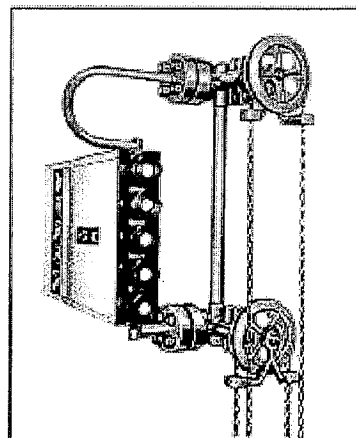
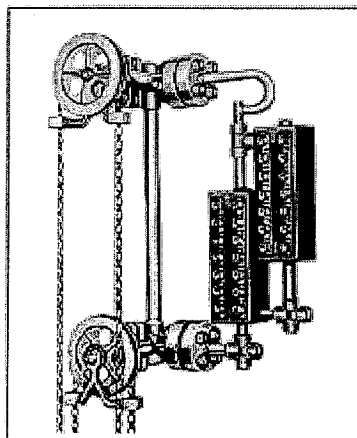
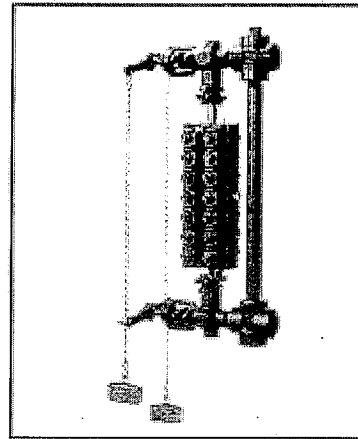
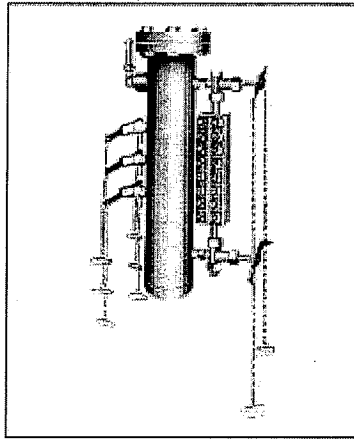
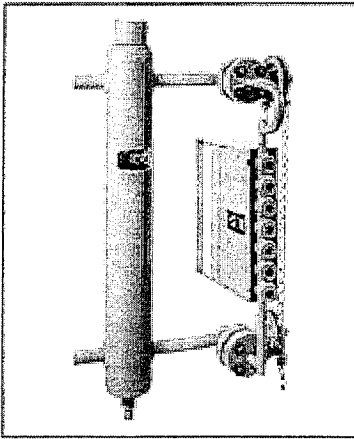


# Boiler Drum Level Instruments For Pressures Above 250 PSIG



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## **Unpacking and inspection**

Upon receipt of the Boiler Drum Level instruments, examine the contents of the container(s) for damage. Report any faulty conditions as soon as possible to your carrier to avoid acceptance of damaged goods. Clark-Reliance will not be responsible for goods damaged in shipping or storage, or subsequent loss or damage due to improper storage or exposure as a result of damage to shipping containers. Submit a digital photo of any damaged equipment and container to Clark-Reliance, if possible

Verify that all materials are present as recorded on the Packing List provided with each shipment. Report any discrepancies to Clark-Reliance immediately. Have the Clark-Reliance order number and shipping waybill available at the time of your call.

## **Handling**

Your Clark-Reliance shipment has been carefully packed. However, the shipment may include spare parts, temporary water gages for "Boil-out" purposes, maintenance instructions, and engineering drawings.

Upon receipt of the order, the equipment and above items should be identified and verified against the packing list. Any documentation that has been provided should be directed to the appropriate personnel.

Care should be exercised as the items are uncrated. The shipment may contain fragile glass components. If any equipment appears to have been damaged from shipment, please contact your local Clark-Reliance representative or the factory immediately.

## **Storage**

Clark-Reliance Boiler Trim products should be stored in a dry and sheltered area prior to installation. The equipment provided may consist of electrical items that are intended for either indoor or outdoor use. As a matter of good practice, dry storage will eliminate the potential for water damage.

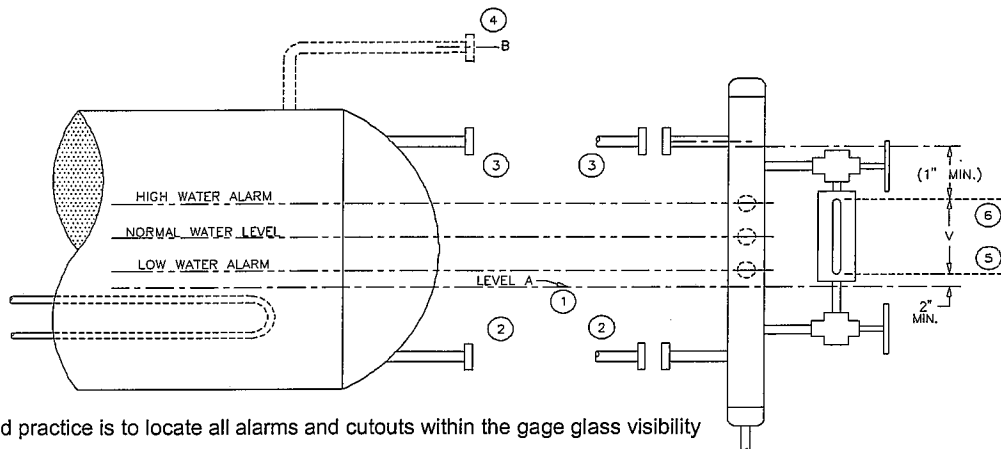
The temperature of the storage area should not exceed 150 degrees F. (65.5 degrees C) or drop below 32 degrees F (0 degrees C).

## **ASME Boiler Code Requirements**

Boilers operated at pressures of 400 PSIG and above shall be provide with two water gage glasses on the same horizontal lines. Section 1 of the ASME Boiler Code requires the lowest visible water level in a gage glass shall be at least 2" above the lowest permissible boiler water level, as determined by the boiler Manufacturer.

When shutoff valves are used in piping to a water column, they should be of a type to meet local code requirements. Such valves must be arranged to avert accidental closing. The steam connection pipe should either be horizontal or slope from the drum down to the water column. The water connection pipe should be horizontal or slope from the column down to the drum. Provide for cleaning the piping by installing crosses with plugs, or blind flanges at all right angle turns. No outlet connections except for water level recorder, feed water regulator, drains, or steam gage shall be placed on the pipes connecting the water column to the boiler. Any device requiring flow of steam or water, taken from the water column piping, would create a false level in the gage glass.

The water column shall be fitted with a drain valve (3/4" pipe size minimum), with a suitable connection to a safe independent point of waste. If the water column drain has a rising bend or pocket, which cannot be drained by means of the water column drain, an additional drain shall be placed on this connection in order that it may be blown off to clear any sediment from the piping. The gage glass shall be fitted with a drain valve, with a suitable connection to a safe independent point of waste. A summary of other Code requirements follows:



Good practice is to locate all alarms and cutouts within the gage glass visibility

### **ASME BOILER CODE INSTALLATION REQUIREMENTS**

1. Lowest permissible water level- at which level there will be no danger of overheating (Level A).
2. Water connection for Water Column- upper edge (2) must be at least 1" below low visibility point of gage glass (5) - must be at least 1" NPS. Line should be level or slope downward from column to drum.
3. Steam connection for Water Column- lower edge (3) must be at least 1" above high visibility point of gage glass - must be at least 1" NPS. Line should slope downward from drum to column.
4. Steam connection may come out of top of vessel- centerline of steam connection on column would be at point marked "B".
5. The lowest visible part of water gage glass- must be at least 2" above the lowest permissible water level (Level A).
6. The highest visible part of water gage glass- must be at least 1" below the center of steam connection.
7. Gage Cock connections- not required. However, if Gage Cocks are used, they shall not be less than 1/2" pipe size and located within gage visibility range "V".
8. Transparent gages with multiple sections must have minimum 1" overlap -tubular or transparent gages that rely on observing the steam-water interface and consist of multiple sections, must have a minimum of 1" overlap of the visible portions.
9. Ported Type Water Gages must be fitted with proper Illuminator - to provide visual discrimination between steam and water.
10. Magnetic Water Level Gage is considered an indirect level indicator because the actual water line cannot be viewed.

### **ASME WATER GAGE REQUIREMENTS**

**UNDER 400 PSIG**  
**At Least 1 Direct Reading Gage**

**400 PSIG and ABOVE**  
**2 Direct Reading Gages OR**  
**1 Direct Reading Gage and**  
**2 Remote Reading Gages**

## Boil-out Gage Practice and Policy

On new boiler installations, it is common procedure to initially operate the boiler at a reduced pressure for a short time to 'cook out' foreign materials (pipe joint compound, grease, oil, flux, etc.) that remain in the drum or other pressurized parts of the system after the boiler has been constructed. During this boil-out period, most of the suspended or dissolved debris is flushed out with blow-down discharges. However, a small amount of residue is unavoidably deposited as a film on all internal wetted surfaces... including those of the water gage glass. This type of scum layer is nearly impossible to remove by blowing down the gage glass, particularly if the gage glasses are protected by mica shields, as they must be, in high pressure installations.

As a practical matter, it is more expedient to employ an inexpensive temporary level gage, which can be discarded or returned after the boil-out procedure, rather than to use then rebuild the gage glass intended for regular service. For boil-out purposes on new water columns, Clark-Reliance provides a temporary level gage at no charge, or at a refundable charge, under one of the following conditions:

1) When a Prismatic, Flat Glass, or Simpliport gage having  $\frac{3}{4}$ " O.D. end nipples is supplied as part of a water column, and the boil-out pressure will not exceed 200 PSIG, Clark-Reliance automatically will furnish for temporary boil-out service the following parts at no charge:

1 pc. –  $\frac{3}{4}$ " O.D. tubular glass gage cut to the proper length

2 pcs. – Rubber packing rings (\*)

1 pc. – Low visibility shield (so that low vision in the tubular glass gage is the same as in the gage glass that will be used for regular service).

At the conclusion of the boil-out procedure, all of the above parts should be discarded. When the gage having stainless steel nipples is installed, it is essential that the appropriate (non-rubber) packing rings are used, to assure durable sealing of the stainless steel nipples.

2) When a gage glass having flanged connections is supplied as part of a water column, and the boil-out pressure will not exceed 200 PSIG, Clark-Reliance will furnish the following parts at no charge:

1 set – VB991 gage valves with  $\frac{1}{2}$ " MNPT connections

1 pc.  $\frac{5}{8}$ " O.D. tubular glass gage cut to the proper length

1 pc. – Low visibility shield.

The boil-out gage valves should be temporarily installed in the  $\frac{1}{2}$ " FNPT "Test" connections in the flanges of the regular water gage shut-off valves, which are on the water column. This equipment may be discarded after the boil-out has been completed.

3) On installations like the above, but where the boil-out pressure will exceed 200 PSIG, consult Clark-Reliance to discuss options for an appropriate temporary use gage and valves. The cost of this assembly will be listed separately on our order invoice. However, full credit will be issued upon its return to Clark-Reliance.

\* Bronze valves are supplied with rubber packing rings. These are to be used for the boil-out procedure. Steel valves are supplied with packing cartridges and separate rubber packing rings (to be used for boil-out).

## **Recommended Blow-Down Procedure for Water Columns and Gage Glasses**

The importance of proper cleaning and maintenance of the water column and the water gage glass, or sight glass, cannot be stressed enough. The water column must be kept clean to ensure the water level in the gage glass accurately represents the water level in the boiler. Note that the frequency and method of blow-down may affect service life and performance of the water column and gage glass.

The water gage glass on a boiler enables the operator to visually observe and verify the actual water level in the boiler. However, if not properly cleaned and maintained, a gage glass can seem to show that there is sufficient water, when the boiler is actually operating in a low or low water condition. A stain or coating can develop on the inside of the glass where it is in contact with boiling water. After a time, this stain gives the appearance of water in the boiler, especially when the glass is completely full or empty of water.

Also, the connection lines to the gage glass can become clogged with sediment and show normal water levels when water may be low. After performing the blow-down procedure, if the water level does not return to normal promptly, the connecting piping may be partially clogged and have to be cleaned.

Clark-Reliance suggests the following blow-down procedure:

1. Close both the steam and water valves between the boiler drum and the water column or water gage.
2. Open the drain valve fully on the bottom of the water column or water gage.
3. Crack open the steam valve and allow a gentle rush of steam to pass through the water column or water gage. The steam should not pass through for longer than 20 seconds.
4. Close the steam valve.
5. Inspect the water gage to insure that all foreign matter is flushed from the glass or mica. If the gage is not visually clean, repeat steps 3 and 4.
6. Close the blow-down valve and simultaneously open the steam and water valves, slowly bringing the equipment back to a normal operating level.
7. Water should enter the gage glass quickly when the blow-down valve is closed. This will indicate that the lines are free of sludge, sediment, or scale buildup.

### **Note:**

1. Any trip or alarm circuits that are actuated by the equipment being blown-down should be bypassed to prevent false alarms during the blow-down process.
2. Blow-down should be conducted on a weekly basis, or as necessary, based on water quality.

3. Always notify control room personnel prior to conducting a Blow-Down to prevent any false alarms or false trips.

### **Recommended Maintenance and Annual Inspections**

Regarding any recommended maintenance procedures or annual inspections, we suggest any device containing probes should be inspected on an annual basis for contaminated probes and wire secure terminations.

**Caution:** Before proceeding, follow any and all plant lock out - tag out procedures required. Verify that all power is turned off to the probes. If under pressure, the equipment should be isolated, or the boiler should be shut down *before* proceeding with the installation. Open drain valve to eliminate any trapped pressure. All inspection and installation steps should be performed by a qualified technician and should be executed in accordance with all applicable national and local codes.

With no pressure or elevated temperature, beyond ambient conditions, at least one probe should be removed for inspection. Ideally, for devices containing multiple probes, we suggest removing one probe from an upper indication location (normally in steam area) and one probe from a lower indication location (normally in water area) for inspection. If any probes display signs of contamination, they can be cleaned with a mild detergent and re-installed using a new sealing gasket, if applicable. Refer to the attached IOM # E189-A for additional details. If a probe exhibits and contamination across the length of the insulator, which cannot be easily cleaned, the probe should be replaced.

**For the Model EA100 Levalarm,** remove the upper flanged housing assembly and inspect pivot point on the float rod assembly for excessive wear around the lever pin and the pivot tube for elongation of the holes. Excessive wear may cause the float to "wobble" and could cause the switch mechanism to not respond properly. Inspect the float for any visible damage. Re-assemble the upper flanged housing assembly, with a new flange gasket (P/N C1-3)t, to the Levalarm body. If visible wear is observed, bench testing may be done according to C-R procedure Form E195-A, which can be furnished on request.

For water gage glasses, annual rebuilding of the gage is recommended. However, if the gage glass appears clean with no visible signs of internal deterioration or loss of visibility, the gage may continue to be used until the next inspection.

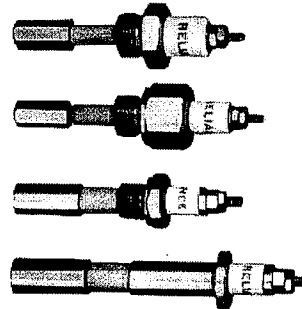
## Probe Type Water Column Maintenance

Clark-Reliance probe type water columns require very little maintenance. We suggest weekly blow downs of the water columns to prevent the build-up of contamination on the probes. A bypass switch can be installed on fuel cutout circuits. This switch will prevent a false trip during blow-down when properly utilized. The blow-down procedure is conducted thoroughly by closing the water valve and opening the drain valve slightly for about 20 seconds.

If blowing-down of the column does not clean the probes sufficiently, use a stainless steel wire brush or fine emery cloth to clean the stainless steel rod portion of the probe. To clean the insulator, use a soft cloth and a mild detergent.

If probes are removed at any time for replacement or inspection, the sealing gasket must be replaced. Probe replacement kits are furnished with two spare gaskets. The gasket part numbers are as follows:

<u>Probe Type</u>	<u>Gasket Part Number</u>
T	WCM-13
V	X175500
ZG	E10-10S
FG	E10-10S



Replacing the probes:

(**Note:** Verify that the power to the probe circuit is off before starting)

1. Close both steam and water valves and drain the column before starting probe maintenance.
2. Remove probe to be inspected or replaced.
3. When replacing the probes, coat threads lightly and uniformly with a high temperature anti-seize type lubricant such as 'Never-Seize', 'MolyCote G', or 'Fel-Pro C'.
4. Torque the probes as follows:
  - Type T, V, or ZG probes to 40 Ft-Lb. (54 Newton-Meters)
  - Type FG probes to 90 Ft-Lb. (122 Newton-Meters)

Hot torquing is suggested for all probes. However, the column must be isolated from service with the drain valve open before retorquing the probes. The hot torquing procedure will extend probe sealing gasket life and should be performed as follows:

1. Partially open the *steam* valve to warm up the column with the drain valve slightly opened.
2. Close steam (and water) valves to isolate the column.
3. Open the drain valve completely.
4. Re-torque as instructed above.
5. Return to service by closing the drain valve, and opening the steam and water valves.



### Interwiring:

The wires attached to the probes must be of high temperature type in order to withstand the heat. Clark-Reliance suggests the following types of wire:

For Application Pressure to 1000 PSIG: 18 Ga., Stranded conductors, Teflon insulation rated at 300 VAC and 200 degrees C. (Belden #83029, Alpha #5857, or equal)

For Application Pressure 1001 to 3000 PSIG: 18 Ga., Stranded conductors, Teflon treated glass braided insulation rated at 300 VAC and 400 degrees C., Nickel coated copper conductor U.L #5182 (Radix #MGT-4502, or equal)

The High temperature wires attached to the probes can be routed to a local junction box or directly to the control unit. If a junction box is used, a low cost 18 Ga. Multi-conductor cable may be used to carry the signal to the control unit. We suggest Belden #8467 or equal.

**NOTE:** Use a wrench to prevent the Probe assembly from rotating while terminal nut is being tightened.



### Troubleshooting:

Troubleshooting is only necessary in the event that a control relay fails to energize or de-energize. In the event that the relay fails to *de-energize* during blow-down, the cause is a failed (short circuited) probe or wire. The probe should be replaced, if necessary.

In the event that a relay fails to *energize*, the following steps should be taken:

1. Verify probe wiring to the appropriate probes from each relay. Verify that all wire terminations are secure.
2. Verify water level in the column.
3. Exchange relays to verify function. If the problem moves with the relay, then replace the relay.

**Note:** Refer to manual E189-A-2 for further detailed instructions.

### Relay Control Units

The Relay Control Unit (FM Approved) contains plug-in electronic relays that perform the on/off functions by responding to the rise and fall of the column water at predetermined levels. The control units supplies a 12 VAC signal to the probes. Integral LED indicators verify relay status.

The relays are wired for Direct Mode Single Service.: rising water activates the relay, falling water deactivates the relay. Optional relays are wired for Inverse Mode Single Service: AC power supply activates the relay, rising water deactivates the relay, and falling water re-activates the relay. (Inverse mode relays are designed for failsafe operation on fuel cutout circuits.)

## Standard ECID-23R Relay Specifications

Design: Solid State components enclosed in a clear Lexan plug-in style housing

Contact Design: DPDT (2 form C): two normally open (N.O.) and two normally closed (N.C.)

Contact Ratings: 5A @ 120, 240 VAC, 5A @ 30 VDC, and 1A @ 120 VDC

Contact Life: Mechanical – 5 million operations, Electrical – 100,000 operations min. at full load

Supply Voltage: Standard units are designed for 120 VAC supply. Some custom units are fabricated for 220 VAC (Refer to appropriate wiring diagram for details)

Supply Current: 4.4 VA

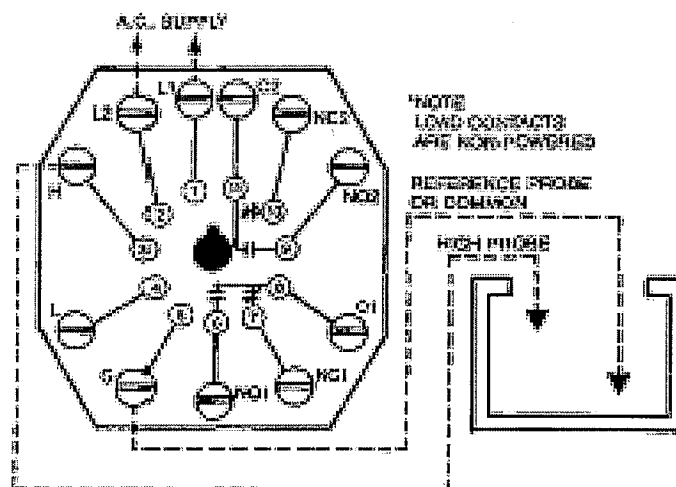
Probe Circuit: 1.5mA @ 12 VAC per probe

Sensitivity: ECID-22R 26,000 Ohms (50 and greater mho water conductivity)  
ECID-23R 50,000 Ohms (10 – 50 mho water conductivity)  
ECID-24R 100,000 Ohms (.1 – 10 mho water conductivity)

Temperature Rating: -40 to +150 degrees F.

Listing: Factory Mutual #0T8A3.AF, CSA #LR14001, and U.L. listed

Direct Mode Operation: When the water level rises in the column to the probe, the control energizes (LED will be lit). The control remains energized until the water level in the column falls below the probe. The relay will then de-energize (LED will not be lit)



Typical single relay module circuit for Direct Mode operation

## Float Type Water Column Maintenance (for pressures under 900 PSIG)

**Note:** Always verify that the water column is not under pressure prior to making repairs.

### WARNING

Do not attempt to unscrew the whistle valve — as turning it without first disconnecting the float rods will damage the working parts. Do not lift the column by inserting a rod in any of the openings as it may damage the levers, rods or floats.

#### FIRST — To remove parts for replacement.

1. Unscrew whistle carefully, with open-end wrench.
2. Take off cap by removing 6 bolts.
3. Remove cotter pins from float rods — and release valve levers.
4. Unscrew valve with monkey or open-end wrench, holding levers with hand as shown in Figures 7 and 8, so they will not catch on sides of column and bend.
5. Then lift out float rods and floats.



Figure 7



Figure 8

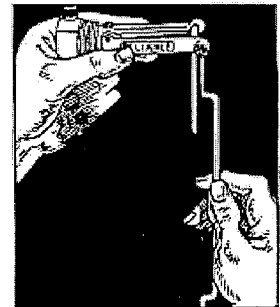


Figure 9

#### SECOND — To reassemble column.

1. Screw float rods into floats firmly, taking care not to change the shape of the rods.
2. Check up on float rods by holding valve in one hand and hooking rods into levers, from inside out. (See Figure 9).
3. Remove rods from levers after above check-up, hold rods with floats together in position and lower into column.
4. Screw in whistle valve — make sure whistle connection points straight up. Hold levers inside column as in Figures 7 and 8.
5. Hook float rods into levers from the inside out, so that the cotter pins will be on the outside of the levers. (See Figure 11). Make sure low alarm rod is in low alarm lever (See Figure 10) and insert new style cotter pins which require no spreading.
6. Replace cap on column — be sure to use new gasket. Tighten bolts firmly. (45 ft-lbs for cast iron columns and 70 ft-lbs. For steel columns)

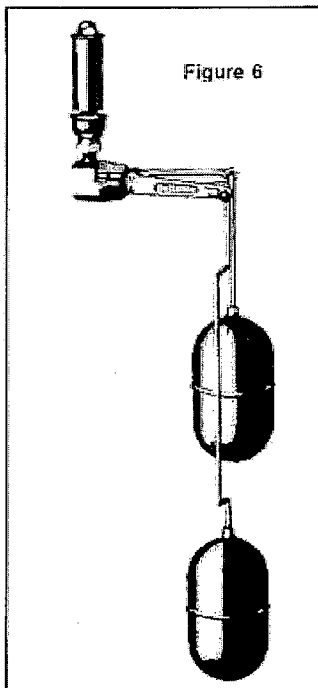


Figure 6

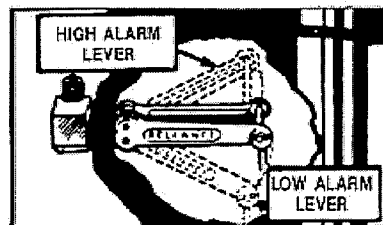


Figure 10

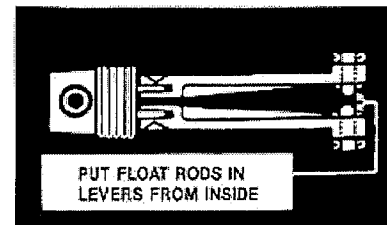
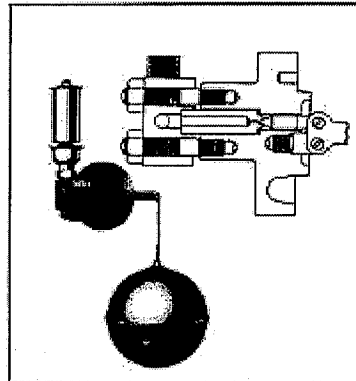
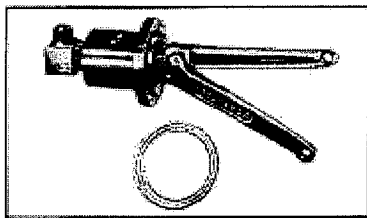


Figure 11

## Float Type Water Column Maintenance (for 900 PSIG rated columns)

To remove parts from Model W0900 for replacement:

1. Unscrew the whistle from the Alarm valve.
2. Remove the 4 nuts holding the valve to the column with a  $\frac{3}{4}$ " wrench.
3. Carefully draw the valve away from the column until the float rod emerges. Fasten a piece of wire to the rod, then fasten the wire to a stud on the column to hold it temporarily.
4. Take the cotter pin from the float rod to release the valve lever.
5. The valve can be disassembled for cleaning or repair.
6. To re-assemble the valve on the column, reverse the above procedure, using a new gasket (Part No. VM900-4) between the valve flange and the column.



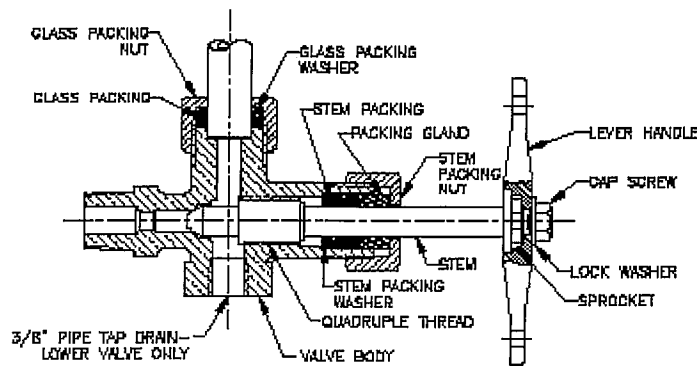
## RetroPak PC Water Column Conversion Kit

The RetroPak PC conversion kit replaces water column alarm floats with electronic controls for alarms, cutouts, pumps, and other equipment. The kit will easily replace the high/low alarm floats with reliable on/off electric controls that will activate local or remote alarms and equipment.

The system is comprised of (1) the RetroPak Cap which contains the number of probes required, and (2) the RetroPak Control Unit.

Please refer to Form E526F for installation and maintenance of the RetroPak Conversion Kit.

## Maintenance Instructions for Bronze Water Gage Valves



Design variations in bronze water gage valves necessitate “typical” illustrations, but basic elements are similar in function and appearance. Some valves used in vertical mounting are also used in Tiltview Water Gage Valves, and operating precautions likewise apply.

### Installation

When mounting bronze water gage valves, make sure they are mounted in exact alignment, especially when tubular glass is used. Any angular or offset misalignment of the valves will strain the tubular glass and may cause early failure. When installing the armored type gage glass or tubular glass in vertical mounting applications, the overall length of the gage should be 2  $\frac{3}{4}$ " less than the valve centers. With Tiltview applications, please consult drawing number B-7535 to determine the correct gage length.

Note that each bronze water gage valve set includes one upper and one lower valve. The lower valve will have a 3/8" FNPT drain connection. The valves must be installed in the correct orientation to ensure proper function.

### Operating Levers

Tools required:  $\frac{1}{2}$ " wrench

To set operating levers in the correct position, close the valve stems tight. Loosen the levers by removing the cap screws. Pull levers forward and turn, with right hand end down, until they are positioned 45° to horizontal centerline of valve. Push the lever back to engage the sprocket teeth at the nearest point to the 45° setting. If the levers do not line up, additional adjustment can be obtained by rotating the sprocket wheel 180° on the valve stem.

### Replacing Stem Packing

Tools Required: 1 ¾" wrench, ½" wrench, ¼" wrench

- 1) Isolate valves from pressure.
- 2) Open drain valve to eliminate any potentially trapped pressure.
- 3) Unhook operating chains from operating levers.
- 4) Remove operating handle and sprocket from valve stem.
- 5) Loosen stem packing nut with 1 ¾" wrench.
- 6) Turn stem counter-clockwise to remove stem/packing assembly.
- 7) Remove stem packing nut, packing gland, stem packing, and stem packing washer. Discard old stem packing material.
- 8) Inspect valve stem and packing cavity in the valve body for steam cut and damage. Replace if necessary.
- 9) Replace stem packing washer, stem packing (set of three), packing gland (concave side toward the stem packing), and stem packing nut.
- 10) Turn stem/packing assembly into valve body.
- 11) Thread stem packing nut onto the valve body and tighten with wrench. Ensure that the valve stem, while being tightly sealed, will still open and close.
- 12) Replace sprocket and operating handle, making sure that the handle is properly aligned (see instructions on page 16).
- 13) Replace operating chain onto operating levers.
- 14) Slowly open isolation valves and inspect for any leakage. Isolate the valves, relieve the pressure, and tighten stem packing nut if necessary.

### Replacing Glass Packing

Tools Required: 1 ¾" wrench, ½" wrench, ¼" wrench

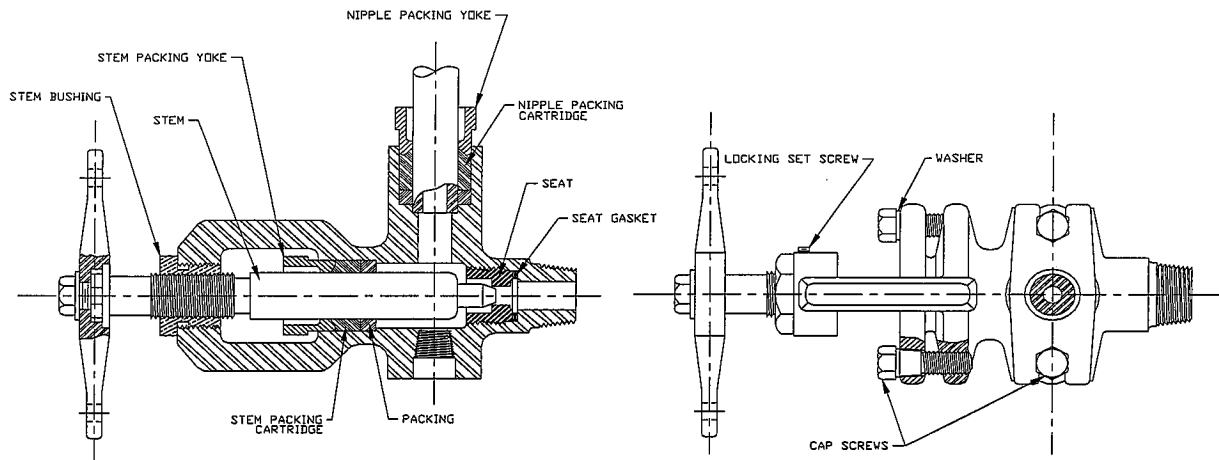
- 1) Isolate valves from pressure.
- 2) Open drain valve to eliminate any potentially trapped pressure.
- 3) Unhook operating chains from operating levers.
- 4) Remove operating handle and sprocket from valve stem.
- 5) Loosen top and bottom glass packing nuts with 1 ¾" wrench.
- 6) Remove tubular glass gage or armored gage from valves.
- 7) Remove nipple/glass packing, glass packing washer, and packing nut. Discard old packing material.
- 8) Inspect end and bore of the tubular glass or gage nipples for erosion or steam cutting. Replace any deteriorated or damaged items.
- 9) To reinstall, slip a glass packing nut onto each end of the tubular glass or ¾" O.D. gage nipple. Follow this with a glass packing washer and a nipple/gage packing ring.
- 10) Insert the top of the tubular glass or upper gage nipple into the top valve body. Insert far enough to allow the lower end of the tubular glass or lower gage nipple to be placed into the lower valve body. Slide packing rings, glass packing washers, and glass packing nuts onto each valve body and tighten.
- 11) Replace operating chain onto operating levers.
- 12) Slowly open isolation valves and inspect for any leakage. Isolate the valves, relieve the pressure, and tighten stem packing nut if necessary.

## Maintenance Instructions for SG700 and SG800 Series Forged Steel Valves

### Installation

When mounting steel water gage valves, make sure they are mounted in exact alignment. Any angular or offset misalignment of the valves may not allow a good seal of the nipple packing and may cause early failure. When installing the armored type gage glass in vertical mounting applications, the overall length of the gage should be 3 1/4" less than the valve centers.

Note that each steel water gage valve set includes one upper and one lower valve. The lower valve will have a 1/2" FNPT/FSW drain connection. The valves must be installed in the correct orientation to ensure proper function.



### To Repack Valves (Valves must not be under pressure)

- 1) Isolate valves from pressure.
- 2) Open drain valve to eliminate any potentially trapped pressure.
- 3) Remove stem bushing locking means; a) If set screw, loosen to clear bushing threads; b) If lock weld bead, file off or cut with hacksaw.
- 4) Remove stem, stem bushing, packing yoke, and **all** old packing material.
- 5) Install new packing cartridge(s). Use SG854-4 stem packing for stem applications, and SG854-5 nipple packing cartridge on valve models with nipple connections for the water gage glass.
- 6) Install packing washer, yoke, stem, and stem bushing.
- 7) Retighten stem bushing locking set screw, or set lock weld bead.
- 8) Replace yoke and cap screws lubricated with Molykote "G", or equal and tighten with a 5/8" open end wrench to avoid over-torquing and stem binding.
- 9) Crack open valves to allow gradual warm up of gage glass for several minutes.
- 10) Close drain valve and further tighten packing yoke screws, if necessary, to stop leakage.
- 11) Open valves and check again for leakage once the valves and packing have reached full operating temperature.

### To Repack Seat (Valves must not be under pressure)

- 1) Isolate valves from pressure.
- 2) Open drain valve to eliminate any potentially trapped pressure.
- 3) Remove stem bushing locking means; a) If set screw, loosen to clear bushing threads; b) If lock weld bead, file off or cut with hacksaw.
- 4) Remove stem, stem bushing, packing yoke, all old packing, and packing washer.
- 5) Insert a  $\frac{3}{4}$ " socket with extension into the valve body, onto the valve seat and remove the valve seat by rotating counter-clockwise. Note: older style valves contain a separate valve seat and seat holder. Remove seat holder with  $\frac{1}{2}$ " socket extension.
- 6) Lift out seat and seat gasket. Dispose of gasket.
- 7) Clean and lubricate threads of seat with Molykote "G" or equal.
- 8) Install new seat gasket and new seat. Tighten seat using 40 ft.-lbs. torque.
- 9) Install packing washer, yoke, stem, and stem bushing.
- 10) Lubricate threads of stem and cap screws with Molykote "G" or equal.
- 11) Repack stem as described. Retighten stem bushing locking set screw, or set lock weld bead. Be sure to check for leakage and re-tighten cap screws (if necessary) shortly after boiler is returned to service.

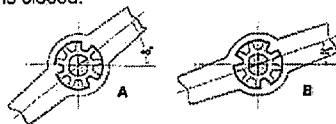
### Installing Chains on Lever Actuated Valve Sets

- 1) Adjust levers with both valves closed. Each lever should be positioned at a 45 degree angle downward to the right. See figure #1 for instructions to adjust the lever onto the valve stem.
- 2) Attach chain (use #8 size chain) to each side of the upper (steam) valve with the "S" hooks, which are included in the chain package. At this stage the levers should be parallel with each other.
- 3) Attach the chain on the left side of the valve lever to the "S" hook on the lower (water) valve.
- 4) Insert the chain on the right hand side of the lever into the bronze locking fixture. Pull the chain tight between the two valves and tighten the locking screw. This is important in order to obtain full closure of both valves. If there is some slack in the chain on the left side of the valves, it has no adverse affect on the actuation of the valves for opening.
- 5) Both chains should extend to a safe elevation below the water gage glass, usually one platform or 10 feet below.

#### 18-POSITION GAGE LEVER

Positive, non-slip locking in 18 positions is assured with the patented Clark-Reliance gage lever. The lever is standard on all Series 400 and 500 bronze water gage valves and all Series 800 forged steel water gage valves.

The gage lever is readily adjusted to the desired angle regardless of the valve stem orientation when the valve is closed.



MOVING THE LEVER FROM POSITION A TO B ACHIEVES AN INTERMEDIATE ANGLE ADJUSTMENT QUICKLY AND EASILY.

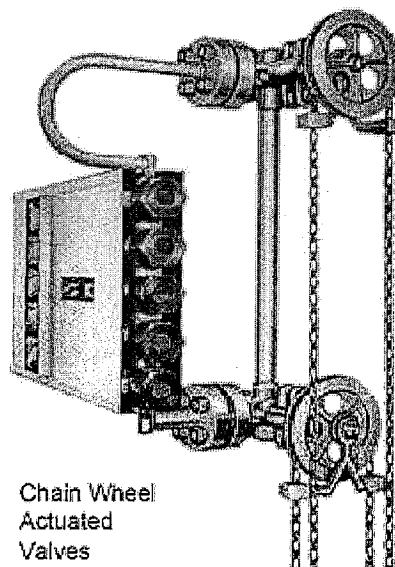
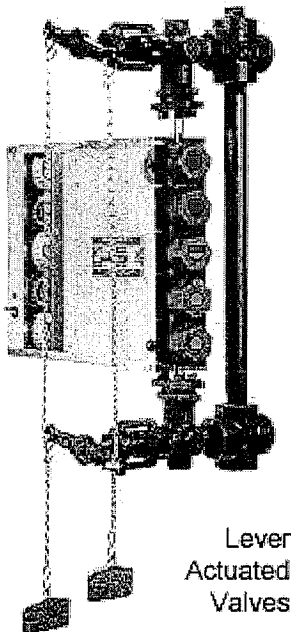
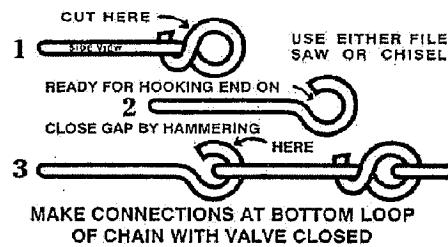
Figure #1



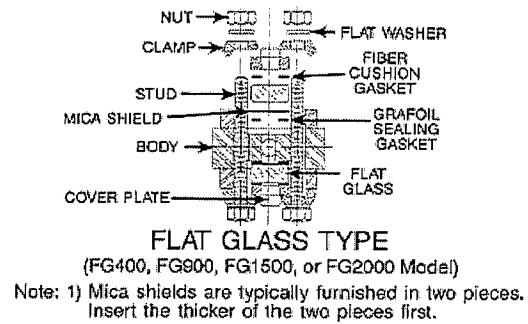
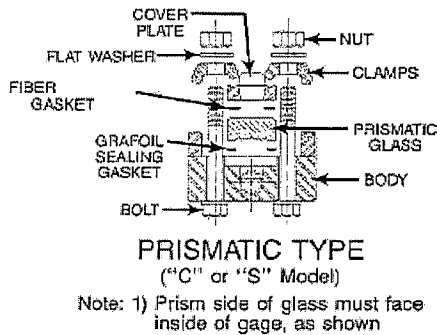
### Installing Chains on Chain Wheel Activated Valves

- 1) The chain wheel on the upper (steam) valve extends further from the valve body than the lower (water) valve. This allows the upper valve chain to fall parallel to the lower valve chain without intersecting it. Install a loop of chain around the chain wheel operator and through the chain guides.
- 2) Attach the ends of the chain together (see figure #2).
- 3) The length of required for each chain wheel equals the length of drop required times two.
- 4) Use #1/0 size double loop chain.

### Directions For Making Endless Chain



# Prismatic and Flat Glass Gages



## BEFORE YOU INSTALL THE GAGE GLASS:

- Support brackets should be considered for gages over four feet long and weighing in excess of 100 pounds. The support brackets will help prevent overloading of the connecting valves and piping. The brackets will also help prevent damage caused by excessive vibration.
- While the advantage of using automatic ball check valves ahead of a level gage is evident, the principal disadvantage is the check valves will prevent effective blow-down of the gage itself. When the level gage drain valve is opened, pressure inside the level gage drops, and the check valve balls are driven into the almost closed positions by system pressure.
- Confirm that the gage glass model number and the pressure rating, which can be found on the nameplate, meet the required specifications and design conditions for the application.

## Maintenance

### Water Gage Removal Procedure

This procedure applies to all Clark-Reliance water level gages with nipple end connections. Nipple end connected water gages are designed in various models to service pressure up to 1500 PSIG (103.4 BarG) saturated steam applications.

Water gages designed for use with bronze water gage valves have an overall length of 2 ¾" (70mm) less than the design of the water gage valve centers. Water gages designed for use with steel water gage valves have an overall length of 3 ¼" (82.5mm) less than the design of the water gage valve centers.

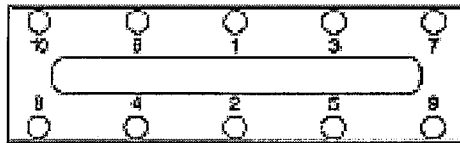
- 1) Isolate the water gage valves and open the drain valve.
- 2) Remove the packing yoke bolts on steel valves. On bronze valves loosen the nipple packing nut.
- 3) Grasp the water gage firmly and push up into the upper (steam) valve. This action will disengage the water gage from the lower (water) valve.
- 4) Carefully swing the water gage off to one side and drop it out from the steam valve.

**Disassembly:**

- After pressure is relieved from the gage glass, remove from the boiler drum and lay flat on a workbench
- Loosen end bolting first, working from the opposite ends toward the center of the gage.
- Remove all components including washers, finger clamps, cover plates, gaskets, glass, and Mica shields. Retain the bolting and cover plates. Discard all gaskets, glass, and Mica. Note: **Never** re-use these components, even when they appear to be in perfect condition!

**Reassembly:**

- Inspect all glass kit components. Verify that the repair kit is the correct one for the model gage that is being repaired. Carefully inspect the glass for any chips, cracks or scratches. Do not use the glass if it is damaged! Inspect the Mica shields and gaskets for any visible signs of damage, Do not use these components if damaged!
- Use a bronze or brass scraper to remove any bits of gasket material that may remain, without causing damage to the gage body or cover plate(s).
- Examine body gasket surfaces for steam cuts or scratches. Gouged or scratched gasket surfaces may be re-machined if necessary. See Clark-Reliance Form E190-A for machining details and tolerances.
- Locate the gaskets, Mica (if on Flat Glass Gages), and glass centrally in the seat and cover to avoid any glass-metal contact at the ends or sides.
- Clean and lubricate all fasteners with Molycote or similar high temperature anti-seize lubricant.
- Tighten nuts 'finger tight' in the sequence shown in the sketch. Using a calibrated torque wrench, tighten all nuts in the proper sequence in 1/3<sup>rd</sup> increments.



-Torque values

'C' and 'S' Prismatic	40 Ft. Lbs. (54 Newton Meters)
FG400 or FG900 Series	45 Ft. Lbs. (61 Newton Meters)
FG1500 or FG2000 Series	70 Ft. Lbs. (95 Newton Meters)

- Hot torque gage per instructions found on page 22 of this manual.
- Return gage to service
- Note:** Conduct regular inspection of the gage glass. The gage must be repaired if there are any signs of scratches, etching, erosion of the glass, clouding, or deterioration of the glass or Mica shields.

# Simpliport Gage

## Boil-Out Procedures (Form E-146A) Must be Completed Prior to Start-Up

### To Place SIMPLIPORT® in Service:

1. Shut off water gage valves.

2. Make proper connection of SIMPLIPORT and nipples or flanges to water gage valves employed.

**NOTE:** Where end nipples are furnished, be sure that red lug is at the top and that all SIMPLIPORT window packing nuts point slightly to the left as observed by viewer. See Fig. No. 2.

3. With Cold Boiler:

a) Open water gage valves and allow SIMPLIPORT to heat up along with boiler.

b) When operating pressure has been attained, close water gage valves and bleed pressure from SIMPLIPORT. It is now necessary to retorque each window nut to Specified Value (see page 2, Fig. 3). Then double check each port window for leakage. A small mirror held opposite the leak-detector hole (drilled through one face of each window nut) is useful here. If leakage is observed, shut off water gage valves and replace module of affected port, as described on reverse side under "To Maintain SIMPLIPORT."

**NOTE:** If a mirror is used to detect leaks a small wisp of steam may be seen on the surface of the mirror when held directly opposite of the leak detection hole. This is typical and should not be construed as a failure.

c) Mount illuminator and hood on side lugs of SIMPLIPORT, joining red slot in illuminator with red lug on SIMPLIPORT.

4. With Hot Boiler:

a) Open drain valve. Crack open steam valve to permit gradual warm-up of SIMPLIPORT for about five minutes so as to obtain operating temperature. Close steam valve and make sure all pressure is released from SIMPLIPORT (drain should remain open).

b) It is now necessary to retorque each window nut to the specified torque. (see page 2, Fig 3)

c) Check each port window for leakage. A small mirror held opposite the leak-detector hole (drilled through one face of each window nut) is useful here. If leakage is observed, shut off water gage valves, drain gage and replace module of affected port, as described on reverse side.

**NOTE:** If a mirror is used to detect leaks a small wisp of steam may be seen on the surface of the mirror when held directly opposite of the leak detection hole. This is typical and should not be construed as a failure.

d) Mount illuminator and hood on side lugs of SIMPLIPORT.

### CAUTIONS:

1. NEVER APPLY TORQUE TO SIMPLIPORT UNDER PRESSURE.
2. EXCESSIVE BLOWDOWNS MAY SHORTEN GAGE SERVICE LIFE (Form E-156B).

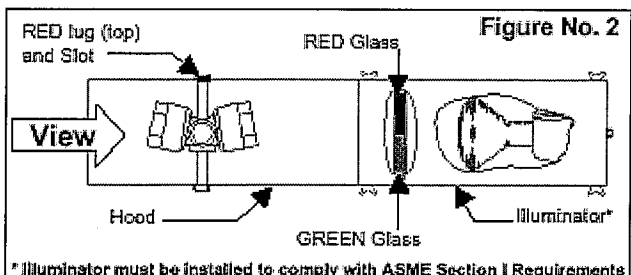
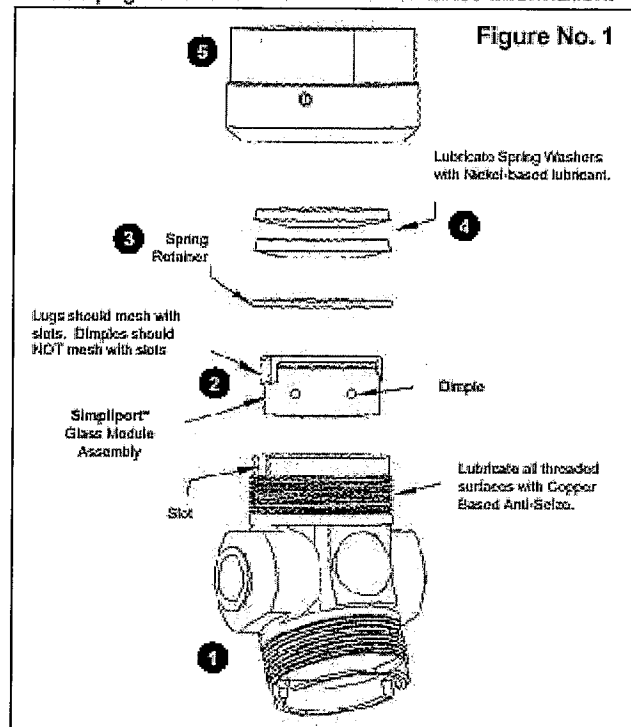
## Authorized Field Services

Plant-Op Centers™ are the first and only of its kind - a network of professional service, repair and sales facilities specializing in the level indication and control industry. Plant-Op Centers are authorized, supported and continually trained by the world's leader in visual process safety - Clark-Relliance. Contact Clark-Relliance or visit the website to locate your nearest Plant-Op Center.

## SIMPLIPORT COMPONENTS (Fig. 1)

1. SIMPLIPORT Body ( Single Window Unit)
2. Module (PW-24BR)
3. Spring Retainer (PW-40)
4. Spring Washers (PW-39) Packing Nuts PW-27R and PW-41 (PW-66) Packing Nut PW-68
5. Packing Nut (see Fig. No. 3)  
Low Pressure - PW-27R  
High Pressure - PW-41  
Hi-Lo Pressure - PW-68

**Note:** Use only OEM replacement modules to retain design and maintain performance safety standards. See page two for additional maintenance information.



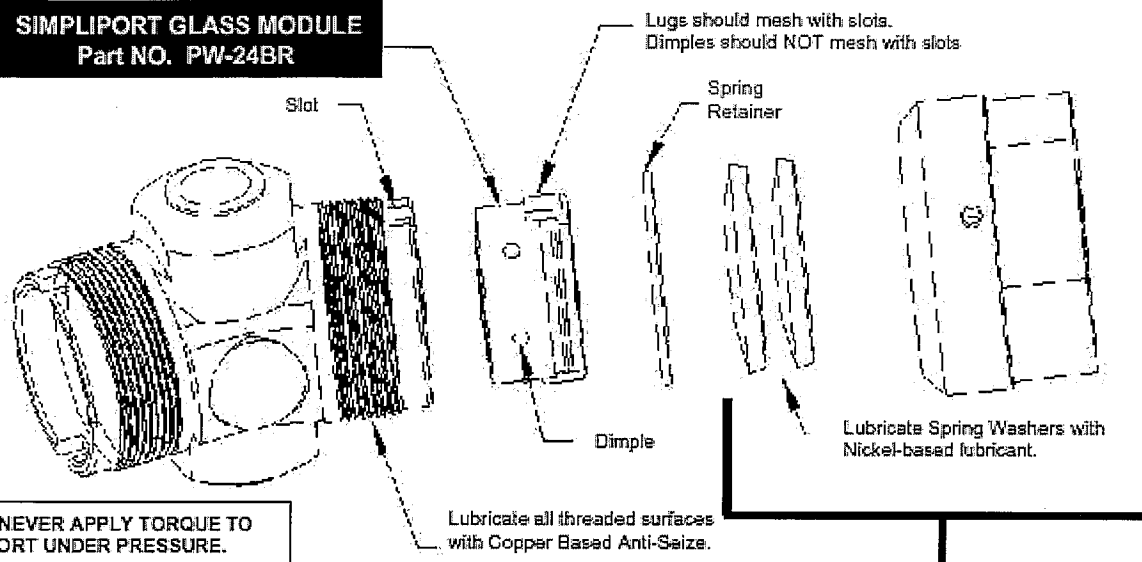
Make sure that illuminator is mounted as shown with respect to the gage

## INSTALLING SIMPLIPORT® O.E.M. REPLACEMENT MODULES

(required: Torque Wrench w/ 1-7/8" Socket, Special Pliers - part # PW-35, Lubricant - see steps 7 & 8)

1. Shut off water gage valves and drain gage.
2. Remove packing nut containing Spring Washers - save for re-use.
3. Remove old module and discard. (use Special Pliers, # PW-35)
4. Wipe recess in Body with clean cloth; be sure that the Gasket Groove at bottom is perfectly clean and smooth. An electric drill with a medium grade 1" (25mm) diameter stainless steel wire brush may be used to polish the Gasket Surface, if necessary.
5. Check that the sealing Gasket is centered in the Glass Module.
6. Install Glass Module. Lugs should mesh with Slots / Dimples should NOT mesh with Slots.

### SIMPLIPORT GLASS MODULE Part No. PW-24BR



7. Remove Spring Retainer and Spring Washers from Packing Nut. Clean and inspect Spring Washers for cracks or pitting. Damaged Spring Washers should not be re-used. Lubricate each Washer with Nickel-based lubricant, and re-insert into the Packing Nut as shown below - note the number & position of the Spring Washers for each assembly.

A). Do not sandblast Spring Washers. Clean with solvent only.

B). Packing Nuts may be glass-bead cleaned to remove corrosion and dirt from threads.

8. Lubricate Threads on Gage Body with a Copper-based lubricant.

9. A) Install Packing Nut Assembly and turn Nut "finger-tight".

B) Tighten Nut to Specified Torque - see below (Fig No. 3).

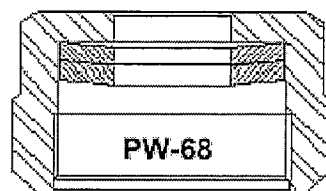
10. Crack open Shut-Off Valves and close Drain Valve to allow Gage to reach operating temperature (approximately 5 minutes).

11. Close Shut-Off Valves and re-open Drain Valve.

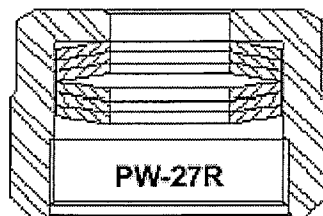
12. Re-Torque Packing Nuts to Specified Torque - see below (Fig. No. 3).

### SIMPLIPORT PACKING NUT ASSEMBLY

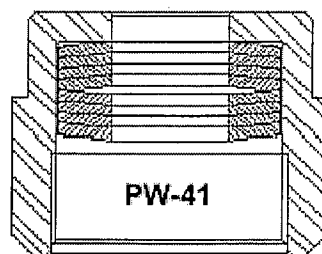
Part No. PW-27R (Low Pressure)  
Part No. PW-41 (High Pressure)  
Part No. PW-68 (Hi-Lo Pressure)



**PW-68**  
Hi - Lo Pressure  
2 Spring Washers  
Torque to 140 ft-lbs.  
(190 Newton-Meters)



**PW-27R**  
Low Pressure  
6 Spring Washers  
Torque to 95 ft-lbs.  
(130 Newton-Meters)



**PW-41**  
High Pressure  
8 Spring Washers  
Torque to 120 ft-lbs.  
(165 Newton-Meters)

Simpliport®  
Packing Nut  
(x-sectional view)

Figure No. 3

### **Recommendations and Instructions for Hot Torquing Gage Glasses and Probe Type Devices**

When a new piece of equipment, whether a Gage Glass or a Probe\* type device is installed, the hot torque procedure must be performed. This ensures that all bolting and components are properly seated for optimum performance. This procedure must also be performed after any maintenance is done to the equipment. Note that only the affected components, such as the installation of a new probe or glass kit, need to be hot torqued.

All work must be done by a qualified technician. All plant rules and procedures must be followed, including any lock out / tag out requirements. Verify that all alarms and trips have been by-passed on probe columns before any maintenance is performed, to prevent any false alarms or wiring hazards.

The hot torque procedure should be performed as follows:

- 1) Isolate the gage glass or probe device from any pressure.
- 2) Fully open the drain valve to evacuate any built up pressures and to allow the contained steam and water to escape during equipment warm up.
- 3) Slowly open the *steam valve* to allow a gentle rush of steam to flow through the equipment. This should take approximately 5 – 10 minutes. The observer should see the High Temperature lubricant “sizzling” and smoke emanating from the gage of column. This is an indication that the equipment has reached the operating temperature.
- 4) When the equipment has been properly heated, close the steam valve. The drain valve should remain open to allow any residual steam or pressure to escape.
- 5) Immediately re-torque the equipment to the correct values stated in the applicable instruction manual. There should be movement of approximately 1/8<sup>th</sup> of a turn or more.
- 6) If there is no movement of the bolting or probes, the equipment was not heated properly. Repeat the procedure.
- 7) Once the hot torque procedure is completed, close the drain valve, and the equipment can be put back into service. Carefully check for any leaks in the equipment and verify proper operation of all illumination, relay controls and wiring, or other accessories.

\*Note that Model FSB Compression Type Probes do not require hot torquing. Refer to Clark-Reliance form E229-A for further instructions.

## Installation Instructions for Model GL-53 Water Gage Illuminators for Tubular Glass Gages or Prismatic Gages

### 1. General Information

Model GL-53 Water Gage Illuminators are designed to improve the vision of the water level, for plant personnel. If a tubular glass or prismatic type water gage is installed in an area with adequate lighting, a gage illuminator may not be required. However, if the water gage is to be viewed from a distance greater than 25 feet, or in poorly lit areas, then a gage illuminator is recommended.

### 2. Installation

Model GL-53 illuminators are designed with a ½" female NPT electrical conduit connection. These illuminators should be installed vertically with the conduit connection located at the bottom. A flexible power cord can be temporarily installed on the unit, and used to test the unit. This will enable the installer to optimize the illuminator location, with respect to the gage. **CAUTION: when testing the position of the unit, the housing will become very hot when powered.** Then, a permanent power connection can be installed. Normally, the illuminator will be installed parallel to the gage and off to the left or right side, to prevent obstructing the operator's view of the water gage.

If the illuminator is to be installed with a prismatic type water gage, one illuminator can be used for up to two sections of size 9 glass or approximately 27 inches of water gage viewing.

This illuminator can be installed outdoors.

### 3. Maintenance

There is no maintenance required, other than the occasional need to service the lamp. For additional instructions, see form E178-A. As an option to extend lamp life, we suggest an illuminator timer: model TPS-120 (for 120 VAC supply) or TPS-240 (for 240 supply). An illuminator timer provides up to 3 minutes of operation time, by depressing a pushbutton. This results in extended lamp life, reduced power consumption and maintenance. Consult C-R or your local representative for additional details.

**Wiring instructions for the Clark • Reliance GL53 Illuminators  
(for 'C' and 'S' Series Gages).**

Note: Make sure that the power is turned off to the supply wiring  
before connecting the illuminator.

Tools needed:

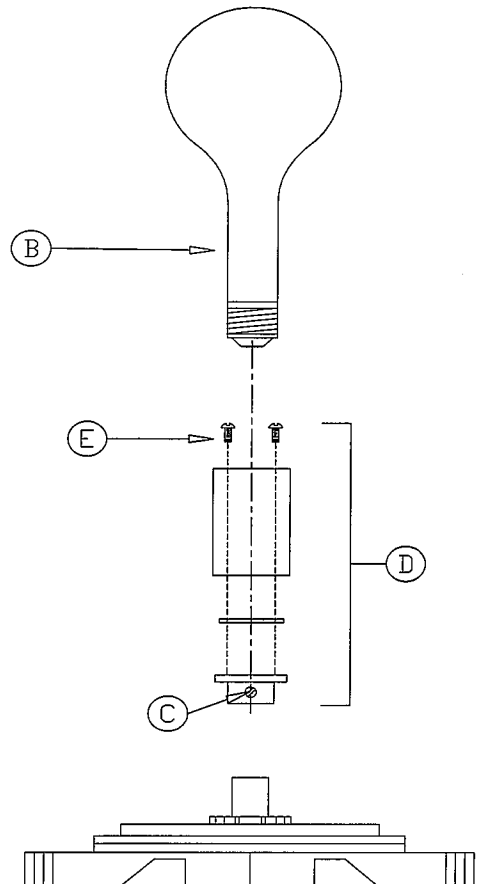
- Slotted Screwdriver
- 1/2" Wrench

1. Open the illuminator housing by loosening the three hex head cap screws on the end of the unit that secures the Conduit/Lamp assembly in place.
2. Carefully remove the assembly and remove the 60W Frosted Lamp (B) from the illuminator housing and set aside.
3. Loosen the screw (C) from the side of the lamp socket/conduit connector that holds the assembly in place on the pipe nipple.
4. Take the lamp socket/conduit connector assembly (D) off of the housing end piece and set the housing aside.
5. Disassemble the lamp socket/conduit connection assembly by removing the two screws (E) from *inside* of the lamp socket. (Note that there are two small washers on the assembly screws. Do not lose these washers as they are needed for re-assembling the illuminator.)
7. Connect the *black* wire to the 'gold' screw terminal on the bottom of the lamp socket.
8. Connect the *white* wire to the 'silver' screw terminal on the bottom of the lamp socket.
9. Re-assemble the lamp socket/conduit connector assembly using the same two screws with washers inside of the lamp socket. Make sure that the mounting plate is centered on the lamp socket/conduit connector assembly.
10. Thread the lamp socket/conduit connector assembly back into the bottom of the pipe nipple and tighten the holding screw.
11. Carefully screw the lamp into the socket and re-assemble the bottom assembly back onto the illuminator housing (make sure that the gasket between the bottom assembly and housing is in place). Secure by tightening the three hex head cap screws on the bottom side of the housing.
12. Wire the illuminator to the 120 V.\* power supply. (\*Unless lamp is for 230 V. service) Note that a proper ground wire is recommended.

**GL53 Illuminator - 120V.**

Specification: 60W/120V

Current Draw: .5 Amps





**Wiring instructions for the Standard and Vertical Clark • Reliance Flat Glass Gage Illuminators (for FG900, FG1500, and FG2000 Series Gages).**

Note: Make sure that the power is turned off to the supply wiring before connecting the illuminator.

Tools needed:

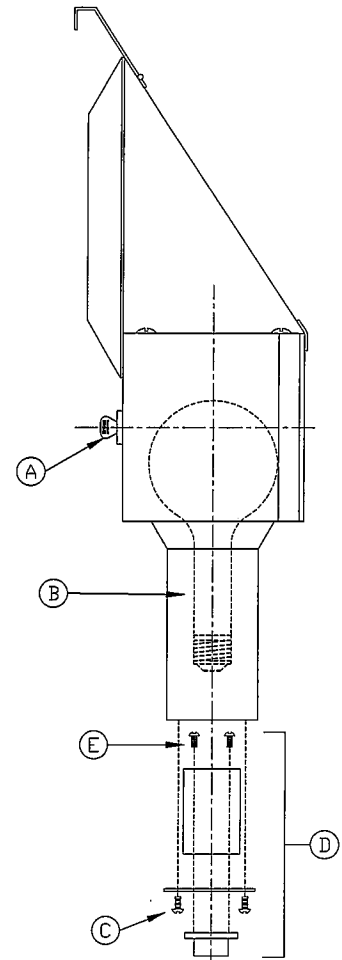
– Slotted Screwdriver

1. Open the illuminator housing by loosening the thumb screw (A) in the side of the unit that secures the door assembly in place.
2. Carefully open the door and remove the 150W clear lamp (B) from the inside of the illuminator housing and set aside.
3. Remove the two brass screws (C) from the bottom of the illuminator which hold the lamp socket/conduit connector assembly in place.
4. Take the lamp socket/conduit connector assembly (D) from the illuminator housing and set the housing aside.
5. Disassemble the lamp socket/conduit connection assembly by removing the two screws (E) from *inside* of the lamp socket. (Note that there are two small washers on the assembly screws. Do not lose these washers as they are needed for re-assembling the illuminator.)
6. Slide the conduit connector and mounting plate over the power supply wires for re-assembly.
7. Connect the *black* wire to the 'gold' screw terminal on the bottom of the lamp socket.
8. Connect the *white* wire to the 'silver' screw terminal on the bottom of the lamp socket.
9. Re-assemble the lamp socket/conduit connector assembly using the same two screws with washers inside of the lamp socket. Make sure that the mounting plate is centered on the lamp socket/conduit connector assembly.
10. Place the lamp socket/conduit connector assembly back into the bottom of the illuminator housing and fasten with the two brass screws.
11. Carefully screw the lamp into the socket and close the illuminator door. Secure by tightening the thumb screw on the side of the housing.
12. Wire the illuminator to the 120 V.\* power supply. (\*Unless lamp is for 230 V. service) Note that a proper ground wire is recommended.

**FG\*0 Standard Illuminator - 120V.**

Specification: 150W/120V

Current Draw: 1.25 Amps



# Reliance DuraStar

## INSTALLATION, OPERATING & MAINTENANCE INSTRUCTIONS

### STORAGE and HANDLING

The Reliance DuraStar LED Illuminator meets or exceeds all applicable specifications when shipped from the factory.

All units should be inspected upon receipt to ensure that no damage has been incurred during transit. If there has been, a claim should be filed with the carrier immediately. The unit should be stored in an area protected from the elements and corrosive fumes, in a secure manner where they can neither fall, nor be struck by other objects. Care should be taken to protect the window and the end connections from damage. Avoid placing any objects on the illuminator at any time.

### COMPONENTS

There are three main components that make up the DuraStar Illuminator: the light strip with louvers, the power supply, and the cable connecting these two main pieces. The cable may have more than one piece depending on the required distance between the illuminator and the power supply. *Note that an illuminator hood is not required or recommended.*

### INSTALLATION

**Caution:** All lights are tagged with the service conditions for that particular unit. These specifications are located on the Reliance tag on the power supply housing, and are contained in the "Specifications" section of this manual. Do not use or refer to specifications listed on the red label on the power supply housing. They are specifications for generic use. Review the ratings prior to installation and again prior to start-up, to ensure proper operation in the installed environment. Should there be any doubt as to the applicability of a unit for the installed environment, consult the factory before placing the unit into service.

**Note:** All installation steps should be performed by a qualified technician and should be executed in accordance with all applicable national and local codes.

The light and power supply should be checked to ensure that they contain no foreign matter, and that the end connections are clean, undamaged, and in line with existing conduit.

### Step by step instructions:

- 1) The upper bracket on the illuminator has two holes that fit onto the hood pins that are installed on the top of the gage glass body. There are two different upper brackets: one for the FG400 and FG900 series gages and another for the FG1500 and FG2000 series gages. Verify that the assembly you received fits the existing gage glass. Slip the upper illuminator bracket onto the hood pins. (See Figure 1)
- 2) Let the lower bracket rest on the gage glass between the cover plate. Adjust the lower bracket by loosening the set screw and align the bracket at the lowest point on the glass between the cover plate opening. Tighten the set screw to secure the lower bracket.

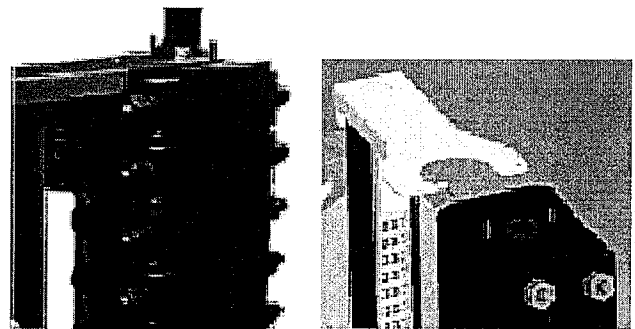
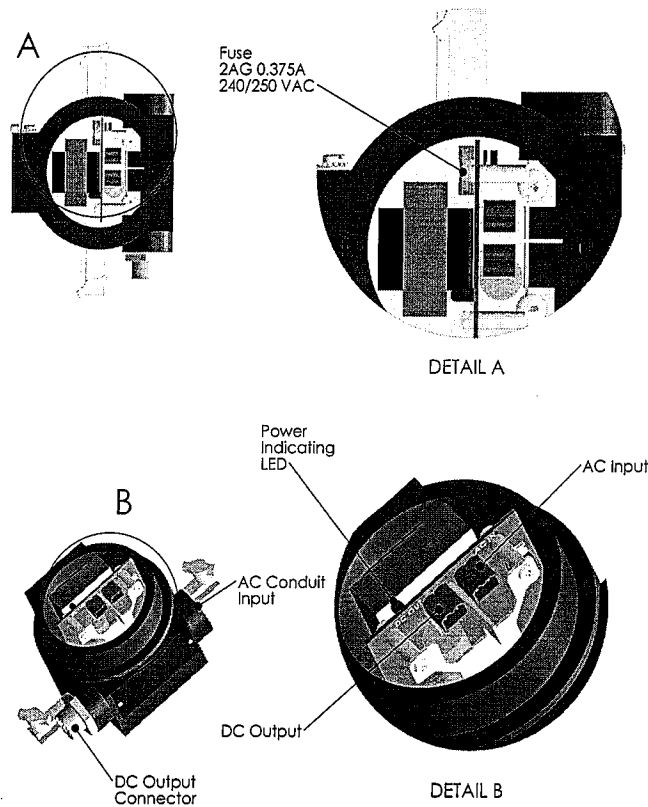


Figure 1

**Figure 1 : Wiring Instructions**



**Caution:**  
Incorrectly wiring the AC input to the DC output will cause permanent damage to the power supply and could result in ignition of hazardous atmosphere

Confirm that the correct supply voltage is being applied to the illuminator power supply. The unit has been manufactured for a specific power source, either 120 or 240 VAC.

**SPECIFICATIONS**

Power Supply: 120 or 240 VAC @ 50-60 Hz  
Power Consumption: < 750 mA @ 120 VAC  
< 375 mA @ 240 VAC

Est. Life: 100,000 Hours (continuous)

Agency Approvals: FM and CSA  
Class I, Div. I Grps. B, C, & D  
Class II, Div I, Grps. E, F, & G  
Intrinsically Safe Associated Apparatus

Wire Size: Min 18 AWG / Max 12 AWG  
Max dist. from power supply to light: 8 feet (2.5M)

Ambient Temperature: -40 F (-40 C) to 170 F (77 C)  
Electrical Connection: 3/4" FNPT

### **Instructions for Wiring Simpliport Illuminators with Halogen or Incandescent Lamps**

Inspect each illuminator for any signs of damaged lamps or color filters. Replace any damaged component before wiring the illuminator. Mount the illuminator on to the Simpliport gage. Note that the red mark on the upper left side of the illuminator should correspond with the red lug on the Simpliport gage. Each Simpliport Illuminator is furnished with 24" of 18 Ga. Wire. To wire the Simpliport Illuminator, with the power disconnected, simply field splice the the existing "pigtail" ends to the 120 VAC power supply or for 240 VAC Power, as specified on nameplate. Connect the power and make sure all the lamps are illuminated and the color filters are oriented correctly: The red color filter should be on the left side of the illuminator as you are viewing it.

### **Instructions for Adjusting Simpliport Illuminators, Hoods, and Intermediate Mirrors**

To begin with, neither the Simpliport Gage, nor the illuminator, nor the companion hood is equipped with any adjustment device as such. Adjusting screws, levers, etc. were omitted from our design for two primary reasons. First, they would add both to the complexity and cost of the equipment; and second, they would be seldom used even if they were available.

There is sufficient clearance — call it "slop", if you like — in the mounting slots of both the illuminator and hood to permit a fair degree of angular movement of either, with respect to the Simpliport Gage itself. Such relative movement is accomplished by (a) loosening all four of the mounting lug screws, (b) exerting moderate lateral pressure at the back of the illuminator and/or at the front of the hood — in either angular direction — while holding stationary the gage itself, and (c) re-tightening the four lug screws, while the gage equipment is in optimum alignment. Once secured in the proper position, the assembly requires no further "adjusting" unless or until the lug screws are again loosened. In most installations, moreover, the illuminator-to-gage-to-hood alignment is such that no adjusting pressures need ever be applied. However, since the illuminator and hood are both essentially sheet metal components, in which close tolerances are difficult to hold, the type of adjustment just described is in fact occasionally required.

#### Attaining "optimum alignment":

Keep in mind that one important characteristic of the ported gage is that it must be viewed from a position directly in front of the gage, or else the observer will see all red ports or all green ports, regardless of the actual water level. Furthermore, the observer should be well away from the gage — at least 3 feet, and preferably 5 to 6 feet. The farther away the observer stands, the more latitude he has between the vantage points from which the gage can be properly observed. Therefore, at the time of original installation, it is desirable to mount and try out the illuminator first; that is, before attaching the companion hood (either Open End or Periscope). In doing this, one person should be stationed approximately 6 feet in front of the gage. Then, with the illuminator turned on and with the gage about half full of water, the observer can signal a helper as to which way the rear of the illuminator should be moved for best viewing (i.e., so that the lower ports show all green and the upper ports all show red).

Next, the companion hood should be installed. And again, the above procedure should be repeated, this time moving the front of the hood to the best position for viewing, while holding firmly the back of the illuminator. With an installation involving a Periscope hood, an observer should be positioned at a distance of 6 to 12 feet directly below the Periscope hood, if at all possible, and should look up into the hood at the hood mirror during the second step — rather than trying to observe the gage image via a floorstand mirror, at this stage. The same recommendation also applies to installations involving intermediate mirrors. The main idea is to back away from the gage on a mirror-to-mirror basis. Make sure first that you can see the image properly. And if you can, so can a mirror, provided that it is located in your line of vision. If you cannot see the gage image correctly by looking directly into the next closer mirror (due for instance to an improper adjustment of that closer mirror, or of the illuminator) then it simply will not be possible to rectify the situation by adjusting or relocating the floorstand mirror assembly.

And finally, all ported gages — competitive models as well as the Clark-Reliance Simpliport Gage — are more sensitive to dirty or turbid water, and to deposits on the mica shields, than are continuous vision, Flat Glass type gages. Dirt in the water or on mica protectors will scatter or diffuse the light from an illuminator, resulting in a port image which appears as a blurred mixture of red and green. Also, even where clean water and a clean gage are involved, there may be a thin "crescent" of red showing in an otherwise all green (water filled) port, or a thin green "crescent" showing in an otherwise all red (steam filled) port. This is normal and the result of internal reflections. It is usually more pronounced in new gages, where the freshly machined stainless steel parts have not as yet tarnished. The thin crescents in no way affect the gage performance or readability, since the red and green ports are bright, clear, and readily distinguishable from one another, with a properly adjusted system.

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## Simpliport LED Bi-Color Illuminator

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The Simpliport LED Illuminator Assembly has been designed to accept 120 or 240 VAC power sources and for a service life of up to 7 years. The Illuminators are available in weatherproof and explosionproof models. The explosionproof models meet NEC hazardous area classification: Class 1 Division II, Group B, C, and D.

### STORAGE and HANDLING

All units should be inspected upon receipt to ensure that no damage has been incurred during transit. If there has been, a claim should be filed with the carrier immediately. Units should be stored in a dry and sheltered area prior to installation, in a secure manner where they can neither fall, nor be struck by other objects. The temperature of the storage area should not exceed 150° F. (84° C.) or drop below 32° F. (0° C.).

### COMPONENTS

There are five main components that make up the Simpliport Illuminator Assembly: the LED Illuminator, the front end hood, the mounting bar assembly, the power supply, and the cable connecting the power supply to the LED Illuminator. The cable may have more than one piece depending on the required distance between the Illuminator and the power supply. In most cases, however, the power supply will be mounted directly to the LED Illuminator.

### INSTALLATION

**CAUTION:** All LED Illuminators are tagged with the service conditions for that particular unit. This information is located on the power supply housing. The ratings should be reviewed prior to installation and again prior to start-up, to ensure proper operation in the installed environment. Should there be any doubt as to the applicability of a unit for the installed

environment, consult the factory before placing the unit into service.

**Note:** All installation steps should be performed by a qualified technician and should be executed in accordance with all applicable national and local codes.

The LED Illuminator and power supply should be checked to ensure that they contain no foreign matter, and that the end connections are clean, undamaged, and in line with existing conduit.

Step by step instructions:

- 1) Assemble the mounting bar assemblies to the Simpliport Gage mounting lugs using the (4) 5/16" X 1" SHCS that are provided (Fig. 1).
- 2) To mount the LED Illuminator assembly to the gage, hold the illuminator over the hinge pin assemblies on mounting bar and release the pins. The pins should engage the flanged bearings that are pressed into the illuminator end caps. Note: the Simpliport Gage must be viewed with the packing nuts facing slightly to the left. The LED Illuminator must be mounted to the opposite side of the gage (Fig. 2).
- 3) Repeat the procedure in Step 2 to mount the front end hood to the opposite side (viewing side) of the gage.
- 4) The unit's power supply has wire leads ready to connect to the incoming power source. Remove the cap in the 3/4" NPT conduit connection to expose the wires. There is no need to open the housing (Fig. 3)
- 5) **IMPORTANT:** The incoming power source must have a "sealing fitting" in the conduit supplying power to the light's power supply within 18" of the power supply.

- 6) Remove the cover on the power supply once the power has been turned on. An LED will be lit if it is wired correctly.
- 7) If the LED in the power supply is not lit, check the power source and the connection before continuing.
- 8) If the LED in the power supply is lit, replace the cover on the power supply, and connect the LED Illuminator to the power supply using only the cable supplied.
- 9) If the cable will not reach the power supply, contact your local representative or factory for the required extension cable.

### OPERATION

The Simpliport LED Illuminator can operate continuously. The operating life of the LED's is up to 7 years under normal conditions.

Customers may install a switch or a model TPS-120 Timer Power Switch if desired. Any additional components must be installed prior to the customer's sealing fitting.

### ROUTINE MAINTENANCE

Keep glass on the front of the front end hood and in the illuminator assembly clean using commercial glass cleaners, such as Windex® or similar. Never use harsh abrasives, wire brushes,

metal scrapers, or any material that could scratch the glass.

The Illuminator may be removed during inspection or maintenance of the customer's Simpliport gage. The gage can be accessed for routine maintenance on the right or left side by releasing the hinge pins on the mounting bar. The LED Illuminator and the front end hood can both be removed by releasing the hinge pins on both sides of the mounting bar. Make sure that the hoods are supported during removal, as damage can occur if either the front end hood or LED Illuminator are dropped.

The LED Illuminator may also be disconnected from the power supply, if desired. Disconnect the cord at the supplied screw connector adjacent to the power supply. The plant power going to the power supply does not need to be disconnected.

### Model Numbers

RSI \*LED Weatherproof LED Illuminator Hood

RSI \*LED EX Explosionproof LED Illuminator Hood

RSH \*LED Front End Hood

Note: To complete the Model Number, replace the \* with the number of window units.

### SPECIFICATIONS

Power Supply:	120 or 240 VAC @ 50-60 Hz 24V DC (800 mA)
Power	.10 Amp @120 VAC
Consumption:	.10 Amp @ 240 VAC
Est. Life:	Up to 7 years (continuous)
Agency Approvals:	
Ratings:	Class 1, Div 1, Grps. B, C, & D Class 2, Div 1, Grps. E, F, & G
Wire Size:	Min 16 AWG / Max 12 AWG
Max dist. from power supply to light:	90' (27.5 M) Standard Cable = 8' (2.5M)
Ambient Temperature:	-40 F (-40 C) to 170 F (77 C)

Figure 1: Typical Simplicort LED Illuminator Installation

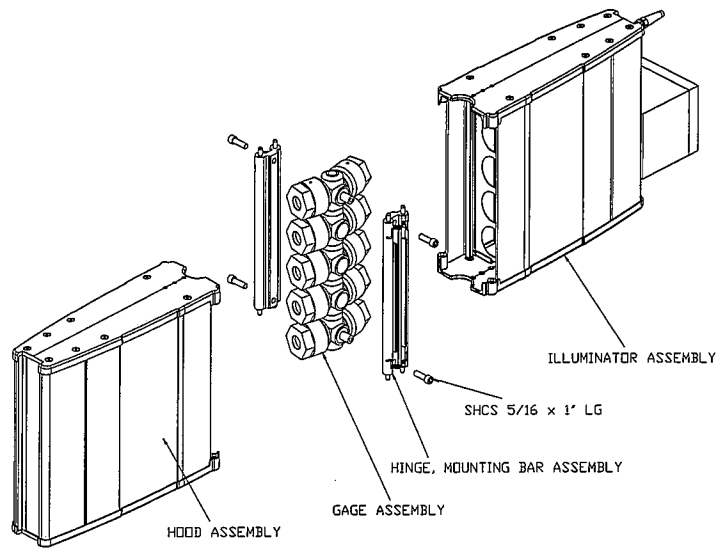


Figure 2: Viewing the Gage

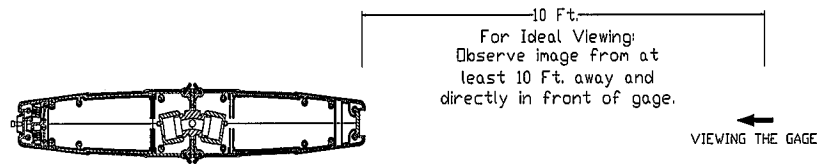
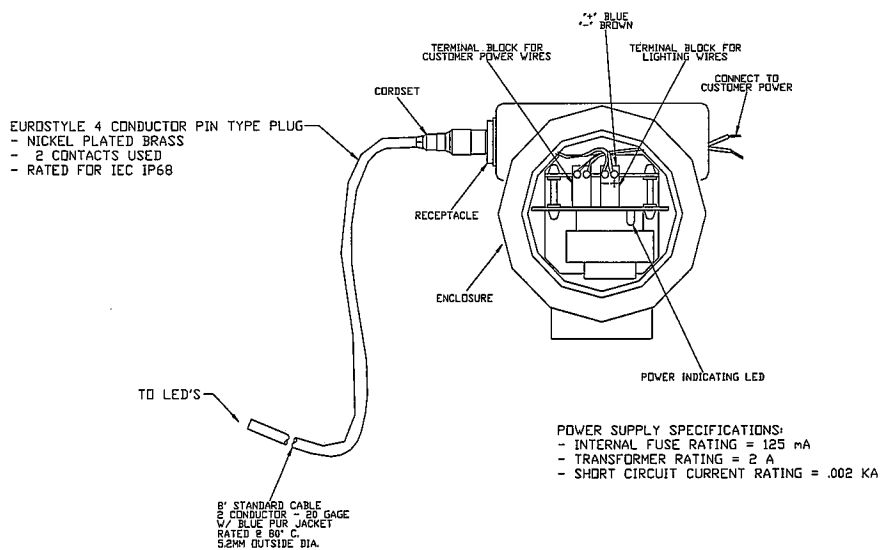


Figure 3: Typical Power Supply Installation



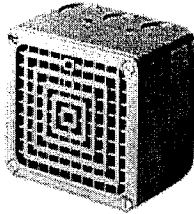


# Accessories and Options

## AUDIBLE ALARM HORNS

Standard Model H350N (for 120 VAC)  
Standard Model  
H350NA (for 240  
VAC)

Weatherproof Model  
H350W (for 120 VAC)  
Weatherproof Model  
H350WA (for 240 VAC)



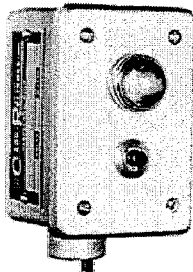
Audible alarms are available for all Levalarm applications. The vibratory horn has a decibel rating of 100DB at 10 ft. and comes in standard or weatherproof models.  
Dimensions: 4<sup>3</sup>/<sub>4</sub>" x 4<sup>3</sup>/<sub>4</sub>" x 2<sup>1</sup>/<sub>2</sub>"

## LOW WATER CUT OUT BYPASS SWITCHES

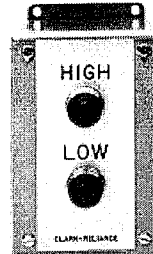
Model HS-0  
Holding Switch Without Light

Model HS-1 (for 120 VAC)  
Model HS-1-30 (for 30 VAC,  
for Electro Eye-Hye applications with ECIL control units)  
Holding Switch With Light

During probe column or Levalarm blow-down, the Holding Switch provides a bypass around the low fuel cut-out switch. This simple switch maintains relay circuit continuity momentarily, while being held in the bypass position during blowdown. The Holding Switch also provides an indicator light to verify that the fuel cut-out relay is functioning properly. The switch can be installed to operate with probe-type Levalarms on columns, boilers or tanks. Also available without indicator light (Model HS-0).  
Dimensions: 4" x 3" x 2<sup>1</sup>/<sub>2</sub>"

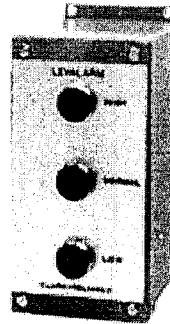


## VISUAL ALARM INDICATORS



Model LI-2  
Two Light Indicator  
for High & Low  
Alarm Applications

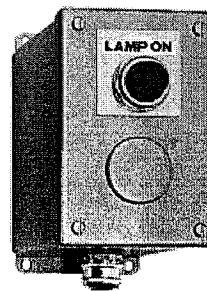
Two Light Alarm Light Indicator designed for 120 VAC or 240 VAC supply. Designed to indicate High and Low Alarm levels.  
Dimensions: 5<sup>3</sup>/<sub>4</sub>" x 3<sup>1</sup>/<sub>4</sub>" x 2<sup>3</sup>/<sub>4</sub>"



Model LI-3  
Three Light Indicator for  
High, Normal & Low  
Display Applications

Three Light Indicator designed for 120 or 240 VAC supply. Designed to indicate High and Low Alarms and Normal Water Level.  
Dimensions: 8" x 3<sup>1</sup>/<sub>4</sub>" x 2<sup>3</sup>/<sub>4</sub>"

## ILLUMINATOR TIMERS



Model: TPS-120  
for 120 VAC supply

Model: TPS-240  
for 240 VAC supply

Models TPS-120 & TPS-240 Illuminator Timer allows illuminator lamps to light only when gage water levels are being observed. Maintenance costs are reduced significantly due to far fewer lamp changes. Added savings occur in lower electricity consumption and fewer lamp purchases. The timer can be set to light lamps for periods up to 3 minutes. Timers are designed to operate up to 10 AMPS of lighting circuits.  
Dimensions: 5<sup>3</sup>/<sub>4</sub>" x 3<sup>1</sup>/<sub>4</sub>" x 2<sup>3</sup>/<sub>4</sub>"

\*Can be used with all Water Gage Illuminators.

## RECOMMENDED SPARE PARTS

Product: Water Columns (Cast Iron)			Product: W0250 - FA Float Columns (Cast Iron)			Product: W0250 - EA Probe Columns (Cast Iron)		
PART NO.	DESCRIPTION	RECOMMENDED QUANTITY	PART NO.	DESCRIPTION	RECOMMENDED QUANTITY	PART NO.	DESCRIPTION	RECOMMENDED QUANTITY
CI-3	Cap Gasket	2	C5-3	Cap Gasket	2	C5-3	Cap Gasket	2
CI-4	Upper Float Rod	1	C5R-4	Upper Float Rod	1	T***RK	Probe	4
CI-5	Lower Float Rod	1	C5R-5	Lower Float Rod	1	ECID-23R	Relay (120VAC)	1
FIM	Float	1	F5M	Float	1	ECID-56R	Relay (240VAC)	1
V5	Alarm Valve	1	V5	Alarm Valve	1	*** indicate probe designator length in inches & eighths		
Product: All Steel Float Columns W0600 & Under*			Product: All W0900 Float Columns* (Steel)					
PART NO.	DESCRIPTION	RECOMMENDED QUANTITY	PART NO.	DESCRIPTION	RECOMMENDED QUANTITY			
F7M	Float	1	F7M	Float	1			
V53	Alarm Valve	1	VM900	Alarm Valve	1			
V53DW	Double Whistle Alarm Valve	1	VM900DW	Alarm Valve	1			
WC53-12	Cap Gasket	2	WC53-12	Cap Gasket	2			
*see float rods			*see float rods					

### FLOAT RODS

Product: W0350-FA8 thru W0600-FA8			Product: W0350-FA10 thru W0600-FA10			Product: W0350-FA12 thru W0600-FA12		
PART NO.	DESCRIPTION	RECOMMENDED QUANTITY	PART NO.	DESCRIPTION	RECOMMENDED QUANTITY	PART NO.	DESCRIPTION	RECOMMENDED QUANTITY
WC53-13	Upper Float Rod	1	WCC10-13	Upper Float Rod	1	WC73-13	Upper Float Rod	1
WC53-14	Upper Float Rod	1	WCC10-14	Lower Float Rod	1	WC73-14	Lower Float Rod	1
Product: W0900-FA8			Product: W0900-FA10			Product: W0900-FA12		
PART NO.	DESCRIPTION	RECOMMENDED QUANTITY	PART NO.	DESCRIPTION	RECOMMENDED QUANTITY	PART NO.	DESCRIPTION	RECOMMENDED QUANTITY
WCM900-13-C8-1/2	Upper Float Rod	1	FH-15-4	Upper Float Rod	1	WCM900-13-C12	Upper Float Rod	1
WCM900-13-C8-1/2	Lower Float Rod	1	WCM900-14-C10	Lower Float Rod	1	WCM900-14-C12	Lower Float Rod	1

### STEEL PROBE TYPE COLUMNS

\*\*\*Indicates length of probe in inches & eighths.

Product: Model W0350-0450			Product: Model W0600-W0900			Product: Model W1000-W1800		
PART NO.	DESCRIPTION	RECOMMENDED QUANTITY	PART NO.	DESCRIPTION	RECOMMENDED QUANTITY	PART NO.	DESCRIPTION	RECOMMENDED QUANTITY
T***RK	Each Probe Includes (2) WCM-13 Gaskets	4	V***RK	Each Probe Includes (2) X175500 Gaskets	4	ZG***RK	Each Probe Includes (2) E10-10S Gaskets	4
Product: Model W3000			Product: All Models			NOTE: Add \$61.00 to any Probe length greater than 48". Also, T & V Probes are not available beyond 48", use ZG Type. *** indicate probe designator length in inches & eighths		
PART NO.	DESCRIPTION	RECOMMENDED QUANTITY	PART NO.	DESCRIPTION	RECOMMENDED QUANTITY			
FG***RK	Each Probe Includes (2) E10-10S Gaskets	3	ECID-23R	Relay (120VAC)	1			
			ECID-56R	Relay (240VAC)	1			

### BRONZE VALVES

Product: Valve Assembly With Tubular Glass			Product: Valve Assembly With Gage Nipples (Bronze)			Flanged Valve Assembly (Bronze)		
PART NO.	DESCRIPTION	RECOMMENDED QUANTITY	PART NO.	DESCRIPTION	RECOMMENDED QUANTITY	PART NO.	DESCRIPTION	RECOMMENDED QUANTITY
RK-1A	Repair Kit	2	RK-1A	Repair Kit	2	BG503R-5	Flange Gasket	2
REG403R-12	Packing Ring	2	EG403R-12	Packing Ring	2			

### STEEL VALVES

Product: Forged Steel Valves (SG700 Series)			Product: Forged Steel Valves (SG800 Series)			Product: Flanged Valves Only (SG860 Series)		
PART NO.	DESCRIPTION	RECOMMENDED QUANTITY	PART NO.	DESCRIPTION	RECOMMENDED QUANTITY	PART NO.	DESCRIPTION	RECOMMENDED QUANTITY
RK-2R	Repair Kit	2	RK-3R	Repair Kit	2	SG460-3	Flange Gasket	2
SG754-6	Stem Bushing	2	SG854-2	Stem Bushing	4			
SG854-4	Stem Packing	2	SG854-4	Stem Packing	2			
R13	Oral Ring	2	SG854-5	Nipple Packing	2			

## TRY (Gage) COCKS

### Product: Gage Cocks GC302

PART NO.	DESCRIPTION	RECOMMENDED QUANTITY
RK-9	Repair Kit	2

### Product: Gage Cocks GC310-311

PART NO.	DESCRIPTION	RECOMMENDED QUANTITY
RK-7	Repair Kit	2

### Product: Gage Cocks GC450-451

PART NO.	DESCRIPTION	RECOMMENDED QUANTITY
RK-9	Repair Kit	2
GC450-7	Sealing Tool	1

## C or S Type Prismatic Water Gage Assembly

NOTE: All Repair Kits include: one glass, cushion gasket & sealing gasket, and instructions.

### Product: Size 4 Gage

PART NO.	DESCRIPTION	RECOMMENDED QUANTITY
RK-35	Repair Kit	2

### Product: Size 5 Gage

PART NO.	DESCRIPTION	RECOMMENDED QUANTITY
RK-35A	Repair Kit	2

### Product: Size 6 Gage

PART NO.	DESCRIPTION	RECOMMENDED QUANTITY
RK-35B	Repair Kit	2

### Product: Size 7 Gage

PART NO.	DESCRIPTION	RECOMMENDED QUANTITY
RK-35C	Repair Kit	2

### Product: Size 8 Gage

PART NO.	DESCRIPTION	RECOMMENDED QUANTITY
RK-35D	Repair Kit	2

### Product: Size 9 Gage

PART NO.	DESCRIPTION	RECOMMENDED QUANTITY
RK-35E	Repair Kit	2

## Flat Glass Water Gages

NOTE: All Kits include: 1.) One glass, mica shield, cushion gasket, sealing gasket, and instructions. 2.) Kits should be ordered in pairs.

### Product: FG400 & FG900 Series

PART NO.	DESCRIPTION	RECOMMENDED QUANTITY
RK-4E	FG404/FG904 Repair Kit	2
RK-4F	FG405/FG905 Repair Kit	2
RK-4A	FG406/FG906 Repair Kit	2
RK-4B	FG407/FG907 Repair Kit	2
RK-4C	FG408/FG908 Repair Kit	2
RK-4D	FG409/FG909 Repair Kit	2

### Product: FG1500 Series

PART NO.	DESCRIPTION	RECOMMENDED QUANTITY
RK-5F	FG1504 Repair Kit	2
RK-5A	FG1505 Repair Kit	2
RK-5B	FG1506 Repair Kit	2
RK-5C	FG1507 Repair Kit	2
RK-5D	FG1508 Repair Kit	2
RK-5E	FG1509 Repair Kit	2

### Product: FG2000 Series

PART NO.	DESCRIPTION	RECOMMENDED QUANTITY
RK-38	FG2004	2
RK-39	FG2005	2
RK-40	FG2006	2
RK-41	FG2007	2

## Simpliport Gage Assemblies & Illuminators

### Product: Simpliport Gage Assembly

PART NO.	DESCRIPTION	RECOMMENDED QUANTITY
PW-68	Packing Nut	2
PW-36	ALL MODELS Lubricant	1
PW-24BR	Glass Module	2

### Product: Simpliport Illuminator

PART NO.	DESCRIPTION	RECOMMENDED QUANTITY
PI-1	Lamp Socket (for Fiber Level)	2
GI40-23	Lamp Socket (indoor or outdoor)	2
PI-14F	Fiber Level Lamp	2
PI-29	Standard Lamp (120V)	2
PI-30	Lamp (230V)	2
PI*-7	Red Glass *# of parts	2
PI*-8	Green Glass *# of parts	2

### Product: Simpliport Viewing Hoods

PART NO.	DESCRIPTION	RECOMMENDED QUANTITY
PHP*-1	Mirror *laser/gage size	2
X173305	Wing Screw	8

Consult the factory or your local Clark-Reliance Representative with any questions. Please have the model numbers and/or reference drawing numbers available when calling.

\*\*\* Always use only genuine Clark-Reliance replacement parts to maintain any regulatory agency approvals and for maximum service life\*\*\*