



Warranty

With respect to goods manufactured by Willoughby, Willoughby warrants the goods to be free from defects in materials and workmanship under normal use and service for one year from the date of shipment; and Willoughby will replace or repair, at its option, any goods which are found defective in material or workmanship within said one-year period from date of shipment upon notification by Buyer identifying each and every defect. Willoughby's obligation with respect to such goods shall be limited to replacement or repair, F.O.B. Indianapolis, Indiana, and in no event shall Willoughby be liable for consequential or special damages, or for transportation, installation, adjustment, replacement or other expenses which may arise in connection with such goods. Any misuse or abuse of the goods voids this limited warranty.

THIS WARRANTY IS EXPRESSLY MADE IN LIEU OF ANY AND ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.



Stainless Steel Care

Stainless Steels are basically alloys of iron and chromium, and are corrosion resistant. Stainless steel has a bright surface that is easy to clean and is free from oxides. Therefore, cleaning of stainless steel is relatively simple and easy if done on a regular basis.

Frequency of cleaning depends on the rate at which the fixture becomes dirty. Remember that fresh (soft) deposits of all kinds are relatively easy to remove, while removing older (hard) deposits are much more difficult. Establish a cleaning schedule.

Routine cleaning should involve ordinary soap or detergent and water, applied with a sponge, brush or cloth. Baking soda, borax or any of several non-abrasive commercial cleansing agents can help hasten the cleaning action. After scrubbing, rinse thoroughly and wipe dry.

Do not use common steel wool, scouring pads, scrapers, wire brushes, files, or other steel tools to clean stainless steel. Such items will scratch the surface or leave small particles of iron embedded in the surface, which will eventually rust and stain the surface—even appearing as if the stainless itself was rusting.

Certain chemical compounds, if used on stainless steel, can give the appearance of rust and, if allowed to stand for long periods of time, can pit the surface of even stainless. Products containing hydrochloric acid, muriatic acid, or potassium hydrochloride can ruin the surface.



Self-Closing Cartridge Assembly Troubleshooting Instructions

VALVE WILL NOT OPEN OR DELIVER WATER:

- (1) Check to be sure screwdriver stop is fully open. Do not partially close the checkstop for any reason as it is not a throttling valve.
- (2) Check tightness of toggle lever nut to insure movement of toggle lever will depress valve stem.
- (3) Check adjustment of trigger clip to be sure it is pulling the toggle lever when the button is pushed.
- (4) Check flow control for blockage.
- (5) Check strainer insert for clogging.

WATER WILL NOT STOP FLOWING:

- (1) Check adjustment of trigger clip to insure no pressure is put on toggle lever when the button is not being pushed.
- (2) Check toggle lever nut tightness to be sure it is not forcing the toggle lever into valve stem when the button is not being pushed.
- (3) Remove cartridge and inspect rubber seals for damage.
- (4) With cartridge removed, inspect faucet washer and seating area for foreign particles stuck in the opening.
- (5) Check to be sure cartridge is tightened securely in casting.

VALVE ONLY DELIVERS A SMALL STREAM OF WATER:

- (1) Make sure screwdriver stop is fully opened.
- (2) Check adjustment of linkage components to insure complete depression of valve stem.
- (3) Check strainer insert for clogging.
- (4) Check flow control for restriction.



Self-Closing Cartridge Operation and Maintenance

The Willoughby Self-Closing Cartridge is designed as a spring loaded on-off water valve. This cartridge is used in hot-cold valve assemblies for lavatories, service sinks and drinking fountains.

The durability of this type of time proven cartridge makes it an ideal choice for correctional facilities. The only moving part in the cartridge is the stem, and the seal around the stem is a self-lubricating o-ring. This insures the stem will always move freely whether operated several times a day or left unused for months at a time.

A strainer is designed to fit in the casting directly under the cartridge. This fine mesh stainless stainer keeps out debris that could cause the cartridge to stick open. The strainer also keeps debris from blocking the small opening in the 0.5 gallon per minute flow control used on lavatories and drinking fountains.

If the cartridge does not shut off tightly and the problem cannot be traced to the faucet washer, rubber seals or linkage components, then the cartridge must be replaced.

REPLACING A SELF-CLOSING CARTRIDGE:

- (1) Unscrew all actuator components from the top of the cartridge.
- (2) Shut off the water with the screwdriver stop.
- (3) Remove the old cartridge.
- (4) Apply a water-proof lubricant to the exterior rubber seals of the new cartridge. These seals form a water tight seal when the cartridge is tightened securely.
- (5) Depress the stem as you insert the cartridge into the casting. It is critical that the stem remain depressed until the cartridge is tightened securely. Failure to depress the stem can cause severe damage to the lower rubber seal.
- (6) Return water supply to cartridge by fully opening screwdriver stop.
- (7) Activate the cartridge several times to insure air is removed from water passageways.
- (8) Return actuator components to the top of the cartridge.
- (9) Check to see that all movable parts operate freely.



Metering Cartridge Assembly Troubleshooting Instructions

VALVE WILL NOT OPEN OR DELIVER WATER:

- (1) Check to be sure screw driver stop is open. Do not partially close the checkstop for any reason as it is not a throttling valve.
- (2) Check tightness of toggle lever nut to insure movement of toggle lever will depress valve stem.
- (3) Check adjustment of trigger clip to be sure it is pulling the toggle lever when the button is pushed.
- (4) Check flow control for blockage.
- (5) Check strainer insert for clogging.

WATER WILL NOT STOP FLOWING:

- (1) Check adjustment of trigger clip to insure no pressure is put on toggle lever when the button is not being pushed.
- (2) Check toggle lever nut tightness to be sure it is not forcing the toggle lever into valve stem when the valve is not in use.
- (3) Remove cartridge and inspect rubber seals for damage.
- (4) With cartridge removed, inspect faucet washer and seating area for foreign particles stuck in the opening.
- (5) Check to be sure cartridge is tightened securely in casting.
- (6) Check to see if cartridge has seized.

VALVE ONLY DELIVERS A SMALL STREAM OF WATER:

- (1) Make sure screwdriver stop is fully opened.
- (2) Check adjustment of linkage components to insure complete depression of valve stem.
- (3) Check strainer insert for clogging.
- (4) Check flow control for restriction.

METERING CARTRIDGE WILL NOT METER:

- (1) Mechanical cartridge may lack clean felt insert.
- (2) Hydraulic cartridge may have internal problems.

Cartridge is not field repairable, and disassembly will void warranty. Service is done by factory only.



Metering Cartridge Operation and Maintenance

The Willoughby Hydraulic Metering Cartridge is designed as a one piece, sealed unit. The unit is sealed at the factory and field disassembly will void all warranties. Installation of cartridges in applications where the maximum operating pressure exceeds 70 PSI or temperature exceeds 130 degrees F will also void warranty.

The metering chamber contains silicone hydraulic fluid and is completely segregated from the water supply. This eliminates many of the problems associated with cartridges that use line water as the control fluid. A chrome adjustable needle valve controls the hydraulic fluid flow, thereby controlling the timing. The cartridge closes in the direction of the water flowing through it to provide a positive shut off.

Operational sequence of the cartridge starts by depressing the push button. This action is transferred via the linkage to the toggle lever. This depresses the bleeder stem. As the stem moves downward, the hydraulic fluid flows from the bottom portion of the metering chamber to the upper portion of the chamber. This is accomplished by the fluid collapsing the walls of the cup seal.

When maximum downward stroke is achieved, the metering spring attempts to return the bleeder stem to its original position. The upward movement is restricted because of the hydraulic fluid in the upper chamber. The fluid forces the flanges of the cup seal outward creating the seal which forces the hydraulic fluid past the needle valve. As the hydraulic fluid flows past the needle valve the pressure in the upper chamber is relieved as the hydraulic fluid passes from the upper chamber back to the lower chamber.

The distance the needle valve is inserted into its seat will determine the flow of the timing fluid. Turning the adjusting screw clockwise increases the resistance to the flow thus increasing the metering time. Turning the screw counter-clockwise has the opposite effect. Metering times from 5 to 60 seconds are possible.

If the cartridge does not meter properly or shut off tightly and the problem cannot be traced to the faucet washer, rubber seals or linkage components, then the cartridge must be replaced.

REPLACING A METERING CARTRIDGE:

- (1) Unscrew all actuator components from the top of the cartridge.
- (2) Shut off the water with the screwdriver stop.
- (3) Remove the old cartridge.
- (4) Apply a water-proof lubricant to the exterior rubber seals of the new cartridge. These seals form a water tight seal when the cartridge is tightened securely.
- (5) Depress the bleeder stem as you insert the cartridge into the casting. It is critical that the stem remain depressed until the cartridge is tightened securely or the lower seal can become severely damaged.
- (6) Return water supply to cartridge by fully opening screwdriver stop.
- (7) Activate the cartridge several times to insure air is removed from water passageways.
- (8) Depress bleeder stem fully to check metering dwell time .
- (9) Return actuator components to the top of the cartridge.
- (10) Check to see that all movable parts operate freely.



PM Series Pneumatic Valve Assembly Installation Instructions

- (1) Clear and flush all supply lines to valves.
- (2) Clear any debris from plastic tubes with air. Do not use water for clearing 1/16" I.D plastic tube.
- (3) Mount the valves at any convenient location, making sure the plastic tubes will reach between valves and filler/bubbler or shower head, maximum 120" from valve to fixture.
- (4) Attach supplies to valves. Close checkstop valves.
- (5) Assemble push buttons to fixture backsplash.
- (6) Insert 3/8" MPT x comp. plastic adapter into filler/bubbler or shower head, on fixture.
- (7) Insert one end of the plastic tube into adapter on filler/bubbler or shower head and other end into adapter on valve assembly.
- (8) Insert one end of 1/16" I.D. red and/or blue plastic tube, taking care not to kink tube, onto pneumatic valve, then insert other end onto pushbutton actuator. Take care to avoid connection of hot water valve to cold water push button, etc.
- (9) Open supply stops and checkstop valves, checking for leaks.
- (10) Actuate push buttons several times to clear water lines and valves of trapped air. Check for leaks at all connections.
- (11) Adjust valve time cycles if needed as per "adjustments to time cycle on valves."

ADJUSTMENTS TO TIME CYCLE ON VALVES:

Adjust hot & cold water valve cycle time by pressing pushbutton and releasing to start timed flow. Turn adjusting screw on top of metering device counterclockwise (-) to make time shorter, (as low as 5 seconds), or clockwise (+) to make cycle time longer, (as long as 90 seconds).



PM Series Pneumatic Valve Assembly Troubleshooting Instructions

VALVE WILL NOT OPEN OR DELIVER WATER:

- (1) Check the plastic tubing that runs from the push button actuator to the pneumatic valve for air leaks.
- (2) Make sure the checkstop on the supply to the valve is fully open. Do not partially close the checkstop for any reason as it is not a throttling valve. The checkstop should be fully open (normal operation) or fully closed (when servicing the valve).
- (3) Close checkstop and then inspect the strainer in the supply line (installed after the checkstop) to make sure the strainer is not blocked or partially blocked prohibiting water flow.

VALVE WILL NOT SHUT OFF:

- (1) Separate valve motor from casting by removing the four (4) # 8 screws.
- (2) Inspect the water diaphragm assembly to see if bypass hole in diaphragm is blocked. Remove any debris by blowing on diaphragm or using force of air. Do not use any tool (such as straight pin) to remove any debris. Enlarging the hole will shorten or make for erratic cycling.
- (3) Check the metering screw on the timer assembly to make sure the adjustment screw is not closed too tightly. To reset, back out adjustment screw (counterclockwise) about 1 1/2" turns, and adjust for desired cycle.

VALVE CONTINUES TO TRICKLE OR PARTIALLY DELIVER WATER AFTER CYCLE IS OVER:

- (1) Inspect seating area on valve base to make sure no debris, pitting or scoring is present.
- (2) Clean seat or replace seat as necessary.
- (3) Inspect seating area of diaphragm for debris, clean as necessary. If debris has caused permanent indentations in the rubber, it may have to be replaced.



Willoughby Individual Timing System

(SYSTEM DESCRIPTION, OPERATION AND TROUBLE-SHOOTING)

The WITS system is capable of controlling the hot and cold lavatory valves, and flush valves on 2 combination fixtures, or 2 toilets and 2 lavatories. The circuit board controls up to six solenoid valves and requires 24 volts AC, 100 VA for operation. Timers across the top of the circuit board can adjust the metering cycles for hot, cold and flush from 2 to 100 seconds. All of the timers are interruptible, meaning a push of the button during a metering cycle will turn the water off. Two additional timer control knobs are located under the six main timers. These are flush re-initiate delays used to discourage water waste by limiting the number of flushes allowed during a certain time period. These timers can be set from 0 seconds (no delay between flushes) to 10 minutes (a maximum of 6 flushes per hour) or anywhere in between.

The circuit board has LED indicators that monitor all WITS functions. Two of these show when the re-initiate delays are in effect. LED #3 corresponds to flush 1 and LED #5 comes on when flush 2 has been delayed. LED #1 is the green LED on the left edge of the circuit board that shows when the power is on. The LEDs across the bottom left of the circuit board are connected to the hot, cold and flush push buttons on the fixtures, if an LED does not light up when a button is pressed, a problem exists with either the push button or the wiring. The LEDs on the bottom right of the circuit board are used to trouble shoot the solenoid valves. If an output LED is on, but the valve does not open, the problem is either in the valve or the wiring. Two other LEDs on the circuit board are used as overflow indicators. LED #2 or #4 will turn on depending on which toilet was approaching an overflow condition. The flush valve on that particular toilet will stay shut off until the overflow LED is reset with the button on the bottom of the control box.

Normally, the output corresponding to each input will energize immediately. If a flush valve fails to come on, check to be sure the re-initiate delay or overflow has not been activated. If LEDs on the input side of the circuit board come on, but the outputs do not, consult Willoughby Industries, Inc. toll-free at 1-800-428-4065 for assistance.

The wiring harnesses for the push buttons and solenoid valves have color coded wires to make installations and trouble-shooting easier. Red and blue wires are used for the hot and cold lavatory valves respectively and white is used on the flush valves. The push button wiring harness has 1/4" male quick connect terminals for connecting to the push buttons and the valve harness is terminated with 1/4" female quick connects. This keeps the harnesses from becoming switched around. To test a push button, disconnect the harness from the button and use a jumper across the ends of the harness to try to turn on the water. Testing a solenoid valve can be done the same way by testing for 24 VAC across the ends of the valve harness.

The overflow indicators are vacuum operated and the switches can be tested by pulling a small vacuum on them with a short section of tubing connected to the box. If an overflow indicator LED lights up when it shouldn't, the bowl sensor may be blocked and will need to be blown out.