Reliance®

Instructions for TWIP System Assemblies

Reliance®
A PRODUCT OF CLARK-RELIANCE

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The TWIP column is attached to steam plant equipment or piping. To facilitate installation, connections may be of the size, type and orientation best suited to each application. The Water Detector is available in various materials to withstand system pressures to 3000 PSI (206 Bar) or temperatures to 1100°F (593°C) and designed to customer supplied specifications. One or more sensing Probes are located at various chamber levels

Caution: Before proceeding, follow any and all plant lock-out/tag-out procedures required. Any trips/alarms should be bypassed to prevent any false trips/alarms when servicing the equipment. Verify that all power is turned off to any applicable equipment. 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 and plant procedures.

Only use a properly calibrated torque wrench to guarantee that the specified torque values are achieved. Make sure all bolting is clean and lubricated per the applicable Reliance IOM.

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 Section I PG-60 Boiler Code Requirements Summary

Boilers operated at pressures of 400 PSIG and below shall be provided with one direct reading gage glass which must be kept in continuous service. Boilers operated at pressures of 400 PSIG and above shall be provided with two water gage glasses on the same horizontal lines. **Note:** When the gage glasses are not continuously visible to the operator, two Remote (Indirect) Reading Gages must be used to meet Section I requirements, the Direct Reading Gage Glass may be valved-off [only when operating above 400 PSI (3 MPa)] but must be maintained in serviceable condition. The two Remote Level Indicators must operate independently and be continuously displayed. If operating below 400 PSI, 2 remote indicators are required when the gage glass (which must always be in service) is not continuously visible by the operator.

When shutoff valves are used in piping to a water column, they should be of a type to meet all national and local code requirements and must locked open. 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.

Water columns shall be fitted with a drain valve (3/4” pipe size minimum), with a suitable connection to a safe independent point of discharge. 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 discharge.

In PG-60.1, Section 1 of the ASME Boiler Code requires the lowest visible water level in a gage glass or Remote Level Indicator on water tube type boilers shall be at least 2” – 3” above the lowest permissible boiler water level, as determined by the boiler Manufacturer. Also, the visible range of the gage glass shall cover the full operating range of the boiler. PG-60.1.2 requires that a mechanism (pull chains) will be installed when either the lower or upper valve is more than 7 feet above the operating floor.

Note that Reliance Products are considered to be a Standard Pressure Part as defined in PG-11 of the ASME Boiler Code. A Code stamp or outside inspector for manufacturing is not required.

Installation

1. The TWIP Column Assembly should be installed on any cold return line, heater, or other vessel to detect water level. The distance between the TWIP Column Assembly and the application connections should be kept to a minimum. Isolation (Shut-off) valves should be installed to permit maintenance while the vessel is pressurized.

A drain valve should be installed on the TWIP Column Assembly. The standard drain connection on the TWIP Column Assembly is 1/2" female socket-weld. The standard vessel connections are 1" male pipe projections. Flanged, butt weld, or female socket weld connections may have been furnished, if specified.

We suggest that all piping between the vessel and the TWIP Column be insulated. Insulation will reduce the effects of cooling and will provide added personnel protection from hot piping. The TWIP Column Assembly may be insulated by field personnel, or with a removable custom-fit Flexpak insulation jacket, when specified. The Flexpak insulation jacket can be specified with the original order or ordered for an existing system. When ordering, specify the serial number of the existing TWIP Column Assembly. This information is located on the nameplates which are attached to the probe housing and the relay control unit. The serial number will enable Clark-Reliance personnel to assist with technical questions or to identify components. Flexpak jackets are designed for easy removal or installation with Velcro seams.

2. The Control Unit is typically furnished in a NEMA 1 (indoor) or NEMA 4 (outdoor) enclosure. Standard ECIL or R***L model Control Units may be mounted up to 1000 feet away from the TWIP Column. The Control Unit should be mounted in an area that is accessible for inspection and below 140º F. The size of the Control Unit enclosure may vary with customer-selected options. Control Unit dimensions are shown on the drawings provided with the system.

3. The optional Remote Indicator should be mounted in the control room. There is no practical distance limitation between the Control Unit and the Remote Indicator. Although all Remote Indicators are designed for panel mounting, wall mounting brackets are available. Weatherproof enclosures should be specified for outdoor installations. Indicators may be wired in parallel, for multiple indicator installations.

4. Field Wiring from the Control Unit to the Remote Indicator(s) and to the TWIP Column Assembly should be performed as illustrated on the field wiring diagrams. Wiring diagrams are furnished with each TWIP system. The TWIP Column Assembly has been furnished with 30" lengths of high temperature leads exiting from the conduit connection. Longer leads may have been furnished, if requested.

The specifications for the high temperature probe wires are as follows:

Pressure	Wire Specifications
Pressures up to 1000 PSIG	18 GA. Stranded Teflon insulated conductors rated at 300 VAC and 200ºC (Belden #83029, Alpha #5857, or equal)

Pressures between 1001 to 3000 PSIG	18 GA. Stranded Teflon-treated glass braided rated at 300 VAC and 400ºC, Nickel coated copper conductor U.L. #5182 (Radix #MGT-4503, or equal)

The high temperature probe wires should be routed to a junction box (furnished by C-R, when specified). Low temperature multi-conductor cable may be routed from the junction box to the control unit. The number of required conductors are equal to the number of probes, plus one, for the common connection. For example, a four probe TWIP Column Assembly would require 5 conductors. We suggest the following cable specifications:
18 GA. multi-conductor (Tinned Copper), PVC insulated, rated at 300 VAC and 60º C (Belden #8468 or equal).

The same type of wire may be used between the Control Unit and the Remote Indicator(s). The number of conductors required for a Remote Indicator is equal to the total number lights, plus one, for a common conductor. For example, a MTI-4BRemote Bicolor Indicator has 4 red lights, 4 green lights, and one common. Therefore, 9 conductors are required. Refer to the remote indicator field wiring diagram furnished with the system for clarification.

Installing the TWIP Column

If welding the Water Column in place with Socket Weld or Butt Weld connections:
- Verify the materials of construction before welding the TWIP column in place
- Use ASME Section I and II Code acceptable materials of construction
- Use Welding processes recognized by the applicable Code sections
- Also, visually inspect all water column welds and the column should be hydrostatically tested at 1-1/2 times the design pressure.

When using flange connections, use ASME Code acceptable bolting, the proper gaskets rated for the flange size and class, and the correct torque value for the flange size and class. Make sure the bolting is lubricated with Nickel based high temperature lubricant. Refer to the proper IOM when installing any water gage valves and gage glasses.

Blowdown Procedure

The importance of proper cleaning and maintenance of the water column cannot be stressed enough. The TWIP column must he kept clean to ensure the water level in the column accurately represents the water level in the boiler. Note that the frequency and method of blowdown may affect service life and performance of the water column and gage glass (if furnished).

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.

Users must consider proper blowdown procedures, in order to keep the water piping clean, even if the probes remain clean for extended operational periods. By simply opening the drain valve to conduct a blowdown, this does not ensure flow thru the water piping between the drum and the TWIP column, even when the water in the column is pushed out the drain connection with steam. The risk of blockage in the steam piping is low. The risk for sediment build-up in the water piping is greater. Therefore, period blowdowns are suggested on a quarterly to monthly basis. The frequency can be determined by the user and plant rules. The user may also consider their water quality as an influencing factor to determine the blowdown frequency. 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. To clean the water piping, slowly open the water valve (lower valve) to allow a flow of water to pass through the line and out the drain. This will flush the water line and help keep sediment from collecting and causing a blockage in the line.
4. Allow the water to flow through the line for 20 seconds.
5. Close the water (lower) valve.
6. Crack open the steam valve (upper shutoff valve) and allow a gentle rush of steam to pass through the probe column or water gage. The steam should not pass through for longer than 20 seconds.
7. Close the steam valve.
8. Inspect the water gage, when suppled, to ensure that all foreign matter is flushed from the glass or mica. If the gage is not visually clean, repeat steps 6 and 7. If the gage glass is visually clean, close the steam valve.
9. Close the blow-down valve and open the steam and water valves, slowly bringing the equipment back to a normal operating level.
10. Water should enter the gage glass quickly when the blow-down valve is closed. This will indicate that the line flows freely.

Note:

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

Refer to IOM R500.E156D for further details or see the video at
http://www.relianceboilertrim.com/blowdown-procedure/

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 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.

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:

Probe Type	Gasket Part Number
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 equal

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 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.

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)

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 ¼" 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 ½" wrench for the compression nut and a 3/8" wrench for the terminal nut.

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 ¼" 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 ½" wrench for the compression nut and a 3/8" wrench for the terminal nut.*

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.

Hot Torque Procedure

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. Inspect the equipment to make sure there are no obvious leaks. Close the steam valve and the drain valve. Then open both the 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 operating temperatures.
4) When the equipment has been properly heated, close the steam valve. The drain valve must 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 1/8th 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 torqueing.

MODEL ECID RELAY SPECIFICATIONS

SPECIFICATIONS

Control Design: Solid State components enclosed in a clear Lexan plug-in style housing. Housing carries no NEMA rating.

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

Contact Ratings: 5A @ 120, 240 VAC resistive, 1/3 H.P. @ 120, 240 VAC, 5A @ 30 VDC.

Contact Life: Mechanical – 5 million operations. Electrical – 100,000 operations minimum at rated load.

Supply Voltage: 24, 120, and 240 VAC models 10%, minus 15%, 50/60 Hz.

Supply Current: 24, 120, and 240 VAC, Relay energized 4.4 VA

Secondary Circuit: 12 VAC RMS voltage on probes, 1.5 milli-amp current.

Sensitivity: Models operate from 0 – 100,000 OHM maximum specific resistance.

Temperature: -40 to 150° F. ambient.

Terminals: All connections #6-32 screw type terminals with pressure clamps

Listings: U.L. listed, Industrial Motor Control (508), CSA approved Industrial Control.

LED Terminal Output: Probe in water, +12VDC, Probe out of water, -12 VDC.

MODEL NUMBER INFORMATION

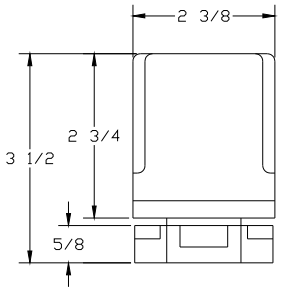
SUFFIX	SENS. (ohms)	MODE	SUPPLY
-22R	28K	DIRECT	120VAC
-23R	50K	DIRECT	120VAC
-24R	100K	DIRECT	120VAC
-26R	28K	INVERSE	120VAC
-28R	50K	INVERSE	120VAC
-27R	100K	INVERSE	120VAC
-28R	28K	DIRECT	24VAC
-29R	50K	DIRECT	24VAC
-30R	100K	DIRECT	24VAC
-31R	28K	INVERSE	24VAC
-32R	50K	INVERSE	24VAC
-33R	100K	INVERSE	24VAC
-116	28K	DIRECT	240VAC
-56R	50K	DIRECT	240VAC
-121R	100K	DIRECT	240VAC
-72	50K	INVERSE	240VAC

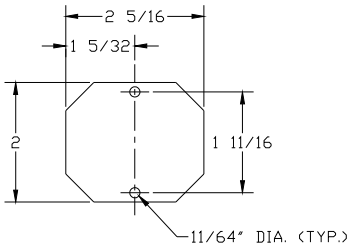
INSTALLATION

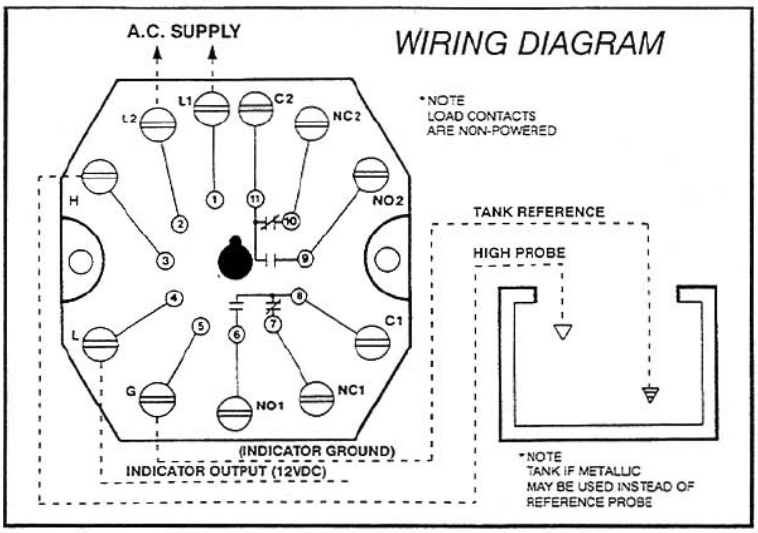
1) Install octal socket in appropriate enclosure using two (2) #6 or #8 metal screws.
2) Wire control per wiring diagram, following N.E.C. and local codes.
3) Install control module in socket.

SENSITIVITIES VS MAXIMUM PROBE WIRE DISTANCE

SEN. (K ohms)	DISTANCE (ft.)
28	2,200
50	1,075
100	570







TWIP COLUMN REPLACEMENT PARTS

NOTE: Consult factory w/ Model Number and Serial Number to confirm the replacement probe P/N. The Serial Number (starting with the letters TD) can be located on the nameplate attached to the metal housing that protects the probes on the column or on the nameplate located on the relay control unit door.

Notes:

Questions? Contact a Reliance Applications Engineer at
RelianceAppEng@clark-reliance.com

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