

HYDRO-GUARD[®]

a **MUELLER** brand

OPERATING INSTRUCTIONS MANUAL

HG-1 Automatic Flushing System

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WARNING:

1. Read and follow instructions carefully. Proper training and periodic review regarding the use of this equipment is essential to prevent possible serious injury and/or property damage. The instructions contained herein were developed for using this equipment on fittings manufactured by Mueller Co. only, and may not be applicable for any other use.
2. DO NOT exceed the pressure ratings of any components or equipment. Exceeding the rated pressure may result in serious injury and/or property damage.
3. Safety goggles and other appropriate protective gear should be used. Failure to do so could result in serious injury.

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GENERAL

Overview

The Hydro-Guard HG-1 Automatic Flushing System, the industry's premium patented, programmable flushing apparatus, is suitable for year-round use in warm climates. This Automatic Flushing System has been designed, engineered, and manufactured to provide outstanding dependability and performance.

Please read and retain this manual. It will be helpful for future reference, training, troubleshooting, and maintenance.

Site Evaluation

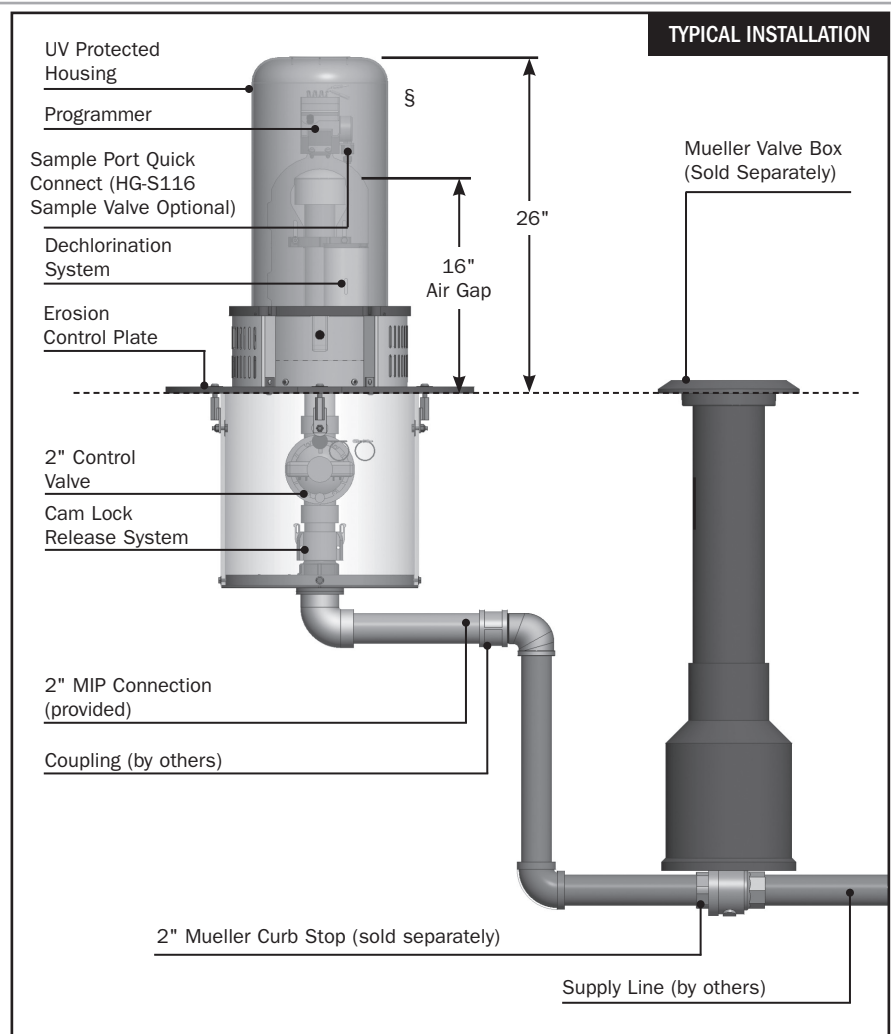
Each Hydro-Guard installation is unique and will require a minimum of advance planning. Prior to the installation of the device, the drainage patterns for the intended

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.

PROGRAMMING HYDRO-GUARD UNIT FOR OPERATION

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 32° to 120° F
- Operating Pressure: 7 to 200 psi

NOTE: Where sustained pressures may exceed 120 psi 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 CONTROLLER)

The BL-KR battery powered irrigation module communicates with the K-Rain BL Application on a Smartphone or Tablet by using Bluetooth SMART 4.0, (low energy) on an iPhone with iOS version 7 minimum or an Android phone/tablet with Marshmallow version 6.0 or higher.




Important

CAUTION: For use only with 9V DC Latching Solenoids. As some solenoids will come from the manufacturer with the plunger already magnetically latched open, some zones will default to OPEN. Follow the start-up procedure for systems with DC Latching Solenoids. (Page 09)

CAUTION: For every change to the program in the Mobile App, you must exit back to

the home screen and tap the blue TRANSMIT button (bottom right corner). The Application aggregates changes and transmits them to the controller when you have finished programming.

CAUTION: Programs A, B, and C are independent programs, including start times, run times, watering days, and water budget.

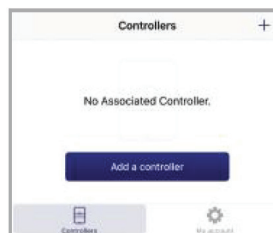
1. Install the App: – From the App Store  or Google Play  Install the free K-RainBL App: 

2. Install a 9 Volt Battery in the Controller: – Unscrew the cap, remove the seal and fasten the battery to the correct terminals. Replace the seal and cap and hand-tighten the cap to ensure it seals.

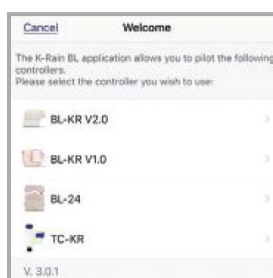
NOTE: Before you launch the App, you will need to enable location services on your phone/tablet in order for the App to geolocate your device during installation. On Android, location services must be enabled in order for the App to connect to the BL-KR device.

3. Launch the application on your Smartphone or Tablet.

4. Associate the controller with your phone by tapping the Add a Controller button.



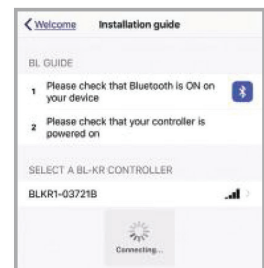
5. The app will now ask what type of Bluetooth device you would like to add:



NOTE: The BL-KR V1.0 and BL-KR V2.0 have identical hardware and software configurations. The only distinction is the outside plastic housing.

6. The App will now search for devices in range.

7. Choose the Controller. The serial numbers that populate the device list can be found on the label located on the back of the controller housing with the designation “Default name.” The App will indicate that it is in the process of connecting.



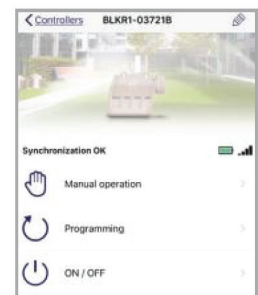
8. Once the device is connected, it will appear on the home screen when you launch the Application.

Application Home Screen:

To add another controller, tap the plus sign in the upper right hand corner of the home screen.



Device Home Screen:



NOTE: You can associate up to 400 devices with the K-Rain BL-KR App. The number of devices is limited to the internal memory on the Smartphone/Tablet.

HG-1 BUILT-IN: (INTEGRATED)

NODE Programming Instructions

Batteries

The NODE uses standard 9-volt alkaline batteries to operate the control valve and program the controller. The controller can operate with one or two batteries installed. Under normal conditions, potential life is 1 year for a single battery.

Battery Installation

1. Unscrew rear body of the NODE to gain access to battery compartment.
2. Insert battery / batteries into battery tray and connect the battery connector to controller.
3. Make sure no water is inside battery compartment.
4. Screw the NODE rear body back onto front half.

NOTE: Make sure that seal marker on rear half of the NODE lines up with front half, ensuring a proper seal is created. Also, The NODE has non-volatile memory, which allows battery replacement without losing program information.

Idle Mode – Waking Up

Normally the NODE display shows time and day, day of week, and battery life indicator. During a short period of inactivity the display will shut off to retain battery power. Pressing any key will wake up the NODE to the Idle Mode.

Run Mode

When controller is operating a program, items shown on display will include station number (always "1"), program letter (A, B, or C), remaining runtime, and a blinking Rotor icon.

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 **HOURLASS** icon is displayed. **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.
2. Press + or – key to change station **RUN TIME** from 1 minute to 6 hours.
3. Press **PRG** key to add a **RUN TIME** to another program.
4. Press **RETURN / ENTER** key to proceed to next programming function, or allow controller to return to idle mode.

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 the 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.

PROGRAMMING HYDRO-GUARD UNIT FOR OPERATION



EQUIPMENT & TOOLS NEEDED – PPE: Hard hat, safety shoes, safety vest, safety glasses, work gloves.

Tools: Wrenches, A-311 operating wrench, pliers.

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.
7. Check battery life of Battery in Programming Interface or on-board Programmer (according to model of unit), replace and restore programming if necessary.
8. Align Lock on Exterior Housing Cover with Locking Bracket on lower assembly of unit and reinstall Exterior Housing Cover (lock will engage when cover is properly seated).
9. Restore water supply to unit.

Loading Dechlorination Chamber

1. Follow instructions "HG-1 Machine Disassembly", steps 1 – 3.
2. Slide Bracket upward as far as possible and remove Dechlorination Chamber Covers.
3. Check for partially dissolved chlorine tablets or residuals and clean the chamber as needed.
4. Insert up to four 3" chlorine tables in each chamber.
5. Reinstall chamber covers, lower bracket to secure them and retighten two nuts securely.
6. Follow instruction #8 above to reinstall Exterior Housing Cover, and restore water supply to unit.

TROUBLESHOOTING THE PROGRAMMER

PROBLEM	CAUSE	SOLUTION
Controller does not flush as desired	Water at main water supply is shut off	Check main supply valve
	Battery dead	Replace battery
	Controller set to OFF	Set controller to desired program
Blank display	Controller improperly programmed	Check program and clock settings
	Battery dead	Replace battery
Water does not turn off	Overlapping programming	Review all programming and edit any program that is in conflict with desired off schedule Clear all programming in memory and reset
	Programmer not communicating	Check Programming 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 & black to black)

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.
- Run a manual flush and confirm the solenoid

plunger is kicking out and pulling back in by listening for a click.

- Check to make sure the flow control knob is open on the valve OR Check the pipes for obstructions OR Check the valve.

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.
- Connection loss from battery box to solenoid.
- The solenoid is loose or there is debris in the adapter.

- There is a hole in or debris around the diaphragm.

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.

PROGRAMMING HYDRO-GUARD UNIT FOR OPERATION

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

Low Lead Brass Internal Components and Piping

Freeze Protection

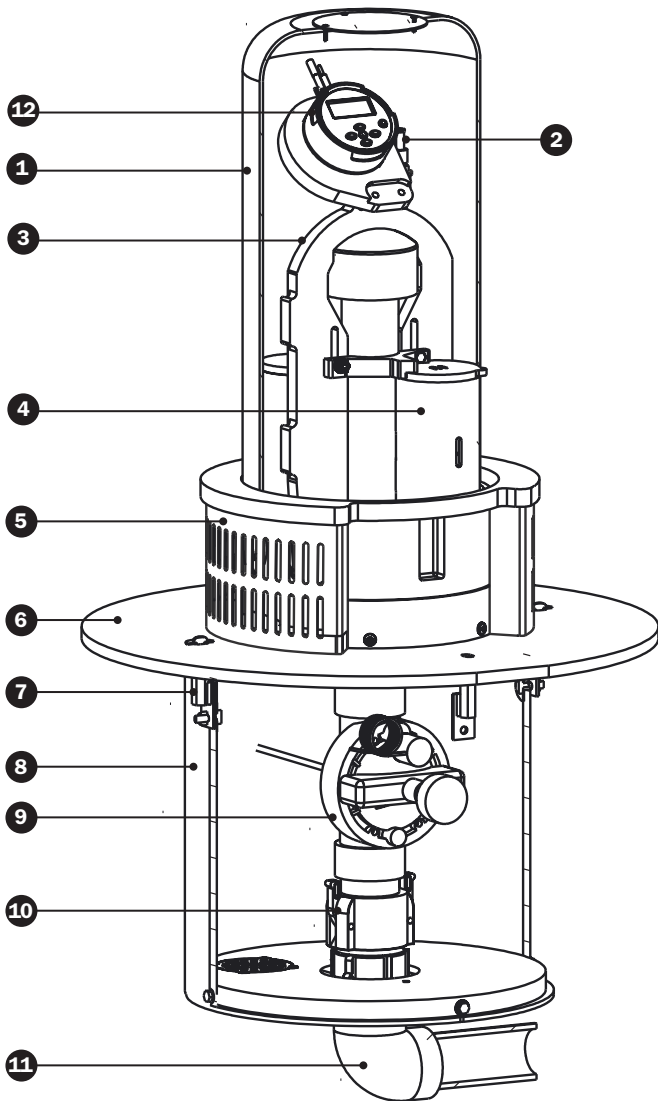
The Hydro-Guard HG-1 Unit is freeze protected to 18" by virtue of the bury depth of the main 2" valve. The HG-1 offers a valve bury depth of approximately 16" with above ground electronics that can be powered by a 9-volt Lithium battery (operational in temperatures as low as -20° F).

For additional freeze protection, consider the HG-3 design.

The HG-3 (18" to 108" bury) is equipped with Mueller's patented freeze protection system. The freeze protection system allows the water in the service piping to drain from the device when a flush sequence has ceased.

HG-1 FLUSHING SYSTEM

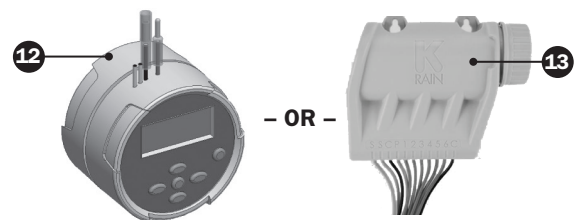
Parts



REPLACEMENT PARTS

ID	PART #	DESCRIPTION
1	546284	UV Protective Housing
2	HG-123014	Quick Connect / B-QC
	HG-123105	Quick Connect Sanitary Cap
3	546703	Riser Assembly
4	546519	OEM Dechlorination System
5	546514	Housing Diffuser Top
6	546292	Ground Plate
7	HG-01141A	Stainless Steel Housing Bracket
8	546025	15" PVC Housing Pipe
9	HG-123100	2" Valve 520-050 w/ Flow Control
10	HG-13101	Cam Lock Release System
11	546330	Splash Pad
12	HG-5292	NODE Controller Sub Assembly
or		
13	HGI-BL	Bluetooth Controller Sub Assembly

CONTROLLER OPTIONS



Built-In Controller
(shown above on illustration)

Bluetooth Controller

PART #	PIPE MATERIAL
HG1ARM2BRN018LPLG	PVC
HG1AIN2BRN018LPLG	Brass
HG1ARM2PVC018LPLG	PVC
HG1AIN2PVC018LPLG	Brass

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