



Alerts:

Specifications and Procedures

Technical Sheet

Introduction

The H₂Orb is an electronic water control valve for use with tank type toilets technically known as water closets. It's main purpose is to control water flow to the toilet and shutting off that water flow and/or creating an audible and/or visual icon when a problem with regular toilet operation occurs that could cause potential damage due to water leaving the confines or the water closet tank or bowl (bowl or tank overflow) or cause substantial water waste due to leaks or stuck, broken or inefficient valves or flappers.

Scope

While the system can be adapted to commercial urinals and flush valves, the purpose of this paper is to define and explain the functionality of the H₂Orb when used with standard, tank type, one or two piece toilets. The device can also be used on toilets using pressurized flush tanks (assisted flush).



Functions

The H₂Orb has three main functions: water shut off, audible alert, visual alert. A fourth function is remote notification but is only available in specific H₂Orb models. (Available: Q4-2009)

Water Shut Off

Depending on the Profile that has been set for a particular unit (see Profile Grid), several excess water flow issues will cause immediate or delayed water shut off by the H₂Orb Control Unit. At the same time, a visual alert will always appear on the screen indicating the type of problem and in the lower left-hand corner of the screen, the specific profile active at the moment.

Problem Notification

Bowl Overflow	Tank Sensor Waterline Recalculation
Tank Overflows <ul style="list-style-type: none"> • Stuck Open Fill Valve • Leaky Fill Valve 	Disconnects <ul style="list-style-type: none"> • Tank Sensor • Bowl Sensor • Control Unit
Stuck Open Flapper	Low Battery
Leaky Flapper*	Control Unit Profile
Tank Flushing	Hose Burst

*also cracked or leaky tank



Problem Identification

Bowl Overflow (w/ bowl sensor in use)

Problem: The toilet is flushed thereby emptying the water from the tank into the bowl. The toilet bowl is clogged or a back-up in the sewer line is not allowing the water to exit the bowl. Therefore, water level in the bowl quickly rises. Often, user attempts a second flush to attempt to force the water through the flushing system. The other issue that can occur is a stuck open or leaky flapper. The flapper valve may stick or a leak creating continuous water flow into the bowl thereby potentially creating a substantially larger overflow.

Solution: H₂Orb receives a signal from the sensor attached to the seat bolt that hangs into to bowl sensor and shuts off the water to the tank. The H₂Orb Control Unit cannot be reset until the water level has gone down enough, usually, to accommodate another full tank of water. Since there is no water left in the tank, a second flush is not possible. (For toilets with pressurized tanks, there may be enough water for a partial flush before completely emptying the system). In most cases, the water level in the bowl is not high enough to go over the rim. When the bowl sensor is used and properly installed, an overflow notification always initiates a water shut-off.

Alert: Alert will always be audible and displayed on the screen.

Reset: Reset of H₂Orb water valve is necessary to restore normal operation. Once the water level has lowered enough to allow the valve to be reset, a single push of the Open Valve Key opens the H₂Orb Control Valve and allows the toilet to resume normal operation assuming no other issues occurred and are still active.

Active: All profiles when bowl sensor is used and properly installed.



Tank Overflow (w/ tank sensor in use)

Problem: The fill valve located inside the toilet tank has failed to shut off the water at the appropriate fill level. Valve type, make or model does not matter.

Solution: The H₂Orb receives a signal from the sensor located inside the toilet tank that an overflow has occurred and after a 2 second delay can shut off the water if proper profile is active.

Alert: Determined by Profile. May be audible, displayed, or disabled.

Reset: The H₂Orb Control Unit will automatically reset 2 seconds after the water level has left the overflow position. This will occur after a flush. Open valve key may be used

Active: Determined by the profile selected if tank sensor is used and properly installed.

Stuck-Open Flapper (w/ tank sensor in use)

Problem: The toilet is flushed and when the water leaves the tank, the flapper does not re-seat itself correctly on the flush hole. This can be caused by: a) debris in the tank, b) chain gets stuck, c) flapper d) does not go down, e) handle gets stuck, f) flapper comes off its pivot point, etc. This creates a constant running toilet. Minimum water loss ranges from 4000 to 6000 gallons per day.

Solution: The H₂Orb receives a signal from the sensor located inside the toilet tank that a flush has occurred. After a 5 minutes if the tank has not refilled, signal is sent to the H₂Orb Control Unit that the tank has not refilled. Unit can shut off the water if proper profile is active

Alert: Determined by Profile. May be audible, displayed, or disabled.

Reset: Push Open Valve Key.



Leaky Flapper (w/ tank sensor in use)

Problem: After completing a tank fill, over a period of time, water leaks from the system. A slow leak often called a silent leak as defined by the EPA can range from 30 to 400 gallons per day. These leaks may go unnoticed for years due to the fact that they do not alter or effect the normal operation of the toilet. Larger leaks occur over time and eventually lead to massive water loss to the thousands of gallons per day.

Solution: The H₂Orb receives a signal from the sensor located inside the toilet tank that a flush has not occurred yet the flush valve has open and allowed the tank to become full. Three issues constitute and problem and activates the alert.

Alert: Determined by Profile. May be audible, displayed, or disabled or ignored

Reset: Push Open Valve Key.

Burst Fill Line (w/ tank sensor in use)

Problem: Fill line from the control unit to the toilet bursts. A hose burst can occur during two different toilet operational phases. A) Tank is full; B) Tank is filling.

Solution: If a hose burst occurs during a tank fill, water will be lost. Up to 5 minutes of water loss may occur. After 5 minutes if the tank is not full due to the hose burst, the unit assumes a stuck flapper and shuts off the water.

If a hose burst occurs after the completion of a tank fill, the H₂Orb has already shut off the water, therefore water loss should be limited to the water in the fill line and possible loss of all water in the tank due to a malfunctioning back-flow valve on the fill valve. While all precautions are taken to insure that no water leaves the H₂Orb when it is in the closed position, it is not guaranteed for zero leakage up and so some leakage may



occur over time. This does not affect the long term alert or catastrophic damage control capabilities of the unit.

If a hose burst after a fill (unlikely due to the nature of the H₂Orb closing the water valve after a flush)

Alert: Determined by Profile. May be audible, displayed, or disabled or ignored.

Programs (Profiles)

The H₂Orb has 10 potential programs also called Profiles. Each profile, as indicated by it's common name, has a specific purpose the will cause the H₂Orb to use it's three main capabilities either together or in a variety of combinations. In all cases, the profile chosen will prevent catastrophic water loss as defined by the continuous running of water for more than 5 minutes through the valve where water leaves the confines of either the toilet bowl or the toilet tank. Catastrophic loss can occur due to a water overflow in either the bowl or the tank, cracked or leaky tank or bowl, or broken tank or bowl.

The purpose of the Profiles is to allow the user to customize the water flow management in conjunction with the various alerts. Below is an example of the need for specific combination of water shut off (or lack of) in conjunction with the audible and visual alert systems. Example:



A toilet located in a guest room is experiencing a small leak in the flapper. This is one where, throughout the day, the tank is continually refilling itself due to small pinhole leaks in the flapper. These silent leaks can waste up to 500 gallons per day. However, in the middle of the night, the guest would not want to be disturbed by a continuous audible chirping from the H₂Orb. However, the hotel owner would be extremely interested in knowing about the issue. Using the Guest Profile 1, the H₂Orb would shut-off the water after the third time the tank refilled and activate an icon on the LCD screen of the H₂Orb. The guest would go to flush the toilet and no water would be in the tank due to the leak. The guest would then call the front desk who would instruct them to reset the valve with a simply button push thereby notifying the hotel owner of the problem without waking the guest in the middle of the night. OR, Guest Profile 2 could be chosen and the water would NOT be shut off but the visual alert would be activated. When the cleaning staff cleaned the room the next time, the icon would be active on the LCD display the staff member would note it on their cleaning log.

Procedures

Identify the Profile

Push the Open Valve Key and hold for 3 seconds. Three beeps may occur if the H₂Orb has no present alerts. In the lower left hand side of the LCD display, a single number from 1 to 9 will appear, indicating the current Profile Mode of the unit.

To change the Profile, while the Profile number is displayed, push the Alarm Silence key one time to incrementally change the profile number. To set the profile, push the Open Valve one time. Three beeps