</td>
</tr>
<tr>
<td>Water does not turn off</td>
<td></td>
<td>Check Programming</td>
</tr>
<tr>
<td>Programmer not communicating</td>
<td></td>
<td>Run Manual On/Off with solenoid removed from valve (hold finger or object over solenoid plunger to prevent plunger from dislodging from solenoid body Check wiring for damage and connectors to ensure proper connection (red to red &amp; black to black)</td>
</tr>
</tbody>
</table>

TROUBLESHOOTING THE UNIT

If your Hydro-Guard® Unit does not activate:

**Possible Causes**
- Water pressure off or low.
- Batteries weak or dead.
- Connection loss from controller to solenoid.
- Solenoid not working properly.
- Obstruction in flow of water.

**Try this Correction**
- Check if curb stop is open.
- Change batteries.
- Check connections for corrosion, breaks, or lack of connection.

**The Hydro-Guard® Unit will not shut off:**

**Possible Causes**
- The solenoid is stuck in the open position or debris is interfering with the plunger.
- Batteries weak or dead.

**Try this Correction**
- Run a manual flush for 1 minute.
- Change batteries.
- Check connections for corrosion, breaks, or lack of connection.
- Check the adapters and solenoid for debris – Run the electrical systems check.
- Refer to valve troubleshooting for possible corrective measures.
HYDRO-GUARD® OPTIONS AND UPGRADES

The following is a brief overview and introduction to Hydro-Guard® Options.

LOW LEAD BRASS INTERNAL COMPONENTS AND PIPING
Freeze Protection
The Hydro-Guard® HG-1 Unit is freeze protected to 18” by virtue of the bury depth of the main 2” valve. The HG-1 offers a valve bury depth of approximately 16” with above ground electronics that can be powered by a 9-volt Lithium battery (operational in temperatures as low as -20° F). For additional freeze protection, consider the HG-3 design. The HG-3 (18” to 108” bury) can be equipped with an optional patented freeze protection system that allows the water in the service piping to drain from the piping when a flush sequence is ceased.

S.M.A.R.T. Monitoring and Flush Management
The Hydro-Guard HG-1 can be upgraded to include a S.M.A.R.T. controller and a variety of water quality sensors. The S.M.A.R.T. equipped HG-1 will allow a utility to remotely monitor, in real-time, the water quality at a specific flush point and automatically initiate a flush event when water quality conditions warrant.

The Hydro-Guard® S.M.A.R.T. flushing system:
• Monitors chlorine levels (total or free).
• Flushes distribution line when residual disinfectant drops below acceptable levels.
• Monitoring of pH, flow, temperature or turbidity available.
• Two-way real-time communication via cellular, wifi, ethernet or BlueTooth®.
HYDRO-GUARD® HG-1 Flushing System

REPLACEMENT PARTS

<table>
<thead>
<tr>
<th>ID</th>
<th>PART #</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>546284</td>
<td>UV Protective Housing</td>
</tr>
<tr>
<td>2</td>
<td>HG-123104</td>
<td>Quick Connect/B-QC</td>
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<tr>
<td></td>
<td>HG-123105</td>
<td>Quick Connect Sanitary Cap</td>
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<tr>
<td>3</td>
<td>546703</td>
<td>Riser Assembly</td>
</tr>
<tr>
<td>4</td>
<td>546519</td>
<td>OEM Dechlorination System</td>
</tr>
<tr>
<td>5</td>
<td>546514</td>
<td>Housing Diffuser Top</td>
</tr>
<tr>
<td>6</td>
<td>546292</td>
<td>Ground Plate</td>
</tr>
<tr>
<td>7</td>
<td>HG-01141A</td>
<td>Stainless Steel Housing Bracket</td>
</tr>
<tr>
<td>8</td>
<td>546025</td>
<td>15” PVC Housing Pipe</td>
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<tr>
<td>9</td>
<td>HG-123100</td>
<td>2” Valve 520-050 w/Flow Control</td>
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<tr>
<td>10</td>
<td>HG-13101</td>
<td>Cam Lock Release System</td>
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<tr>
<td>11</td>
<td>546330</td>
<td>Splash Pad</td>
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<tr>
<td>12</td>
<td>HG-5292</td>
<td>NODE Controller Sub Assembly</td>
</tr>
<tr>
<td>13</td>
<td>HG-5295</td>
<td>TBOS-II Controller Sub Assembly</td>
</tr>
</tbody>
</table>

CONTROLLER OPTIONS

Built-In Controller (shown above on illustration)

- OR -

Removable Controller

<table>
<thead>
<tr>
<th>PART NUMBER</th>
<th>PIPE MATERIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>HG1ARM2BRN018LPLG</td>
<td>PVC</td>
</tr>
<tr>
<td>HG1AIN2BRN018LPLG</td>
<td>Brass</td>
</tr>
<tr>
<td>HG1ARM2PVC018LPLG</td>
<td>PVC</td>
</tr>
<tr>
<td>HG1AIN2PVC018LPLG</td>
<td>Brass</td>
</tr>
</tbody>
</table>