

## Instructions for Installing and Operating Clark-Reliance EA101 Series Levalarm®



This manual covers the following model numbers: EA101D, EA101S, and EA101SW

**Reliance®**  
A PRODUCT OF CLARK-RELIANCE

## STORAGE and HANDLING

All units should be inspected upon receipt to ensure that no damage has been incurred during transit. If there is a claim due to damage, it should be filed with the carrier immediately. 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 prevent the products from exposure to the outdoor elements. This will eliminate the potential for water damage. The temperature of the storage area should not exceed 150 Deg. F (84 Deg. C) or drop below 32 Deg. F (0 Deg. C).

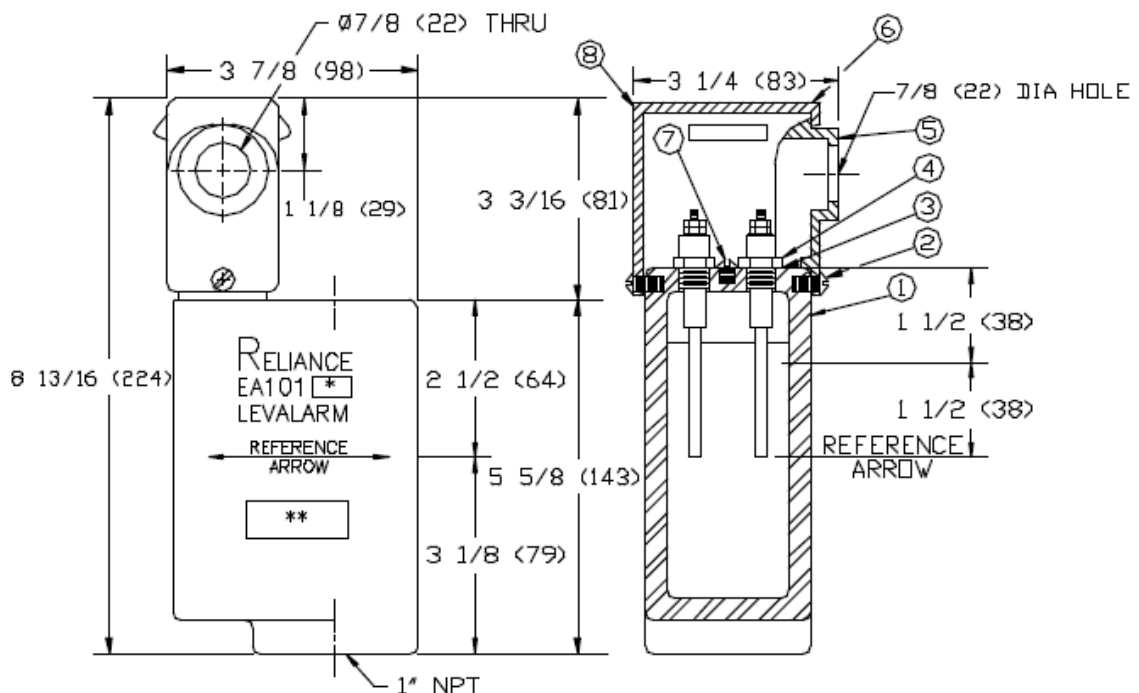
## OPERATION

A conductivity probe is inserted in the Levalarm chamber. When the water is below the control probe, the relay in the control unit is de-energized. When the water covers the end of the probe (and common probe if used), current flows and energizes the relay circuit, and reverses the switch contacts. The probe circuit is isolated from the power or alarm signal circuits, eliminating any possibility of electrolysis. The only electric contact with the boiler or tank is 12 VAC.

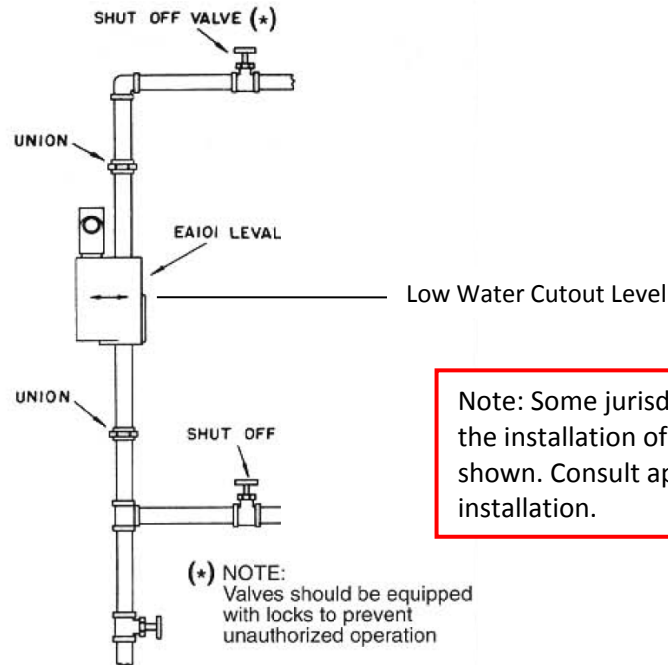
## INSTALLATION

**Caution:** Before proceeding, follow any and all plant lock out - tag out procedures required. Verify that all power is turned off to the Levalarms. 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

EA101 Series Levalarm dimensional information  
(Please refer to applicable drawing for component information.)



Standard connections for the EA101 Series Levelarms are 1" FNPT for threaded connections or 1" FSW for socket weld connections. The Levelarm should be installed with the reference arrow at the level where the alarm or trip is specified. Shut off valves above and below the Levelarm should be installed for safe inspection or repair of the unit. However, these valves must be locked open when the boiler is in service. Also, a drain connection with a shut off valve should be installed to a point of safe discharge to facilitate blowdowns. Below is a typical arrangement for the installation of the Levelarm.



Note: Some jurisdictions do not permit the installation of isolation valves as shown. Consult applicable Codes before installation.

After the piping has been installed to the body of the Levelarm, the probe(s) should be connected by following this procedure:

1. Remove the probe cover in order to access the probe and ground connection by loosening the screw at the bottom of the probe cover.
2. Use the 7/8" Dia. opening in the switch housing assembly for connecting flexible or rigid conduit when wiring the unit. Wire the probe and ground to the relay control unit.
3. Example wiring diagrams for connecting the low water cutout, alarms (such as lights or and audible signal), etc, are illustrated below. Refer to IOM R500.E189-A-3 for probe wiring instructions and R500.E137E for relay specifications.
4. After checking that all connections are tight and correct, replace the probe cover, as the unit is now ready to be put in operation.

## PROBES

### A. Maintenance

Reliance® probes 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. The blow-down procedure is conducted thoroughly by closing the water valve and opening the drain valve slightly for about 20 seconds. (Refer to Reliance Form E156-B, "Recommended Blow-Down Practices for Water Columns, Electrolevs, and Water Gages)

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:

Probe Type	Gasket part Number
T	WCM-13
V	X175500 (Formerly E10-10)
ZG or ZB	E10-10S

Replacing the probes:

1. Before removing and replacing any probes, make sure that the column is isolated from any pressure and the drain valve is open.
2. After the column has cooled, remove probe to be inspected or replaced.
3. When replacing the probes, coat the 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, ZG, or ZB to 40 Ft-Lb. (54 Newton-Meters)
  - Type FG or FB Probes to 90 Ft-Lb. (122 Newton-Meters)
  -

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

1. Partially open steam valve to warm up the column with the drain valve slightly open.
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.

## **B. Interwiring**

The wires attached to the probes must be of high temperature type in order to withstand the heat. We suggest the following types of wire:

Maximum Application Pressure (PSI)	Wire Specification
1000	18 Ga. Stranded conductors, Teflon insulation rated at 300 VAC and 200°C (Belden #83029, Alpha #5857, or equal)
1001 to 3000	18 Ga. Stranded conductors, Teflon treated glass braided insulation rated at 300 VAC and 400°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:** When installing the high temperature wire to the probe, use an open end wrench to prevent the Probe assembly from turning while tightening the wire terminal nut. Use a 1/4" wrench for both the compression nut and the terminal nuts on T and V type probes. ZG, ZB, FG, and FB type probes require a 1/2" wrench for the compression nut and a 3/8" wrench for the terminal nut.



### **C. Troubleshooting**

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

If a relay fails to energize, the following steps should be taken:

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

### **Probe Evaluation**

4. Probes can be evaluated by performing the following 3 steps:

- 1.) Resistance – For practical purposes, a resistance measurement taken by a typical DVM (Digital Voltmeter) between the probes tip connection and its securing body should measure an infinite impedance. It should measure less than 10 ohms from its tip to its wiring connection.
- 2.) Appearance – The probe tip and its associated insulator(s) should be clean and free of any scaling, rust, corrosion, or any other foreign contamination. All surfaces should also have no visible degradation, cracks, galling, or any other signs of excessive wear. The entire assembly should be secure and moderately tight with no loose or missing parts. Inspection should also include the wiring connection and its associated lock washer and hex nut.
- 3.) Age/Usage – Probes should generally be replaced after 3 to 5 years of hard service, such as extreme heat, daily heat cycling, usage in extreme outdoor environments, excessive vibration, use in applications with low water quality, etc. Assessing the operational attributes of your boiler system and keeping a record of performance and maintenance can yield useful future information to keep any system in optimum performance. In some applications, probes may provide up to 15 years of service in low pressure applications up to 450 PSI (30 Bar).

## **Other Inspections**

Other inspections are recommended to be periodically performed. These inspections can affect overall level measurement system performance and are as follows.

- 1.) Inspect water columns for leaking probes. Probes leaking on others not only are subject to fail but can also affect others. Address them ASAP.
- 2.) Inspect the condition and securement off all probes wires and wiring connections from the probe connections themselves, through any junction box connections, back to the input on the level measuring system. This also includes the condition of the wire insulation, as they tend to degrade over time and can short to adjacent probe wiring or ground out in the conduits and along the column.
- 3.) Inspect and maintain a good ground connection from the column back to the measuring system. File clean ground surfaces on the column and replace the wiring or wiring hardware if necessary. A bad ground compromises the entire measurement system.
- 4.) If possible, compare the operations results with channels above and below any suspect probe and other level measuring instrumentation.

The probe assemblies have a 5/8"-24 UNEF thread and are furnished with a copper or Monel gasket. Stainless steel rods are connected to the probes with a coupling nut to make a complete assembly. Probe installation and maintenance instructions can be found in this manual or in IOM #R500.E189-A-3. The probe(s) can be removed for inspection and cleaning by merely removing them from the Levalarm body with a 7/8" deep well socket. When replacing the probes, be sure to lubricate the threads and use a new gasket. Probes can usually be cleaned by wiping with a damp cloth. Future cleaning frequency will depend upon conditions of boiler water. Routine blowdowns help keep probes clean. Refer to IOM #R500.E156C.

## **RELAY CONTROL UNIT**

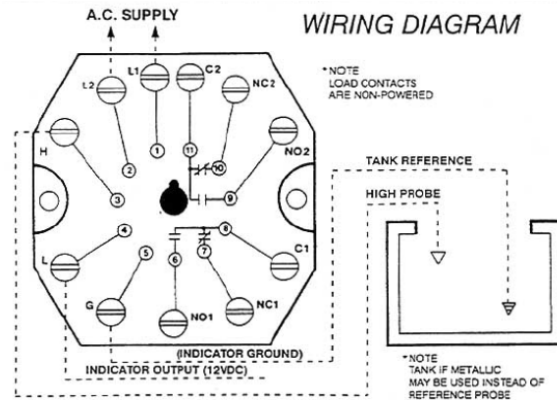
For EA101 Series Levalarms, follow this procedure after piping has been connected to body of the unit:

### **Installation Procedure:**

This procedure must be performed with the boiler down, or the probe circuit by-passed, to prevent any false alarms or wiring hazard. Verify the power at the existing switch is off, before installing the relay control unit.

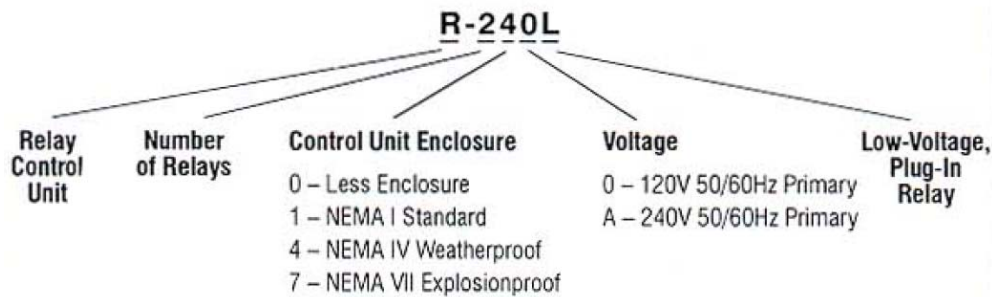
1. Install relay control unit at any convenient location, as the connecting wires may be of any reasonable length up to 1000 ft. Verify that the control unit is rated for the correct supply line voltage and frequency (cycles).
2. Install optional light indicator, or horn, or both at a convenient location for the operator.
3. Remove the probe fitting housing. This will give you access to the terminals on the probe assemblies for wiring. Verify with a calibrated torque wrench that the probe fittings are torqued to 40 Ft-Lb. The conduit bracket has a 7/8" Dia. opening for the conduit
4. Attach high temperature wires (furnished) from probe and cap assembly (common wire) and wire to relay socket terminals (See actual relay for wiring schematic diagram label)..
5. Wire per wiring diagram. See below.
6. Replace probe fitting housing
7. The relay will require a 120 VAC or 230 VAC power source depending upon the Part Number (Use Relay Part No. ECID-23R for 120 VAC or Part No. ECID-56R for 230 VAC).
8. Recheck all wiring before returning to service.
9. Installation is complete.

Note: The relay can be installed in user supplied enclosure with a surface mount relay socket (Part No. ECID-49) or the relay can be ordered already mounted in an Indoor or Outdoor enclosure. See below for information on relay control options.



Please refer to actual relay control unit drawing provided with your system for details. ECID Series Relay specifications can be found in IOM #R500.E137E

## Relay Control Unit Model Numbering Codes



**NOTE:**

1. Standard units are furnished with relay part no. ECID-23R (Direct mode for 120VAC supply)
2. For optional inverse mode relays (Specify relay part no. ECID-26R for 120VAC supply)

## BLOWDOWNS

The importance of proper cleaning and maintenance of the Levalarm cannot be stressed enough. The Levalarm 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 Levalarm.

The connection lines to the Levalarm can become clogged with sediment and indicate a normal water levels when water may be low. After performing the blow-down procedure, if the water level does not appear to 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 Levalarm unit.
2. Open the drain valve fully on the bottom of the Levalarm piping.
3. Crack open the steam valve and allow a gentle rush of steam to pass through the device. The steam should not pass through for longer than 20 seconds.
4. Close the steam valve.
5. Close the blow-down valve and simultaneously open the steam and water valves, slowly bringing the equipment back to a normal operating level.
6. Water should enter the Levalarm 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. A Clark-Reliance model HS-0 can be used to by-pass the Low Water Cutout to prevent a false trip during the blow-down procedure.
2. Blow-down should be conducted on a weekly basis, or as necessary, based on water quality.

### SPECIFICATIONS

Connection sizes:	EA101D: 1" FNPT EA101S: 1" FNPT EA101SW: 1" FSW
Pressure Rating:	EA101D with "T" type probe: 450 PSI @ 456° F. EA101S/EA101SW with "V" type probe: 1000 PSI @ 545° F. EA101SW with "ZG" type probe: 1800 PSI @ 621° F
Relay Contact Rating:	DPDT (2 form C): two normally open (N.O.) and two normally closed (N.C.) non-powered contact. 5A @ 120, 240 VAC resistive, 1/3 H.P. @ 120, 240 VAC, 5A @ 30 VDC
Environment:	Indoor or outdoor

**Warning:** If this equipment is used in a manner not specified by Clark-Reliance, the protection provided by the equipment may be impaired. Only replacement parts manufactured by Clark-Reliance should be used to ensure safety and reliable operation.

The use of non-Clark-Reliance parts will void the factory warranty and any agency approvals.

Order genuine Clark-Reliance replacement parts at: <http://parts.clark-reliance.com> or contact your local Clark-Reliance Representative.

Any additional questions should be directed to your local Clark-Reliance Representative, or to the Factory: Phone: (440) 572-1500 Fax: (440) 238-8828