

Lync LC-Q Water Heating Solution

LC-Q Water Heaters, AquaSolve Anti-Scale,
and DigiTemp Mixing Valve



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1. SAFETY CONSIDERATIONS

Installers and operating personnel **MUST**, at all times, observe all safety regulations. The following warnings and cautions are general and must be given the same attention as specific precautions included in these instructions. In addition to all the requirements included in this AERCO Instruction Manual, the installation of units **MUST** conform with local building codes, or, in the absence of local codes, ANSI Z223.1 (National Fuel Gas Code Publication No. NFPA-54) for gas-fired heaters and ANSI/NFPA5B for LP gas-fired heaters. Where applicable, the equipment shall be installed in accordance with the current Installation Code for Gas Burning Appliances and Equipment, CSA B149.1, and applicable Provincial regulations for the class; which should be carefully followed in all cases. Authorities having jurisdiction should be consulted before installations are made.

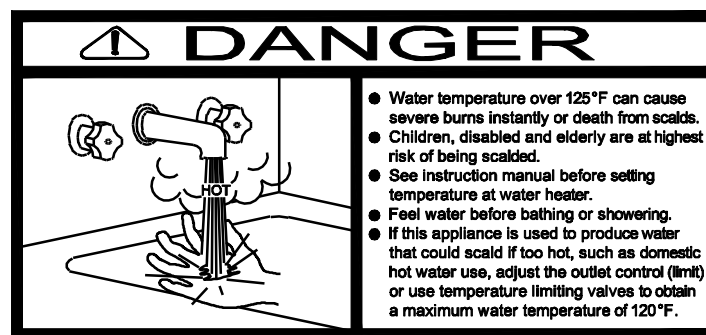
See Section 1.4, below, for installations within the Commonwealth of Massachusetts.

IMPORTANT SAFETY NOTE

It takes only 5 seconds of skin contact with 140°F water to cause a second degree burn! You must protect against high water temperatures in all lavatories, tubs, showers and other points of hot water contact.

Accidental scalding from hot water is a greater risk in some types of installations. Some examples are:

- Homes For The Mentally Handicapped
- Homes For The Physically Handicapped
- Hospitals And Nursing Homes
- Elder Care Facilities And Rest Homes
- Orphanages And Child Care Facilities
- Any installation where response to contact with hot water may be slower or where the danger of hot water contact is greater



IMPORTANT!

Thermostatically controlled mixing valves must be used in the design of the potable hot water system.

Potable hot water should be tempered to no more than 110°F when used for bathing or other personal uses.

Good engineering practice mandates thermostatically controlled mixing valves set at 120°F or less to keep the delivered water temperature below scalding temperatures.

⚠ WARNING!

If the information in this manual is not followed exactly a fire, explosion or exposure to hazardous materials may result, causing property damage, personal injury or death.

Refer to the information contained in this manual. Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury, exposure to hazardous materials or death.

FOR YOUR SAFETY

Do not store or use gasoline or other flammable liquids near this or any other appliance.

WHAT TO DO IF YOU SMELL GAS

Do not try to light any appliance. Do not touch any electric switch; do not use any phone in your building. Immediately call your gas supplier from a location away from your building and the smell of gas. Follow the gas supplier's instructions. If you cannot reach your gas supplier, call the fire department.

Installation and service must be performed by a qualified installer or gas supplier.

This product contains, or may come to contain materials that have been identified as carcinogenic, or possibly carcinogenic to humans. Before installing, servicing or removing this product, read and follow the supplied instructions.

Clearance must conform with all local installation codes and gas supplier requirements.

Should overheating occur or the gas supply fail to shut off, turn off the manual gas control valve to the Lync LC-Q Water Heating Solution.

⚠ WARNING!

Installation and service must be performed by a qualified installer, service agency or the gas supplier, who must read and follow the supplied instructions before installing, servicing or removing the Lync LC-Q Water Heating Solution.

Refer to the information contained in this manual. Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury, exposure to hazardous materials or death.

⚠ WARNING!

Do not use the Lync LC-Q Water Heating Solution if any part has been under water. Immediately call a qualified service technician to inspect the unit and to replace any part of the control system, all gas controls and all other items affecting safe appliance operation and which has been under water.

⚠ WARNING!

In an emergency shut the main gas supply valve to the Lync LC-Q Water Heating Solution from a location safely away from the emergency. Failure to follow these instructions can cause property damage, personal injury, and exposure to hazardous materials or death.

PRODUCT SAFETY INFORMATION

REFRACTORY CERAMIC FIBER PRODUCT WITH CRYSTALLINE SILICA

⚠ WARNING!

This product contains or may come to contain crystalline silica, which has been identified by the International Agency for Research on Cancer (IARC) as carcinogenic to humans. This product also contains refractory ceramic fibers, which have been identified by the IARC as possibly carcinogenic to humans. Avoid breathing fiber particulates and dust.

RISKS:

- Air borne fibrous insulation is a possible cancer hazard by inhalation.
- Airborne crystalline silica may cause silicosis (lung disease) by inhalation.
- May cause temporary irritation to eyes, skin, and respiratory tract.

PRECAUTIONARY MEASURES:

- Minimize airborne fibers with engineering controls.
- Use NIOSH/MSHA approved respirators as required (see MSDS).
- Wear long sleeved, loose-fitting clothing, eye protection and gloves.

FIRST AID MEASURES:

- Eyes: Flush with water.
- Skin: Wash with soap and warm water.
- Ingestion: Do not induce vomiting; get medical attention for gastrointestinal symptoms.
- Inhalation: Remove to fresh clean air.
- If any of the irritations listed persists, seek medical attention

⚠ WARNING!

If you are unfamiliar with the safe handling of refractory ceramic fiber products, or if you wish additional information prior to beginning any disassembly of the water heater that might expose refractory ceramic fiber materials, contact: Unifrax Corporation, 2351 Whirlpool Street, Niagara Falls, NY 14305-2413, 1-800-322-2293.

Identification of Refractory Ceramic Fiber Materials (Rcf):

The burner assembly utilizes RCF material. (The RFC materials are located within the product and not generally exposed except during service, disassembly or assembly.)

⚠ WARNING!

If the information in these instructions is not followed exactly, a fire or explosion may result causing property damage, personal injury or death. Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

IMPORTANT: This manual contains information required for installation, operation and maintenance of the Lync LC-Q Water Heating Solution. Read and follow the information in this manual and all other provided instructions, labels and markings before installing, operating or servicing this equipment.

1.1. FOR MASSACHUSETTS INSTALLATIONS

Water heater Installations within the Commonwealth of Massachusetts must conform to the following requirements:

SECTION 1: Safety Considerations

- Heater must be installed by a plumber or a gas fitter who is licensed within the Commonwealth of Massachusetts.
- Prior to unit operation, the complete gas train and all connections must be leak tested using a non-corrosive soap.
- The vent termination must be located a minimum of 4 feet (1.2m) above grade level. If side-wall venting is used, the installation must conform to the following requirements **extracted from 248 CMR 5.08 (2):**

(a) For all side wall horizontally vented gas fueled equipment installed in every dwelling, building or structure used in whole or in part for residential purposes, including those owned or operated by the Commonwealth and where the side wall exhaust vent termination is less than seven (7) feet (2.1m) above finished grade in the area of the venting, including but not limited to decks and porches, the following requirements shall be satisfied:

1. INSTALLATION OF CARBON MONOXIDE DETECTORS. At the time of installation of the side wall horizontal vented gas fueled equipment, the installing plumber or gasfitter shall observe that a hard-wired carbon monoxide detector with an alarm and battery back-up is installed on the floor level where the gas equipment is to be installed. In addition, the installing plumber or gasfitter shall observe that a battery operated or hard-wired carbon monoxide detector with an alarm is installed on each additional level of the dwelling, building or structure served by the side wall horizontal vented gas fueled equipment. It shall be the responsibility of the property owner to secure the services of qualified licensed professionals for the installation of hard-wired carbon monoxide detectors.

a. In the event that the side wall horizontally vented gas fueled equipment is installed in a crawl space or an attic, the hard-wired carbon monoxide detector with alarm and battery back-up may be installed on the next adjacent floor level.

b. In the event that the requirements of this subdivision cannot be met at the time of completion of installation, the owner shall have a period of thirty (30) days to comply with the above requirements; provided, however, that during said thirty (30) day period, a battery-operated carbon monoxide detector with an alarm shall be installed.

2. APPROVED CARBON MONOXIDE DETECTORS. Each carbon monoxide detector as required in accordance with the above provisions shall comply with NFPA 720 and be ANSI/UL 2034 listed and IAS certified.

3. SIGNAGE. A metal or plastic identification plate shall be permanently mounted to the exterior of the building at a minimum height of eight (8) feet (2.4m) above grade directly in line with the exhaust vent terminal for the horizontally vented gas fueled heating appliance or equipment. The sign shall read, in print size no less than one-half (1/2) inch in size, "**GAS VENT DIRECTLY BELOW. KEEP CLEAR OF ALL OBSTRUCTIONS**".

4. INSPECTION. The state or local gas inspector of the side wall horizontally vented gas fueled equipment shall not approve the installation unless, upon inspection, the inspector observes carbon monoxide detectors and signage installed in accordance with the provisions of 248 CMR 5.08(2)(a)1 through 4.

(b) EXEMPTIONS: The following equipment is exempt from 248 CMR 5.08(2)(a)1 through 4:

1. The equipment listed in Chapter 10 entitled "Equipment Not Required To Be Vented" in the most current edition of NFPA 54 as adopted by the Board; and
2. Product Approved side wall horizontally vented gas fueled equipment installed in a room or structure separate from the dwelling, building or structure used in whole or in part for residential purposes.

(c) MANUFACTURER REQUIREMENTS - GAS EQUIPMENT VENTING SYSTEM PROVIDED.

When the manufacturer of Product Approved side wall horizontally vented gas equipment provides a venting system design or venting system components with the equipment, the instructions provided by the manufacturer for installation of the equipment and the venting system shall include:

1. Detailed instructions for the installation of the venting system design or the venting system components; and
2. A complete parts list for the venting system design or venting system.

(d) MANUFACTURER REQUIREMENTS - GAS EQUIPMENT VENTING SYSTEM NOT PROVIDED.

When the manufacturer of a Product Approved side wall horizontally vented gas fueled equipment does not provide the parts for venting the flue gases, but identifies "special venting systems", the following requirements shall be satisfied by the manufacturer:

1. The referenced "special venting system" instructions shall be included with the appliance or equipment installation instructions; and
2. The "special venting systems" shall be Product Approved by the Board, and the instructions for that system shall include a parts list and detailed installation instructions.

(e) A copy of all installation instructions for all Product Approved side wall horizontally vented gas fueled equipment, all venting instructions, all parts lists for venting instructions, and/or all venting design instructions shall remain with the appliance or equipment at the completion of the installation.

[End of Extracted Information From 248 CMR 5.08 (2)]

2. PRODUCT DESCRIPTION

The Lync LC-Q Water Heating Solution consists of two or three high efficiency LC-Q Water Heaters, plus the AquaSolve Anti-Scale System and the DigiTemp Mixing Valve, all pre-assembled on a single skid. The LC-Q Water Heating Solution is designed and tested to provide the required service clearances, as well as proper flow balance between heaters.

The following Natural Gas Lync LC-Q Water Heating Solution models are available:

Lync LC-Q Water Heating Solution Models	Water Heater Model	Water Heater Qty.	Max Input (BTU/Hr.)	Design Flow (GPM)
LC-Q-800-2	LC4Q	2	798,000	30
LC-Q-1000-2	LC5Q		1,000,000	36
LC-Q-1200-2	LC6Q		1,200,000	42
LC-Q-1400-2	LC7Q		1,400,000	48
LC-Q-1600-2	LC8Q		1,600,000	53
LC-Q-1800-2	LC9Q		1,800,000	59
LC-Q-2000-2	LC10Q		2,000,000	65
LC-Q-1200-3	LC4Q	3	1,197,000	45
LC-Q-1500-3	LC5Q		1,500,000	54
LC-Q-1800-3	LC6Q		1,800,000	63
LC-Q-2100-3	LC7Q		2,100,000	71
LC-Q-2400-3	LC8Q		2,400,000	80

The following Propane Lync LC-Q Water Heating Solution models are available:

Lync LC-Q Water Heating Solution Models	Water Heater Model	Water Heater Qty.	Max Input (BTU/Hr.)	Design Flow (GPM)
LC-Q-800-2(P)	LC4Q(P)	2	798,000	30
LC-Q-1000-2(P)	LC5Q(P)		1,000,000	36
LC-Q-1200-2(P)	LC6Q(P)		1,200,000	42
LC-Q-1400-2(P)	LC7Q(P)		1,400,000	48
LC-Q-1600-2(P)	LC8Q(P)		1,600,000	53
LC-Q-1800-2(P)	LC9Q(P)		1,800,000	59
LC-Q-2000-2(P)	LC10Q(P)		2,000,000	65
LC-Q-1200-3(P)	LC4Q(P)	3	1,197,000	45
LC-Q-1500-3(P)	LC5Q(P)		1,500,000	54
LC-Q-1800-3(P)	LC6Q(P)		1,800,000	63
LC-Q-2100-3(P)	LC7Q(P)		2,100,000	71
LC-Q-2400-3(P)	LC8Q(P)		2,400,000	80

Design Flow calculated at 60°F to 140°F and blended to 125°F. For flow rates at other conditions, contact your Lync representative.

2.1. Model LC-Q-800 through LC-Q-2000 Two Unit Series Dimensions

The following applies to all Lync LC-Q Water Heating Solution models:

- Neutralizer kit (provided) and relief valve piped to drain by contractor.
- Lync reserves the right to modify dimensions without prior notice.
- Piping locations are approximate. Final dimensions may vary due to manufacturing tolerances.
- Do NOT rig from system piping.
- For clearances to combustible materials and to service the equipment, see Section 3.2: *Clearances*.

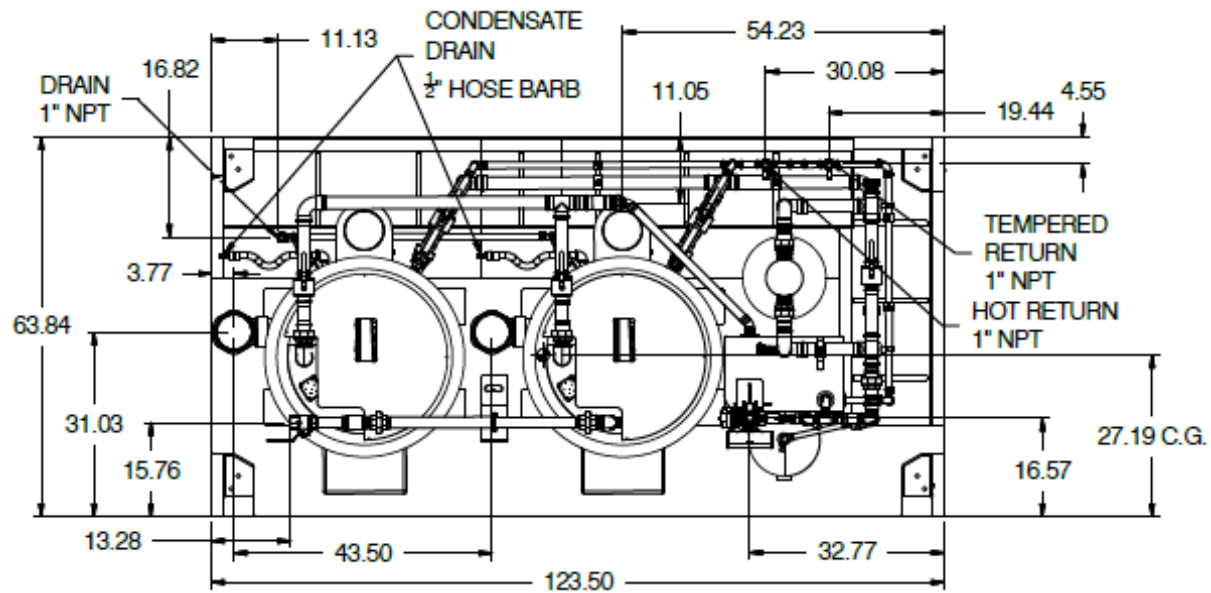


Figure 2-1: LC-Q-800-2 and LC-Q-1000-2 – Overhead View

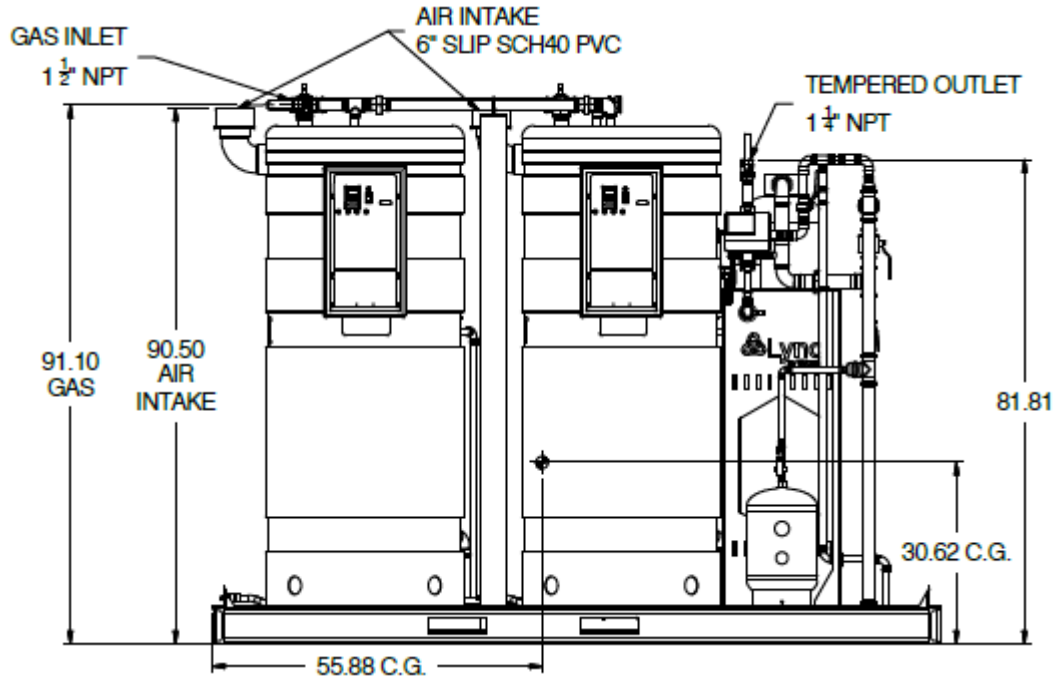


Figure 2-2: LC-Q-800-2 and LC-Q-1000-2 – Front View

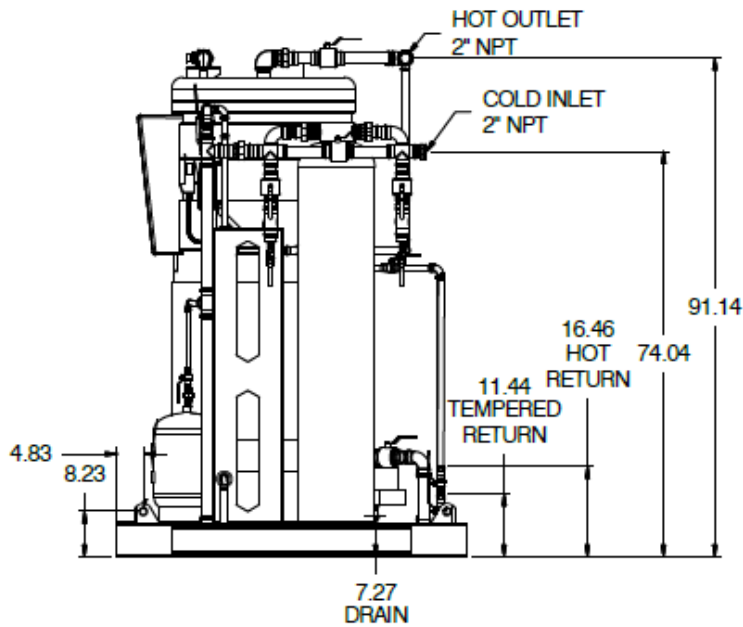


Figure 2-3 LC-Q-800-2 & LC-Q-1000-2 – Side View

2.2. Model LC-Q-1200-2 through LC-Q-1600-2 Two Unit Series Dimensions

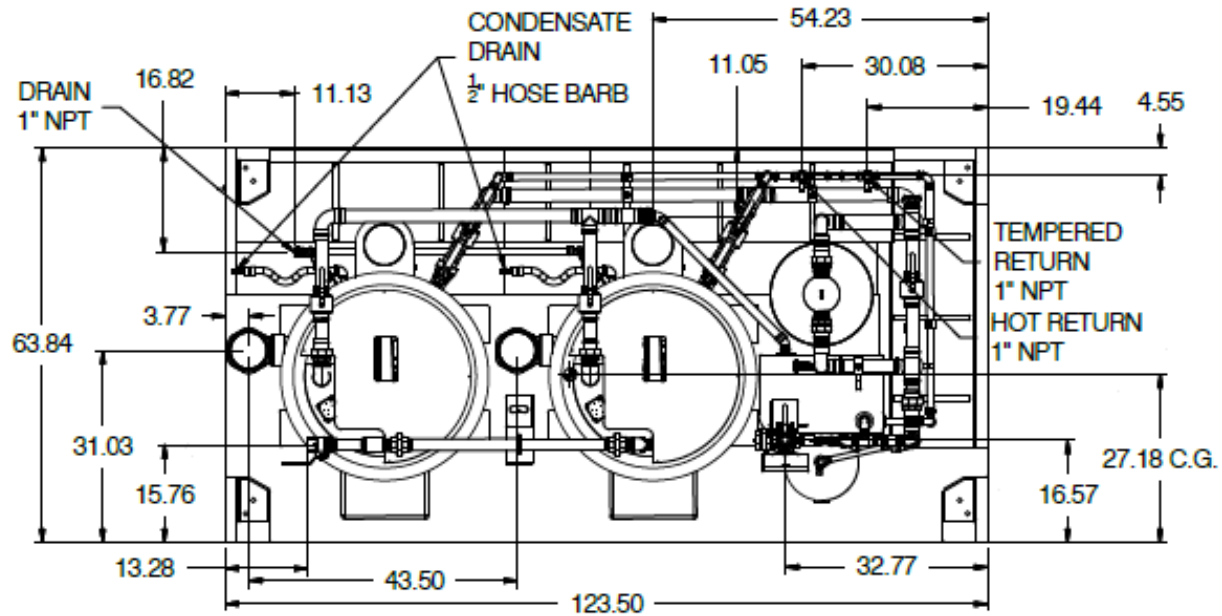


Figure 2-4: LC-Q-1200-2 through LC-Q-1600-2 – Overhead View

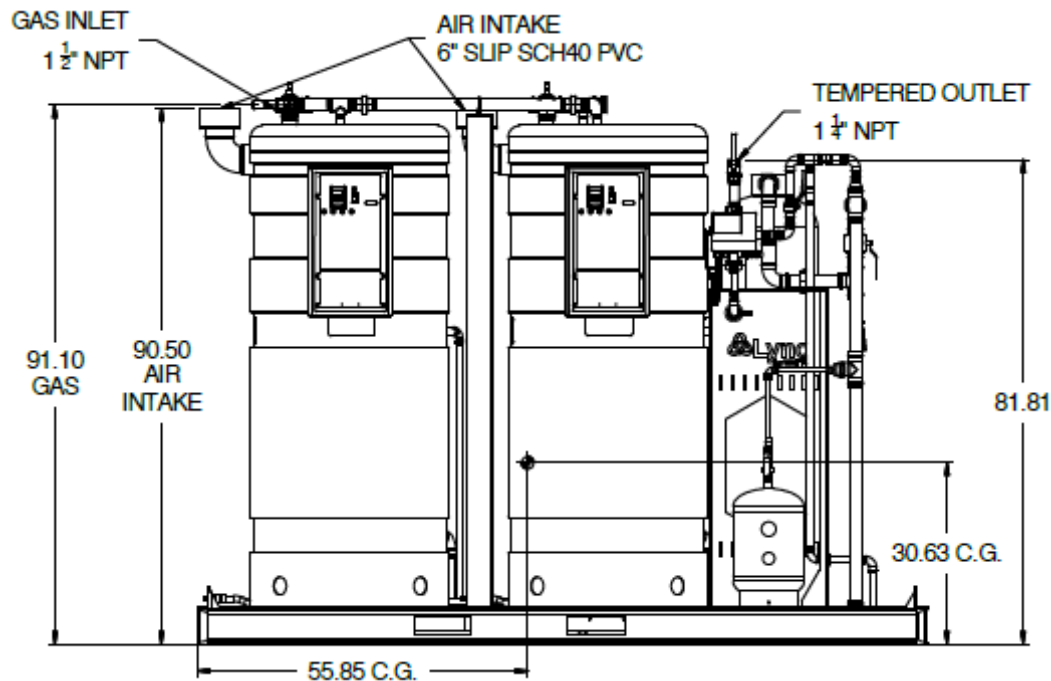


Figure 2-5: LC-Q-1200-2 – LC-Q-1600-2 – Front View

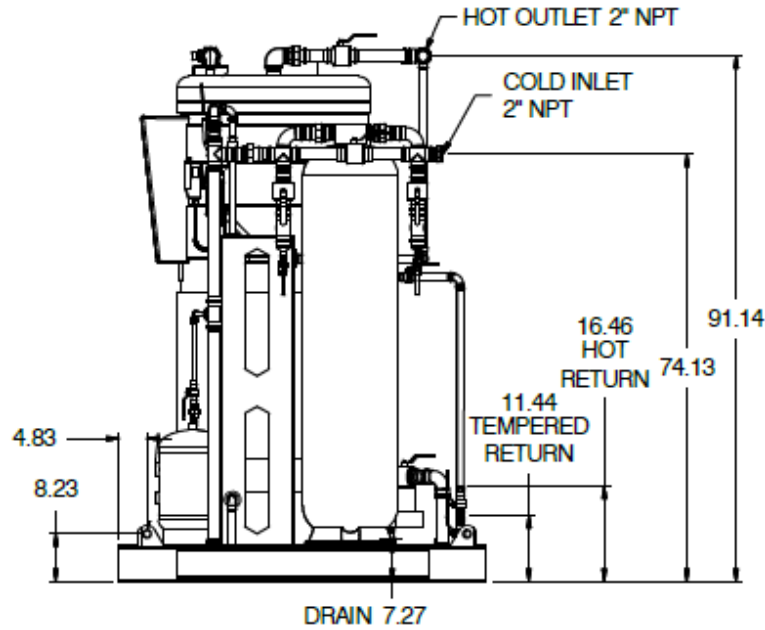


Figure 2-6 LC-Q-1200-2 – LC-Q-1600-2 – Side View

2.3. Model LC-Q-1800-2 & LC-Q-2000-2 Two Unit Series Dimensions

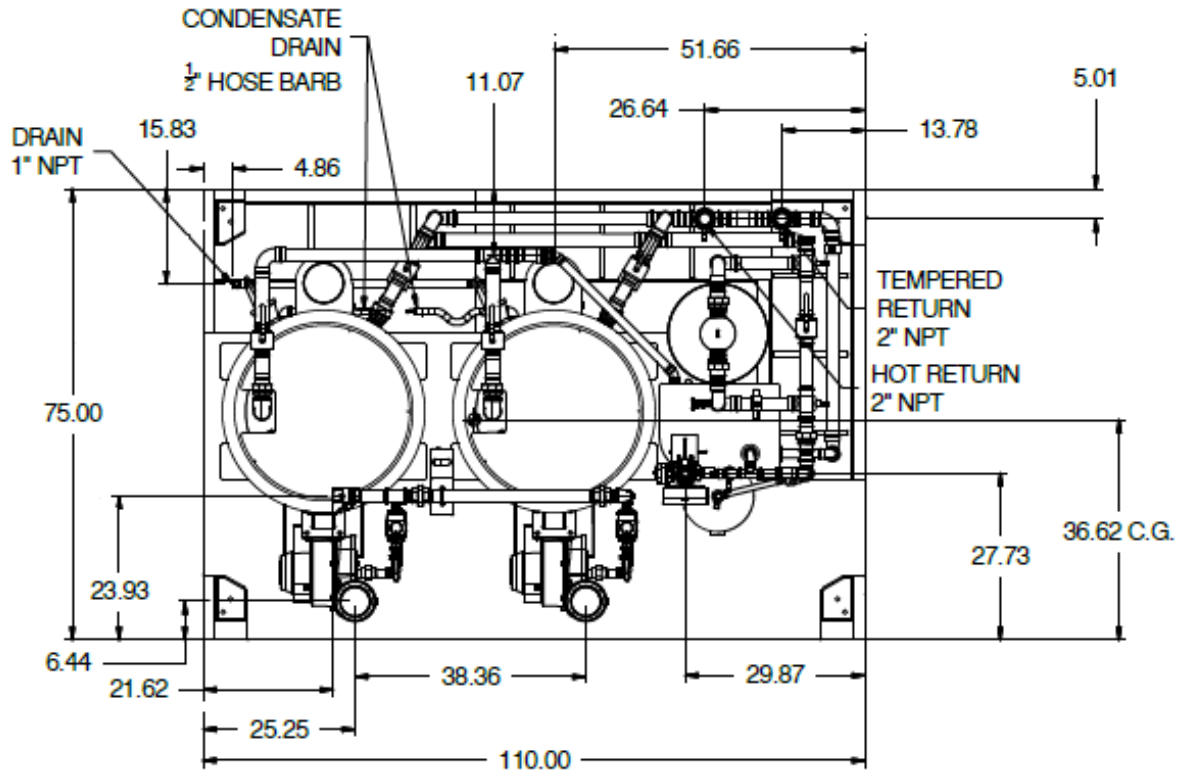


Figure 2-7: LC-Q-1800-2 – LC-Q-2000-2 – Overhead View

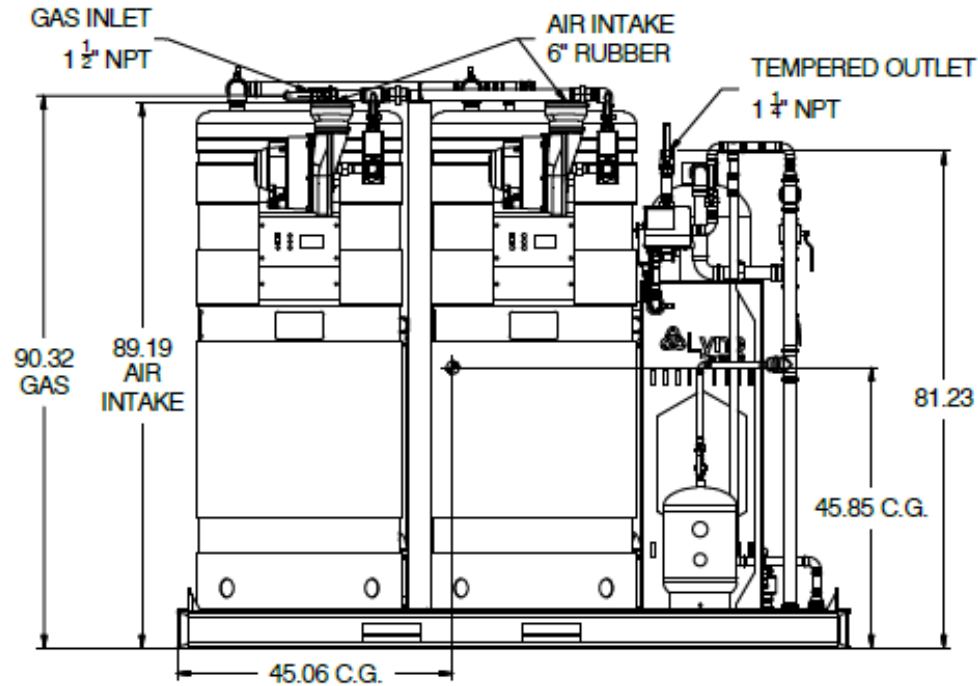


Figure 2-8: LC-Q-1200-2 – LC-Q-1600-2 – Front View

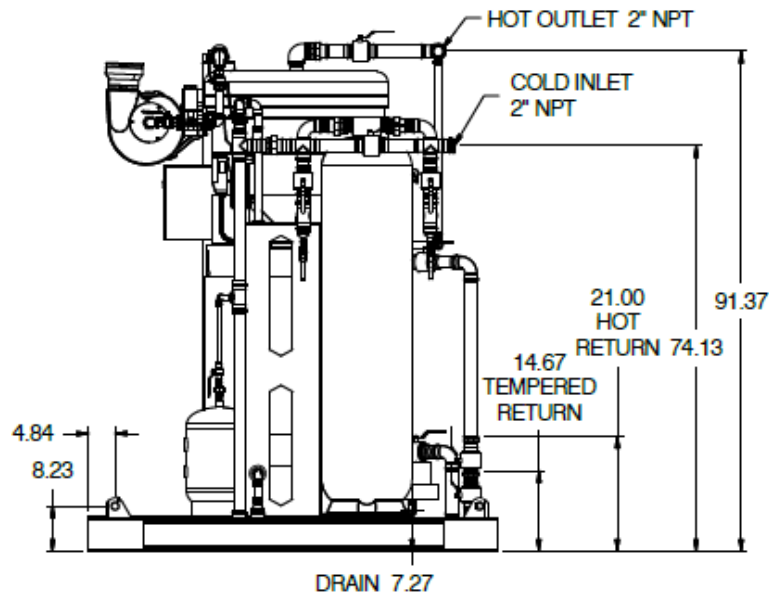


Figure 2-9 LC-Q-1200-2 through LC-Q-1600 – Side View

2.4. Model LC-Q-1200-3 through LC-Q-2400-3 Three Unit Series Dimensions

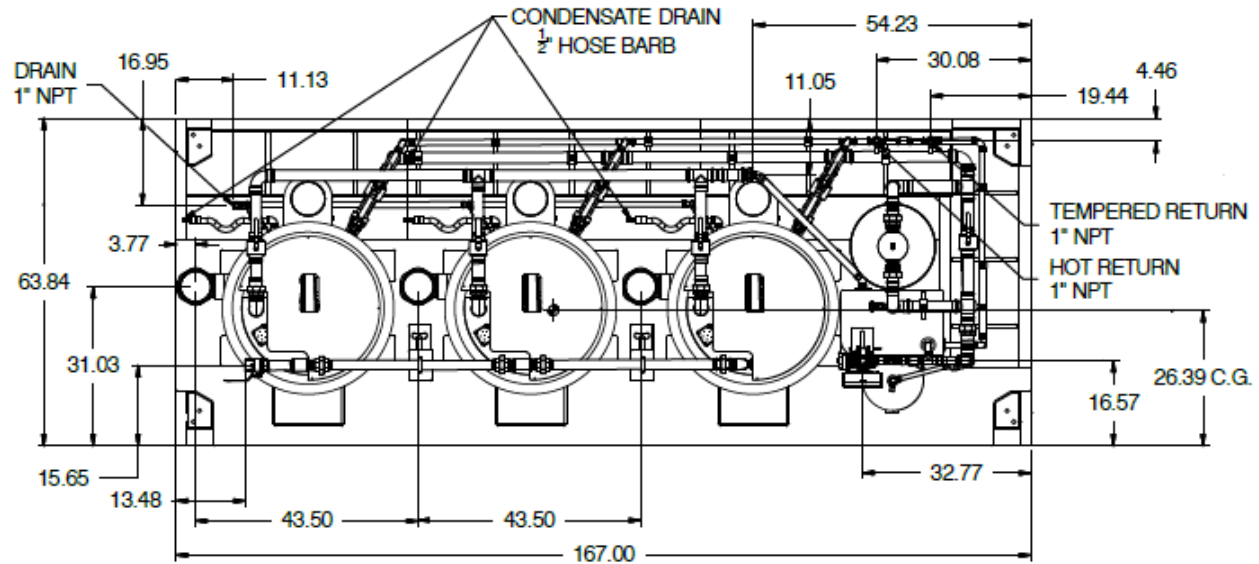


Figure 2-10: LC-Q-1200-3 through LC-Q-2400-3 – Overhead View

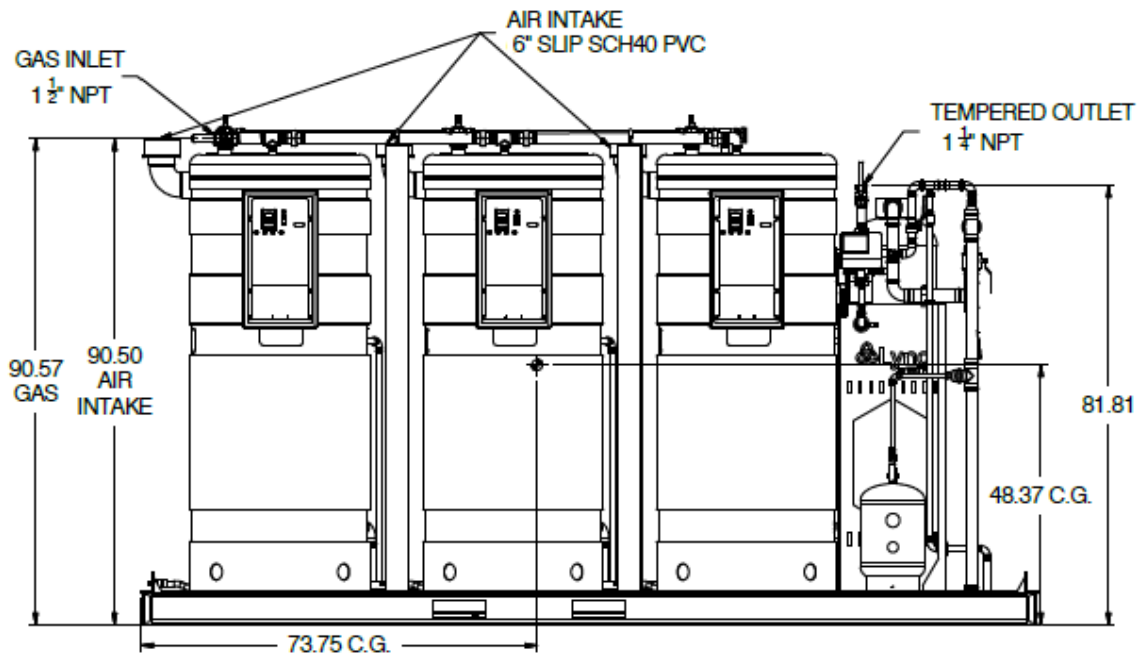


Figure 2-11: LC-Q-1200-3 through LC-Q-2400-3 – Front View

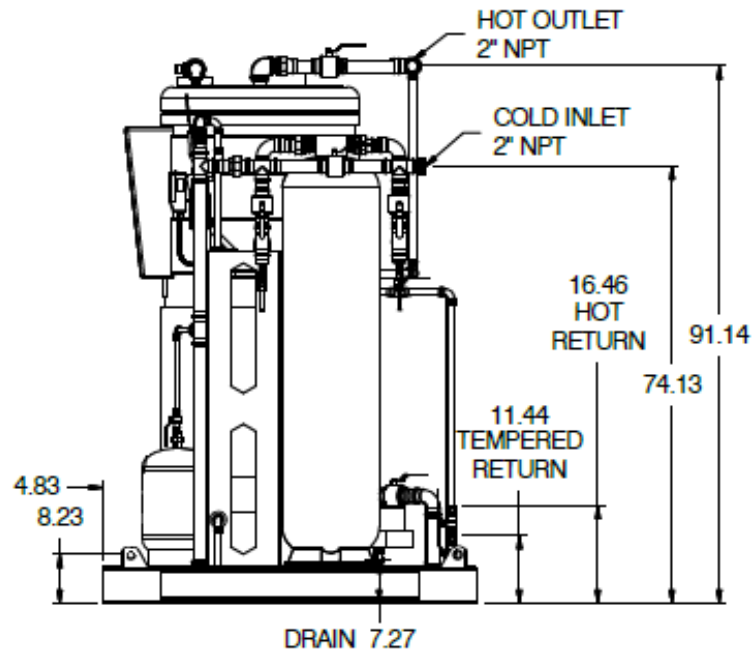


Figure 2-12 LC-Q-1200-3 through LC-Q-2400 – Side View

3. Lync LC-Q Water Heating Solution INSTALLATION

3.1. Checking the Unit Before Installation

- Upon receipt from the freight carrier, completely inspect the Lync LC-Q Water Heating Solution before signing the bill of lading. Inspect the unit and all accompanying parts for signs of impact or mishandling. Verify the total number of pieces shown on packing slips with those actually received. Contact the freight carrier immediately if any damage or shortage is detected.
- Check the data decal on the unit. Be sure the electrical, water and gas supply is adequate for the installation.
- Carefully remove all side and top shipping supports and bracing. If possible, do not remove the wooden base/skid assembly until the product has been moved to its final location for installation and operation (see Section 3.6: Handling and Locating the Lync LC-Q Water Heating Solution).

3.2. Clearances

The location in which the Lync LC-Q Water Heating Solution is installed must comply to the following clearance requirements:

Minimum Clearance from Combustibles:	Zero clearance from sides and rear of skid, 24" from front of skid, 15" from top.
Recommended Service Clearances:	Zero clearance from rear, 18" from all other sides of skid. Check local and national codes for additional clearance requirements.

Additional clearance beyond the minimum required to combustible material should be considered to facilitate easy access for inspection and service of items such as: the burner, gas controls and plumbing connections. Allow enough space for installing and servicing building water, gas, vent, combustion air, electrical, pump and other auxiliary/optional equipment and connections.

3.3. Other Codes and Regulatory Clearances/Requirements

Examples of codes or regulations that may apply are the National Electric Code, State/Regional/National drain water and flue emissions regulations, the National Fuel Gas Code, Building Construction and Safety Codes, the Americans with Disabilities Act (ADA) and, in states where water heaters above a certain input or storage capacity is considered a boiler, the applicable boiler code requirements, the applicable boiler installation requirements in "Safety Code for Controls and Safety Devices for Automatically Fired Boilers" (CSD-1) and other regulatory requirements.

The Lync LC-Q Water Heating Solution must be installed in accordance with the installation regulations in force in the local area where it is installed. Authorities having jurisdiction must be consulted before installation is made. In the absence of such requirements, the installation must be in accordance with the instructions in this manual, unit markings and supplemental instructions, and in compliance with the latest edition of the National Fuel Gas Code, ANSI Z223.1/NFPA 54. Where required by the Canadian authority having jurisdiction, the Lync LC-Q Water Heating Solution must be installed in accordance with the latest edition of the CSA B149.1 Natural Gas and Propane Installation Code and applicable Provincial Regulations. All

This equipment conforms to the current edition of the ASME Boiler and Pressure Vessel Code, Section IV, Part HLW.

3.4. Lifting Lug and Anchor Locations

Use the following diagrams to locate anchors or attachment points, when connecting the Lync LC-Q Water Heating Solution to the floor. Commonly used concrete anchors: 5/16" x 1-3/4" double expansion shield.

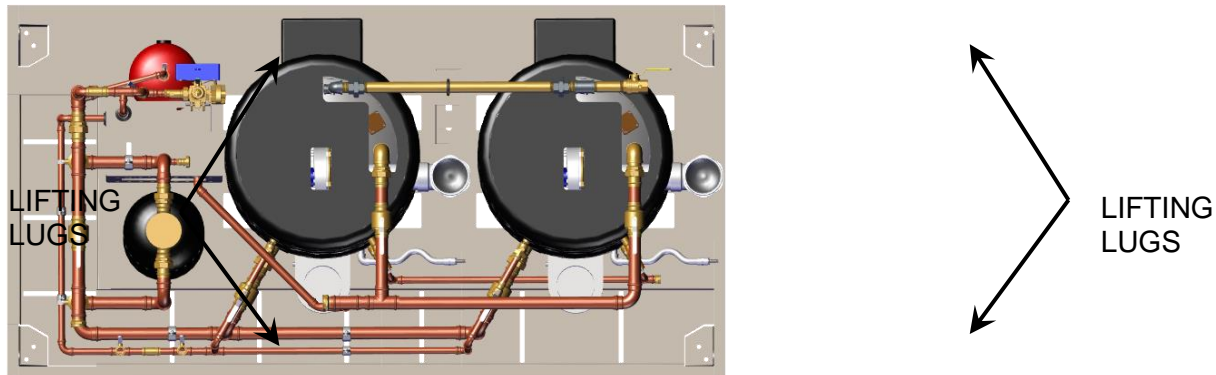


Figure 3-1 Lifting and Anchor Location – Two Units

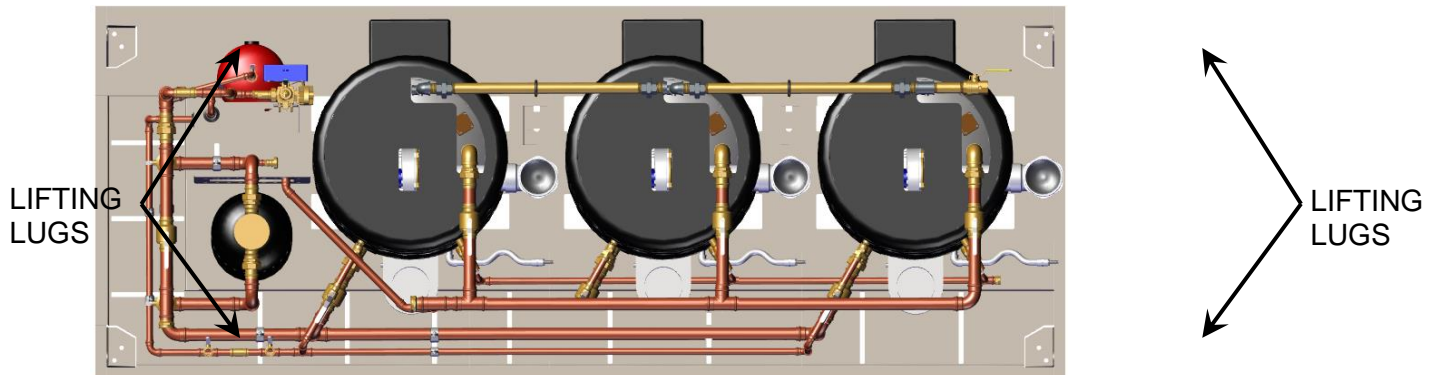


Figure 3-2 Lifting and Anchor Location – Three Units

3.5. Electrical Requirements

See the Lync LC-Q Water Heating Solution's rating decal for electrical service requirements. The unit must be electrically supplied and grounded in accordance with the requirements of the authority having jurisdiction or, in the absence of such requirements, with the latest edition of the National Electrical Code ANSI/NFPA No. 70. In Canada, the electrical service must conform to local electrical codes and/or CSA C22.1, Canadian Electrical Code, Part 1.

- All wiring between the unit and field installed devices must be made with type T copper wire.
- Line voltage wire exterior to the unit must be enclosed in approved conduit or approved metal clad cable.
- To avoid serious damage, DO NOT energize the the system and unit is full of water.

3.6. Handling and Locating the Lync LC-Q Water Heating Solution

⚠ WARNING!

Use industry standard safe rigging methods, such as strapping around the Lync LC-Q Water Heating Solution's base/skid assembly and using spreader bars, when attempting to lift or move this product. Failure to follow standard safe rigging methods can result in property damage, serious injury or death.

To the greatest extent possible, install the Lync LC-Q Water Heating Solution in accordance with the following guidelines:

1. It must be located indoors.
2. It can be installed directly on a combustible floor.
3. Locate it in an area that is not exposed to freezing temperatures.
4. Locate it on a level surface.
5. Locate it near a floor drain.
6. Locate it so that if a water tank or connection should leak, water damage will not spread to an adjacent area or to lower floors of the building. Lync recommends installation of an FM approved wireless leak detection system. The manufacturer's warranty does not cover water damage.
7. Locate it where the vent and air intake piping, when installed, will remain within the maximum equivalent lengths allowed. See *Section 8: Venting* for details.
8. Protect associated electrical components and electrical connections from water (dripping, spraying, rain, etc.) during operation and service.

4. GENERAL PIPING GUIDELINES

⚠ WARNING!

Hot outlet and cold-water piping materials connected to this product must be suitable for temperatures up to 212°F at normal operating water pressures.

4.1. Inlet and Outlet Connections

1. Use only non-ferrous water piping and fittings. Do not use galvanized pipe or fittings. Use of ferrous or galvanized pipe or fittings can cause rust to form. Do not use di-electric couplings.
2. Insulate hot water and return circulation lines. Insulate cold-water supply lines if subject to freezing during shutdown periods.

IMPORTANT: Do not use the plumbing connected to the Lync LC-Q Water Heating Solution as a ground for welding or any other purpose.

3. Pipe the drain valves to a suitable open drain capable of receiving discharge temperatures up to 212°F.

IMPORTANT:

For maximum efficiency, the inlet water to LC-Q Water Heaters should not exceed 100°F. The package utilizes cold inlet water to help extract most of the heat energy from the products of combustion, which lowers the vent temperature to allow the use of PVC vent pipe. Higher cold inlet water temperatures will reduce water heater efficiency and increase the vent temperature. If the vent temperature approaches the maximum allowed, a vent temperature limit switch will cycle LC-Q Water Heaters off to protect the PVC vent.

4.2. Gas and Water Connections

All Lync LC-Q Water Heating Solution models contain the water and gas connections shown in the figures below.

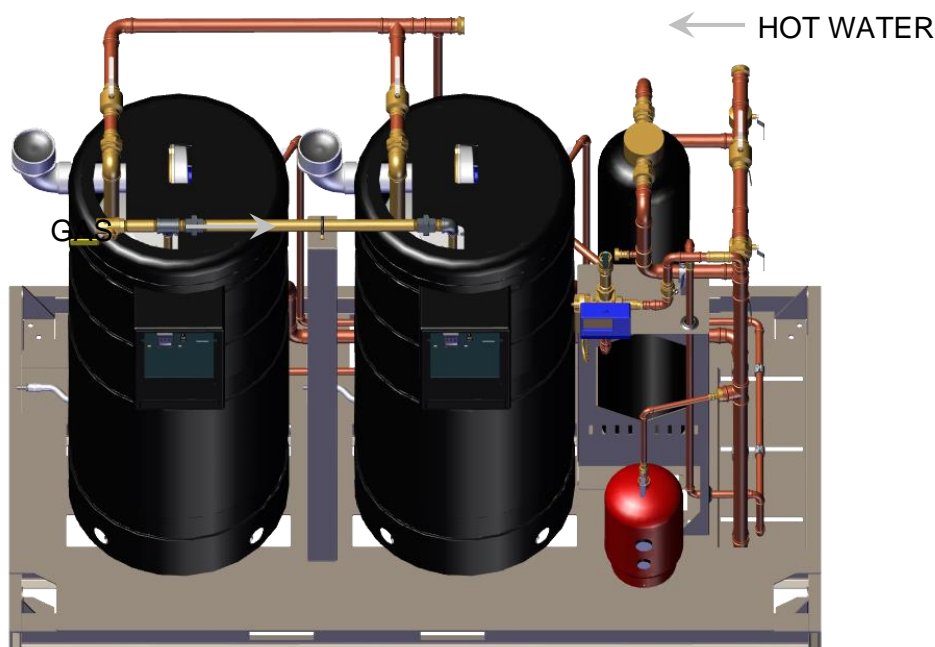


Figure 4-1: Lync LC-Q Water Heating Solution Connections – Front View

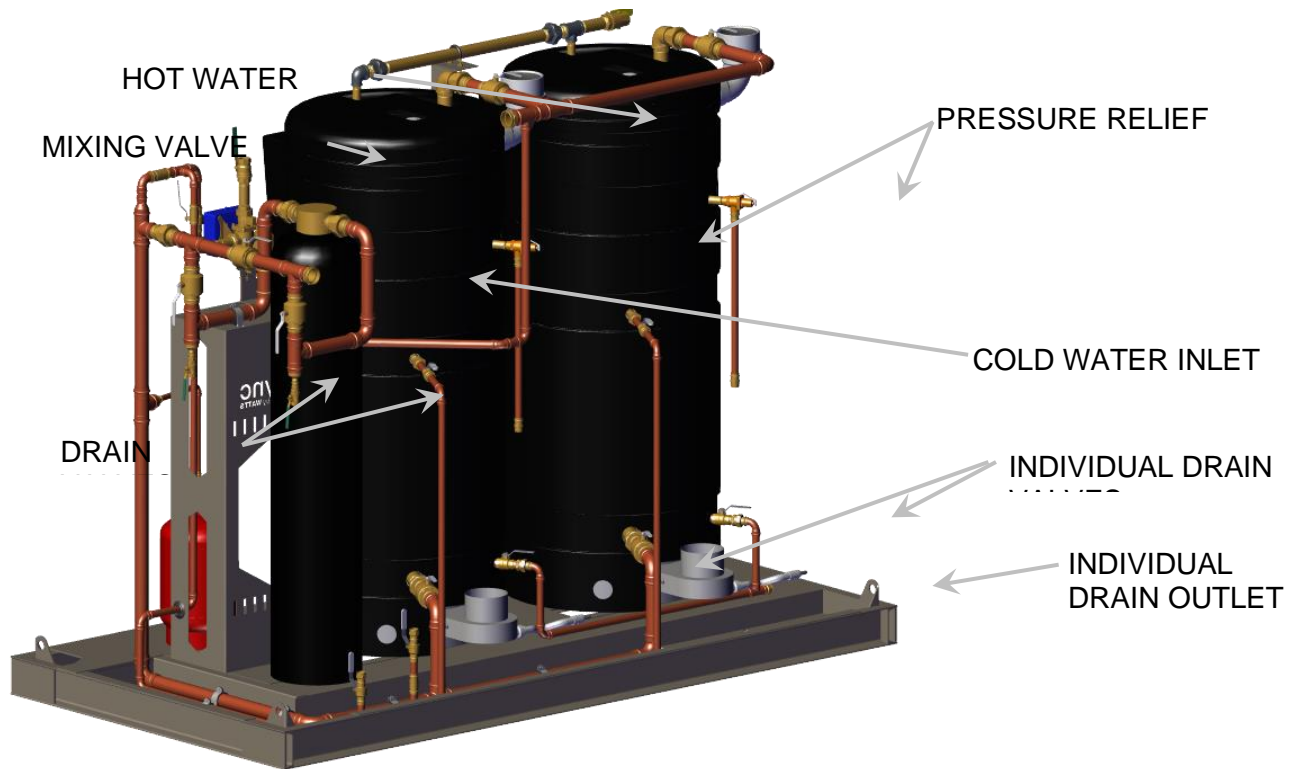


Figure 4-2: Lync LC-Q Water Heating Solution Connections – Right-Rear View

The Lync LC-Q Water Heating Solution has two (2) water drain valves, as shown above. These must be directed to or connected directly to nearby floor drains. In addition, each LC-Q Water Heater has its own individual drain valve on the rear of the unit.

5. CONDENSATE DRAIN, TRAP & DISPOSAL

LC-Q Water Heaters are designed for operation with normal cold inlet water temperatures of less than or equal to 110°F and produce a significant amount of condensate. The condensate drain is under slightly positive flue pressure, so the provided 3/4" PVC condensate trap must always be used. This trap is sized and designed to fill with the proper amount of condensate to create a liquid barrier to prevent flue gases escaping through the condensate drain into the installed space.

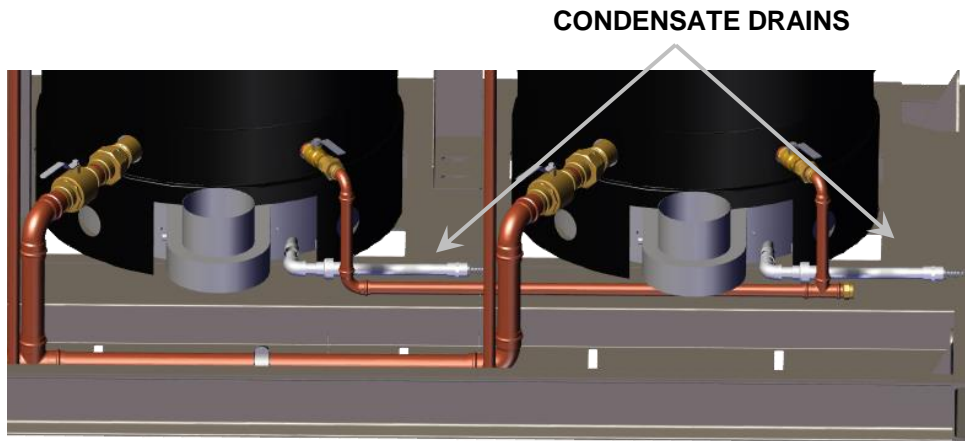


Figure 5-1: Condensate Drain Location – REAR VIEW

WARNING!

The condensate trap included with the Lync LC-Q Water Heating Solution must be installed and maintained as described in these instructions and must be included as part of the condensate piping system. This trap is required to keep potentially hazardous products of combustion from continually entering the installed space where the condensate piping terminates. Failure to properly install this trap can cause, personal injury, exposure to hazardous materials or death.

5.1. Connect Condensate Trap

Complete the instructions below to connect the condensate drains on each unit to the condensate trap. All units will connect to a single condensate trap, shipped with the unit.

1. The condensate drains are located at the bottom-rear of each LC-Q Water Heater, near the flue outlet. Connect the condensate trap assembly to the PVC fitting on the condensate drain pipe. Additional PVC fittings and pipe can be added to the condensate drain connection to relocate the condensate trap assembly as long as all added parts are at the same elevation. After attachment, the trap must be rotated so the offset in the pipe aims down toward the floor. Do not rotate the offset toward the ceiling. Do not use tools to tighten the PVC union. Hand-tighten the PVC union to seat the internal gasket.
2. Do **not** combine the Lync LC-Q Water Heating Solution condensate drain to the condensate drains of other condensing appliances into a single drain line. Route each drain line into a drain suitable for condensate and make certain the end of the drain lines are not submerged or otherwise blocked.

3. All condensate plumbing must be protected from freezing. Do not locate condensate piping such that an ice dam of frozen condensate can block condensate from leaving the outlet.
4. Connect the condensate drain line or the Condensate Neutralization System (CNS) to the barbed hose connection, sized for 1" heavy wall Vinyl tubing rated for 170°F or higher, located at the end of the condensate trap. All piping from the condensate trap to the suitable drain or the CNS must remain below the highest point (top of the condensate outlet pipe) on the properly attached condensate trap.

The Lync LC-Q Water Heating Solution is shipped with an optional, field installed, Condensate Neutralization System (CNS). To use the CNS, complete the instructions in the next section.

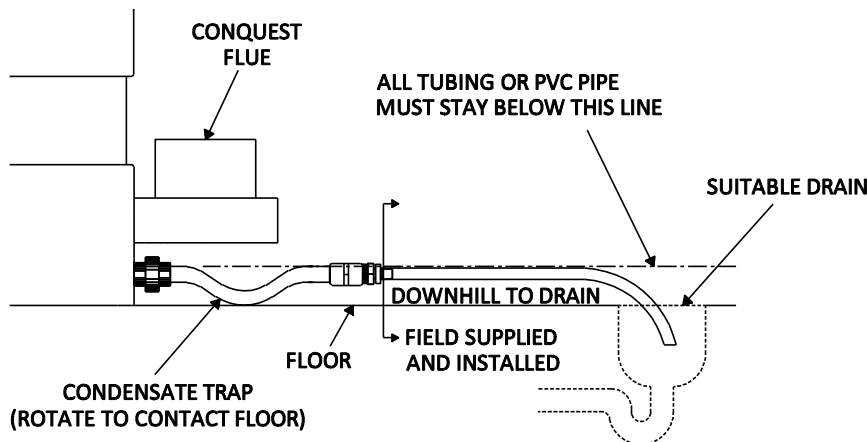


Figure 5-2 Condensate Trap Without Condensate Neutralizer

5.2. Condensate Neutralization System

Condensate is only slightly acidic (3-5 PH). In some locations, local codes require it to be neutralized prior to entering a suitable drainage system. If required, this slight acidity can be neutralized by routing it through a Condensate Neutralization System (CNS). The Lync LC-Q Water Heating Solution includes a Condensate Neutralization System, sized for the specific system, and shipped separately. For additional information on the Condensate Neutralization System, contact your local Lync representative.

The CNS neutralizes condensate while it slowly flows through a container filled with renewable neutralizing media. The condensate neutralizer reduces or avoids the need for separate chemical treatment or dilution using substantial quantities of tap water.

Condensate Neutralization Systems Installation Requirements

The Lync LC-Q Water Heating Solution includes a Condensate Neutralization System (CNS), sized for the specific system, and shipped separately. Complete the instructions below to connect the CNS to the Lync LC-Q Water Heating Solution.

1. Complete the steps in Section 5.1: *Connect Condensate Trap* section, above.
2. Choose the location for the CNS that conforms to the following requirements:
 - a) Locate it in a convenient place between the condensate outlet and a suitable drain.
 - b) It must be located such that condensate will flow downhill from the condensate trap outlet to the inlet on one end of the CNS, and then downhill from the other end of the CNS to the drain. If this continuous downhill flow is not maintained, the trap will not properly operate and condensate could back up into a water heater.

- c) Install it where the threaded end cap can be removed to recharge the Neutralizer.
 - d) Use only the materials included with the CNS.
 - e) Follow the instructions included in the Condensate Neutralization System for connecting the Vinyl tubing.
 - f) The CNS *must* be mounted horizontally and level.
3. Keep the condensate trap flooded at all times, except when the LC-Q Water Heaters are turned off for maintenance to recharge the condensate neutralizer with replacement media.

WARNING!

Keep the Condensate Neutralization System closed at all times the LC-Q Water Heaters are operating. The system must remain closed to prevent potentially hazardous products combustion from continually enter the room. Failure to keep the Condensate Neutralization System closed during operation can cause property damage, exposure to hazardous material, personal injury or death.

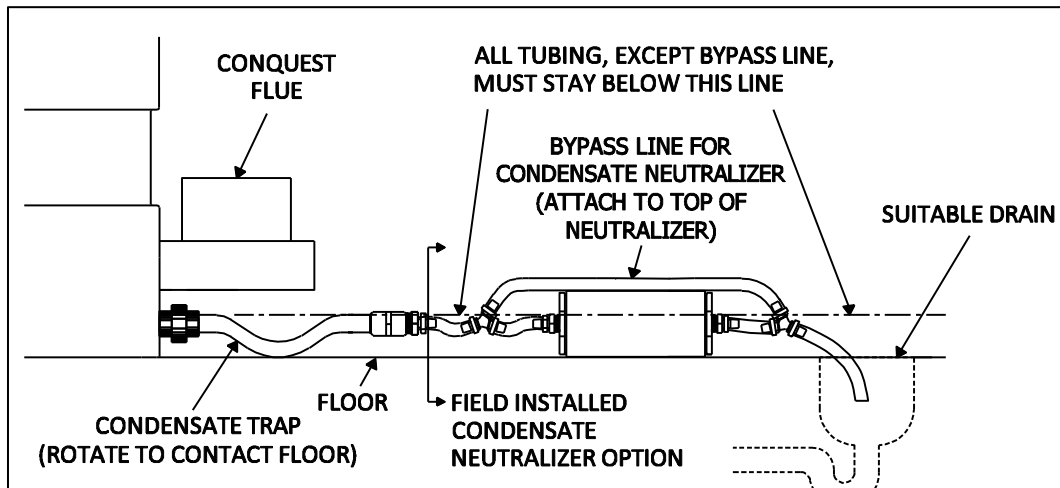


Figure 5-3 Condensate Trap with Condensate Neutralizer Located On the SAME LEVEL as the LC-Q Water Heaters

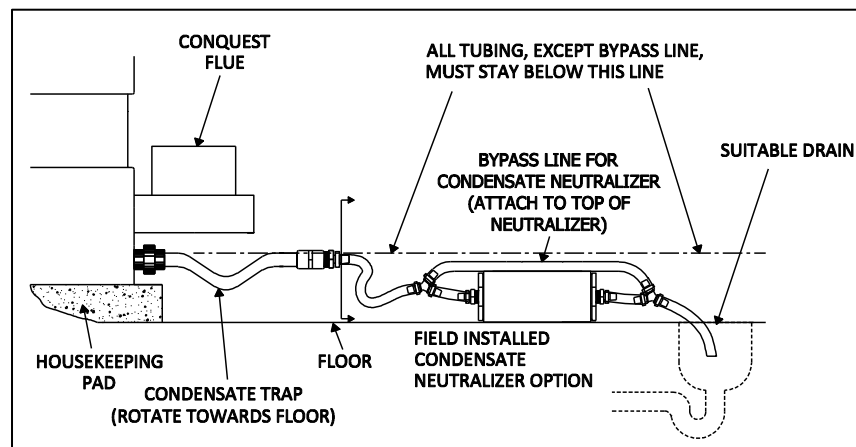


Figure 5-4 Condensate Trap with Condensate Neutralizer Located BELOW the LC-Q Water Heaters

6. GAS SUPPLY AND PIPING

Verify the type of gas specified on rating plate is supplied to the LC-Q Water Heater. It is designed for operation up to 2000 feet altitude. LC-Q Water Heater's Btu/h input derates 4% per 1000 feet elevation above sea level. Consult Factory for installations above 2000 feet elevation.

6.1. Gas Train and Controls Certification

NOTE: The LC-Q Water Heater's gas train and controls assembly have been tested under the applicable Nationally Recognized Standard to comply with safety and performance criteria such as ignition, combustion and safety shutdown operation.

6.2. Gas Control Trains

All LC-Q Water Heater models include the following gas control train components:

- Manual shutoff valve
- Two safety shutoff valves
- Zero governor type regulator
- Manual test valve
- Manifold pressure taps.

These components may be separate or combined in a common housing.

WARNING!

Do not adjust or remove any screws or bolts on gas train control components which are secured with a red or blue sealing compound. In addition to voiding warranties and certification listings, such adjustment or disassembly can cause improper operation which could result in property damage, personal injury or death.

6.3. Inlet Pressure

Measure at the inlet pressure tap located at the main gas cock. The inlet pressure must remain within the minimum and maximum values while the LC-Q Water Heater is at rest when operating at maximum firing rate.

INLET PRESSURE	NAT. GAS	Propane
Maximum Static Pressure (Inches-Water Column)	14.0"	13.0"
Minimum Flow Pressure (Inches-Water Column)	3.5"	8.0"

6.4. Manifold Pressure

Measure at the pressure tap located on the downstream side of the manual valve closest to the burner. The rated manifold pressure appears on the product data label located near the front of LC-Q Water Heaters.

6.5. Gas Piping Size

Do not use the gas pipe connection size to determine the gas supply piping. Designing and sizing a gas supply piping system requires consideration of many factors and must be done by a gas supply piping expert. Always follow NFPA 54 National Fuel Gas Code for gas pipe sizing and gas pipe system design. The following charts provide examples of some of the information used by the gas supply piping expert to determine proper pipe sizes.

Use the values in the following table to add the equivalent straight pipe for each elbow or tee to obtain the total distance from the meter:

CONVERT FITTINGS TO EQUIVALENT STRAIGHT PIPE*								
Diameter Fitting (inches)	¾"	1"	1¼"	1½"	2"	3"	4"	5"
Equivalent Length of Straight Pipe (feet)	2'	2'	3'	4'	5'	10'	14'	20'

MULTIPLE WATER HEATER INSTALLATIONS, SCHEDULE 40 METALLIC GAS PIPE SIZE CHART*
Maximum Capacity of Pipe in Thousands of Btu/hr's per hour for gas pressures of 14 Inches Water Column (0.5 PSIG) or less and a pressure drop of 0.05 Inch Water Column (Based on NAT GAS, 1025BTU's per Cubic Foot of Gas and 0.60 Specific Gravity).*

Nominal Iron Pipe Size, Inches	Length of Pipe in Straight Feet													
	10	20	30	40	50	60	70	80	90	100	125	150	175	200
¾	369	256	205	174	155	141	128	121	113	106	95	86	79	74
1	697	477	384	328	292	267	246	256	210	200	179	164	149	138
1 ¼	1400	974	789	677	595	543	502	472	441	410	369	333	308	287
1 ½	2150	1500	1210	1020	923	830	769	707	666	636	564	513	472	441
2	4100	2820	2260	1950	1720	1560	1440	1330	1250	1180	1100	974	871	820
2 ½	6460	4460	3610	3100	2720	2460	2310	2100	2000	1900	1700	1540	1400	1300
3	11200	7900	6400	5400	4870	4410	4000	3800	3540	3300	3000	2720	2500	2340
4	23500	16100	13100	11100	10000	9000	8300	7690	7380	6870	6150	5640	5130	4720

*See NFPA 54 National Fuel Gas Code for actual pipe size selection and for sizing Propane gas piping.

6.6. LC-Q Water Heater Isolation During Gas Supply Piping Pressure Test

1. LC-Q Water Heaters and their provided manual shutoff valves must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of ½ PSI (3.5 kPa).
2. LC-Q Water Heaters must be isolated from the gas supply piping system by closing their individual manual shutoff valves during any pressure testing of the gas supply piping system at test pressures equal to or less than ½ PSI (3.5 kPa).
3. LC-Q Water Heaters and gas connections must be leak-tested before operation.

6.7. Gas Connection

1. Safe operation of LC-Q Water Heaters require adequate gas supply with the required static and dynamic (flow) pressures. Actual piping selection depends on many variables that must be carefully considered by the gas piping system designer.
2. Do not select gas pipe sizes based only on the supplied tables. These tables are for use by the gas piping system designer as a reference in checking pipe size selections.
3. Gas pipe size may be larger than the LC-Q Water Heater's connections.
4. Installation of a union is suggested for ease of service.
5. Install a manual main gas shutoff valve on the gas supply piping connected to the Lync LC-Q Water Heating Solution to isolate the burners and gas trains from the main supply gas in compliance with NFPA 54 National Fuel Gas Code and most local Codes.
6. The gas system installer must clearly identify the emergency shut-off device.
7. A sediment trap (drip leg) MUST be provided in the inlet of the gas connection to the Lync LC-Q Water Heating Solution.
8. LC-Q Water Heater models LC4Q, LC9Q and LC10Q combination gas valves and/or gas regulators incorporate either an internal vent limiter or an externally mounted vent limiting orifice and 1/4" aluminum tube located in a "T" attached to the regulator vent port. Venting to outdoors is not required. Never remove, cut, splice or alter the flexible tubing attached directly to the regulator vent port or to a vent limiting fitting attached externally to the regulator, as this will cause unreliable ignition and can cause improper operation. Although not required, a connection to the open end of the 1/4" aluminum tube can be made and routed to the outdoors. No other connection point is allowed. Do not remove the aluminum tubing and connect directly to the "T", as damage to the required vent limiter and improper gas control could result.
9. LC-Q Water Heater models LC-Q-800-2, LC9Q and LC10Q combination gas valves contain an internal venter. Venting to outdoors is not allowed.

7. COMBUSTION AND VENTILATION AIR

Provisions for adequate combustion and ventilation air to mechanical room must be in accordance with Section “Air for Combustion and Ventilation” in the latest edition of the NFPA 54 National Fuel Gas Code, ANSI Z223.1 and/or CSA B149.1, Natural Gas and Propane Installation Code or applicable provisions of the local building codes. Any method addressed in NFPA 54 National Fuel Gas Code section “Air for Combustion and Ventilation is acceptable as outlined below.

7.1. Equipment Located In Confined Spaces

A Lync LC-Q Water Heating Solution located in a confined space requires two openings, one commencing within 12" (30.5 cm) from the top of the enclosure/room and one commencing within 12" from bottom of the enclosure/room to assure adequate combustion air and proper ventilation. The total input of all gas utilization equipment installed in the room must be used to determine the required minimum air volume needed for combustion, ventilation and dilution of flue gasses. Also consider makeup air requirements from other equipment within the mechanical room or other rooms that are pressure connected with the mechanical room. Some examples of other makeup air requirements are from kitchen exhaust hoods, clothes dryers, powered exhaust fans, etc.

All Air From Outdoors:

Each opening requires a minimum free area of 1 square inch per 4000 Btu/hr of the total input rating of all LC-Q Water Heaters in the enclosure, if directly communicating with the outdoors or communicating to the outdoors through vertical ducts.

Each opening requires a minimum free area of 1 square inch per 2000 Btu/hr of the total input rating of all LC-Q Water Heaters in the enclosure, if communicating with the outdoors through horizontal ducts.

All Air From Inside The Building:

Follow the requirements of NFPA 54 National Fuel Gas Code, ANSI Z223.1 section “Indoor Combustion Air”.

Combination Of Air From The Indoors And From The Outdoors:

Follow the requirements of NFPA National Fuel Gas Code, ANSI Z223.1 section “Combination Indoor and Outdoor Combustion Air”.

From Outdoors Through One Opening:

Follow the requirements of NFPA National Fuel Gas Code, ANSI Z223.1 section “One Permanent Opening Method”.

NOTE: The Lync LC-Q Water Heating Solution may be installed with a remote air intake system, which uses a make-up air duct to draw combustion air directly from outdoors.

WARNING!

Adequate clean combustion air must be provided to the LC-Q Water Heaters. They must never operate under a negative pressure. Particular care must be taken when exhaust fans, compressors, air handling units, etc. may rob air from the LC-Q Water Heaters. The combustion air supply must be completely free of any chemicals or fumes, which may be corrosive to LC-Q Water Heaters. Some common chemical fumes to avoid are fluorocarbons and other halogenated compounds, most commonly present as refrigerants or solvents, such as Freon, trichloroethylene, perchlorethylene, chlorine, etc. These chemicals, when in contact with the equipment or when burned, form acids which quickly attack the tubes, flue collector, stack and other unit and auxiliary equipment. Failure to provide adequate clean combustion air or operating under negative pressure can cause premature, unwarranted product failure or unsafe operation producing carbon monoxide that could escape into the building. Exposure to carbon monoxide can lead to personal injury or death.

7.2. Maximum Allowed Remote Combustion Air Inlet Length (Equivalent Length)

A vertical or horizontal remote air inlet system can be connected to the LC-Q Water Heaters without modification. The maximum length of field supplied single wall pipe, such as galvanized ventilation pipe, is shown in the chart below titled Maximum Air Inlet Duct Equivalent Length. Use metal tape or RTV sealant to seal each pipe joint.

Maximum Air Inlet Duct Equivalent Length / Max Elbows			
Duct Size	4" Duct	6" Duct	8" Duct
Max Equivalent Length Model LC4Q	125 feet / 4	200 feet / 10	300 feet / 10
Max Equivalent Length Model LC5Q	80 feet / 3	200 feet / 10	300 feet / 10
Max Equivalent Length Models LC6Q – LC8Q	N/A	250 feet / 10	300 feet / 10
Max Equivalent Length Models LC9Q – LC10Q	N/A	150 feet / 5	250 feet / 10

To determine the maximum straight length of duct allowed, use the Duct Fitting Equivalent Length chart below to find the total equivalent length for all duct fittings in your combustion air system. Then subtract this number of feet from the total equivalent length allowed in Maximum Air Inlet Duct Equivalent Length chart above. The sum of this calculation is the maximum length of straight duct allowed. If a longer length is required, repeat the calculation using a larger duct size. No additional deduction is required for the addition of the duct system terminal.

Duct Fitting Equivalent Length for Model LC4Q - LC5Q		
Duct Pipe:	4" Duct	6" Duct
90° Elbow	18 feet	10 feet
90° Long Radius Elbow	10 feet	6 feet
45° Elbow	10 feet	6 feet

Duct Fitting Equivalent Length for Model LC6Q - LC10Q		
Duct Pipe:	6" Duct	8" Duct
90° Elbow	20 feet	10 feet
90° Long Radius Elbow	12 feet	6 feet
45° Elbow	12 feet	6 feet

The following remote air duct information is provided for use in design calculations, if needed.

Remote Air Duct Specifications	
Input MBtu/h	Required Air (SCFM)
399	87
500	108
600	130
700	152
800	173
900	195
1000	216

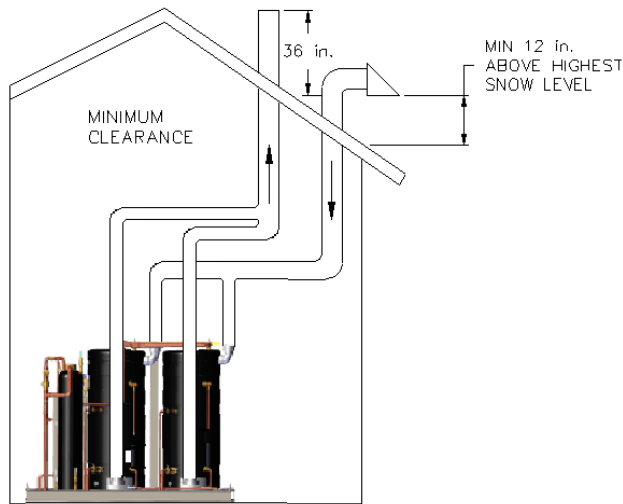
7.3. Remote Combustion Air Cap

A suitable remote air termination must be used to prevent water, debris, animals or obstructing material from entering the remote air supply.

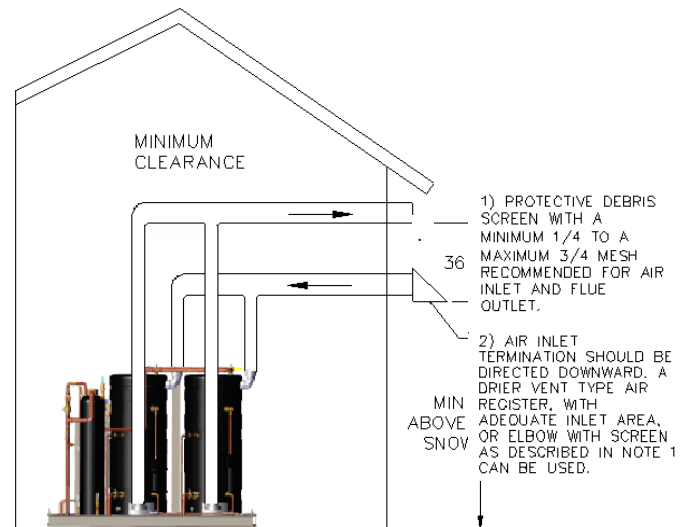
7.4. Vertical or Horizontal Remote Air Duct Termination

- Air inlet must be located no less than 3 feet (0.91m) below the exhaust terminal if they are within 10 feet (3.05 m) of each other, unless the flue outlet terminates with a straight discharge. If the flue outlet terminates with a straight discharge, the air inlet can be located no less than 18 inches (0.46m) below the exhaust terminal.
- If terminating through the roof, the air inlet must terminate at least 12 inches (0.3 m) above roof level and at least 12 inches (0.3 m) above snow levels.
- If terminating through a sidewall, the air inlet must terminate at least 12 inches (0.3 m) above grade and/or at least 12 inches (0.3 m) above possible snow levels.

Vertical Remote Air



Horizontal Remote Air



* When flue outlet is terminated with a straight discharge, separation of terminations must be a minimum of 18".

Figure 7-1 Venting Options

7.5. Combining Remote Air Ducting

The Lync LC-Q Water Heating Solution **must** have **separate** intake piping, unless the air inlet piping, exhaust duct and other system considerations have been designed by Lync Systems Engineering. Before operation of a combined remote air ducting system, all of the duct design firm's system installation and operation requirements must be in place, their instructions followed and the system must be properly maintained.

The Lync LC-Q Water Heating Solution air intake piping must incorporate a variable speed blower capable of providing and regulating positive pressure air supplied to all LC-Q Water Heaters on the skid. The pressure of the supplied air must not be less than 0.0" W.C. and must not exceed 0.25" W.C.

The common combustion air supply system must be interlocked, so the LC-Q Water Heaters will not operate until the common combustion air supply is proved to be within the range of 0.0 to 0.25" W.C.

⚠ WARNING!

Do not combine remote air ducting of multiple LC-Q Water Heaters into a single remote air duct unless isolation dampers have been installed and the combined remote air duct system is installed, operated and maintained following manufacturer instructions. Combining remote air ducting without following these requirements can result in failure of LC-Q Water Heaters and venting system and/or exposure to carbon monoxide and can result in property damage, personal injury or death.

⚠ WARNING!

If the cold inlet water temperature is above 100°F, then solid CPVC or ETL, UL, ULC or CSA listed polypropylene or stainless steel venting is required and the vent limit switch must be adjusted for the higher temperature rating allowed by these vent materials. (See Section 10.6: Changing the Vent Material Type.)

8. VENTING

8.1. Venting LC-Q Water Heaters

All LC-Q Water Heater models use the positive pressure generated by the burner system blower to push combustion products out of the vent. Since the vent system is under positive pressure and must be capable of containing condensate, it must be constructed of schedule 40 solid PVC or CPVC pipe. Use of cellular core PVC (ASTM F891), cellular core CPVC, or Radel® (polyphenylsulfone) in nonmetallic venting systems is prohibited. Polypropylene or single or double wall stainless steel venting listed by ETL, UL, ULC or CSA for Category IV positive pressure gas appliance venting may be used instead of solid PVC or CPVC plastic pipe venting.

Follow the instructions below for installing solid PVC or CPVC pipe. For other listed vent materials, follow the vent manufacturer's instructions for installation, sealing, supporting and terminating their vent system. Covering non-metallic vent pipe and fittings with thermal insulation is prohibited.

The stainless steel vent connection located near the front of each LC-Q Water Heater is 6-5/8" O.D., to accept a 6 inch PVC or CPVC pipe coupling. A reducer coupling may also be used to accommodate smaller or larger vent pipe. (See Maximum Vent Length tables). Do not use a barometric damper with the LC-Q Water Heater positive pressure vent.

LC-Q Water Heaters can be vented either vertically, through a ceiling or roof, or horizontally through a wall. LC-Q Water Heaters are a Category IV positive pressure gas appliance; venting and can be routed to the outdoors in any direction, from the flue outlet of the water heater, except down. The vent must be installed and supported at least every four feet to slope downward toward the water heater's vent connection with at least ¼ inch drop per linear foot of horizontal vent run, to allow proper drainage of accumulated condensation. The venting system shall also have a means for collection and disposal of condensate. All penetrations through walls and roofs must be weather and gas tight, such that rain and products of combustion cannot pass from outdoors back indoors.

Additional steps required when venting with solid PVC or CPVC pipe:

1. Read and follow the information, instructions and warnings above.
2. Do not insulate the plastic vent pipe.
3. Design the vent pipe route so that normal expansion (pipe getting longer) and contraction (pipe getting shorter), due to on and off temperatures, does not bind or put stress on cemented pipe fittings.
4. A 6 inch pipe coupling must always be the first fitting attached to the water heater's vent connection when using a PVC or CPVC vent system. If a listed stainless steel or polypropylene Category IV vent system is used, the correct adapter for attaching and sealing to the water heater's 6-5/8 inch O.D. vent connection must be obtained from the manufacturer of the vent system to be installed.
5. For PVC or CPVC, dry-fit the 6" pipe coupling onto the water heater's vent connector. Then remove the coupling and apply a liberal coating of room temperature vulcanizing (RTV) adhesive to the outside of the vent connector and to the inside of the plastic pipe coupling. Before the RTV sets, slide the coupling over the vent connector while rotating approximately 1/8 of a turn. Inspect and apply additional RTV to the joints, if needed to provide a sound air and water tight seal.
6. Drill a pilot hole through the PVC or CPVC coupling flange and into the center of the stainless steel vent connector flange in three equally spaced locations around the pipe.

Drive stainless steel sheet metal screws through the pilot holes to attach and firmly hold the plastic coupling onto the vent connector flange.

⚠ WARNING!

Use only solid PVC or CPVC pipe or use Polypropylene or stainless steel venting (single or double wall) listed by a nationally recognized testing laboratory for Category IV positive pressure gas appliance venting. Use of ABS pipe, or use of PVC or CPVC pipe with cell/foam type construction or use of use of venting materials other than specified in these instructions can result in failure of the venting system and/or exposure to carbon monoxide or other toxic fumes, which can result in property damage, personal injury or death.

Do not vent LC-Q Water Heaters into an existing or traditional gas vent or chimney, do not combine the vent with any other unit and do not use a barometric damper in the vent. Such venting could result in failure of the venting system and/or exposure to carbon monoxide which can result in property damage, personal injury or death.

7. Clean and deburr all solid PVC or CPVC pipe ends, then trial assemble the entire vent system vent before joining with cement. Mark the pipe and fittings to identify their locations, then disassemble. Reassemble the vent system using fresh PVC cement to connect PVC pipe and fresh CPVC cement to connect CPVC pipe. If both solid PVC and solid CPVC pipe are used in the same vent system, all joints between the two types of pipe must be made with fresh cement suitable for both materials. Follow the cement manufacturer's instructions for making sound air and water tight joints.
8. **Vent support** – For PVC or CPVC, the vent system must be supported at intervals no greater than four feet, to prevent sagging, distortion and stress on pipe fittings. Vertical pipe must also be supported to avoid stress on all cemented pipe fittings and to prevent putting excessive weight on the LC-Q Water Heater's vent connection. For listed stainless steel or polypropylene vent system, follow the vent system manufacturer's instructions.
9. **Testing for leaks** – Once the vent system is installed, it must be checked to confirm all joints in the vent system are air and water tight. After the vent is assembled, close the end of the vent with a taped plastic bag or some other temporary closure. With the gas supply turned off, energize the LC-Q Water Heater's combustion blower to apply air pressure to the vent system. Spray each joint and vent connection with commercially available leak detection liquid to confirm no air is escaping from any point. Repair any leaks and retest. After testing is complete, de-energize the combustion blower, wipe clean the leak detection liquid and REMOVE the temporary vent closure.
10. The vent pipe must be sealed at the point where it passes through a wall or roof, to prevent rain, insects or flue products from entering the living space or interior of the building.
11. For proper vent operation and to protect the gas vent from wind and weather, provide suitable termination to prevent wind, water, debris or animals from obstructing or entering the vent. The LC-Q Water Heater vent shall not terminate:
 - Over public walkways.
 - Near soffit vents or crawl space vents or other areas where condensate or vapor could create a nuisance or hazard or cause property damage; or
 - Where condensate vapor could cause damage or could be detrimental to the operation of regulators, relief valves, or other equipment.
12. Do not use a barometric damper with the LC-Q Water Heater venting system. Barometric dampers are designed for use with certain Category I negative pressure vent systems. LC-Q Water Heaters use certain Category IV positive pressure vent systems and will not operate safely with a barometric damper.

8.2. Maximum Vent Length (Equivalent Length)

The maximum length of field supplied Category IV vent is shown in the chart below:

Maximum Allowable Equivalent Vent Length / Max Elbows			
Duct Size	4" Duct	6" Duct	8" Duct
Max Equivalent Length Model LC4Q	125 feet / 4	200 feet / 10	300 feet / 10
Max Equivalent Length Model LC5Q	80 feet / 3	200 feet / 10	300 feet / 10
Max Equivalent Length Models LC6Q - LC8Q	N/A	250 feet/10	300 feet/10
Max Equivalent Length Models LC9Q - LC10Q	N/A	150 feet/5	250 feet/10

Pipe fittings reduce the maximum allowable vent length. Use the Category IV vent manufacturer's equivalent length deduction for all elbows, terminations, etc. If the information is not readily available from the vent manufacturer, use the Vent Fitting Equivalent Length chart below to find the total equivalent length for all vent fittings in your combustion air system. Then subtract this number of feet from the total equivalent length allowed in Maximum Category IV Vent Equivalent Length chart above. The sum of this calculation is the maximum length of straight vent allowed. If a longer length is required, repeat the calculation using a larger vent size. When using this chart, no additional deduction is required for the addition of the vent system terminal.

Vent Pipe Fitting Equivalent Length for Model LC4Q - LC5Q					
Vent Pipe:	PP *	Other **	PP *	Other **	8" Vent
	4" Vent	4" Vent	6" Vent	6" Vent	
90° Elbow	20 feet	18 feet	12 feet	10 feet	5 feet
90° Long Radius Elbow	12 feet	10 feet	7 feet	6 feet	3 feet
45° Elbow	12 feet	10 feet	7 feet	6 feet	3 feet

* PP = polypropylene

** Other = PVC, CPVC or Stainless Steel

Vent Pipe Fitting Equivalent Length for Model LC6Q - LC10Q			
Vent Pipe:	PP *	Other **	8" Vent
	6" Vent	6" Vent	
90° Elbow	22 feet	20 feet	10 feet
90° Long Radius Elbow	14 feet	12 feet	6 feet
45° Elbow	14 feet	12 feet	6 feet

* PP = polypropylene ** Other = PVC, CPVC or Stainless Steel

The following vent information is provided for use in design calculations, if needed:

Venting Specifications		
Input MBtu/h	Combustion Air Volume (cfm)	Max Vent Press. " W.C.

399	136	0.5
500	170	0.5
600	205	0.5
700	239	0.5
800	273	0.5
900	307	0.5
1000	341	0.5

8.3. Vertical or Horizontal Vent Termination Requirements

1. The vent terminal must have a minimum clearance of 4 feet (1.22 m) horizontally from, and in no case be located above or below, unless a 4 foot (1.22 m) horizontal distance is maintained from electric meters, gas meters, regulators and relief equipment.
2. The vent cap must terminate at least 3 feet (0.91 m) above any forced air inlet within 10 feet (3.05 m).
3. The vent shall terminate at least 4 feet (1.22 m) below, 4 feet (1.22 m) horizontally from or 1 foot (0.3 m) above any door, window or building air inlet to the building.
4. The vent system shall terminate at least 1 foot (0.3 m) above grade and at least 1 foot (0.3m) above possible snow accumulation levels and shall terminate at least 7 feet (2.13 m) above grade when located adjacent to public walkways or gathering areas.
5. To avoid a blocked flue condition, keep the vent cap clear of snow, ice, leaves, debris, etc.
6. The vent must not exit over a public walkway, near soffit vents or crawl space vents or other areas where condensate or vapor could create a nuisance or hazard or cause property or could be detrimental to the operation of regulators, relief valves or other equipment.
7. A horizontal vent must extend one foot beyond the wall.
8. A horizontal vent terminal must not be installed closer than 3 feet (0.91m) from an inside corner of an L-shaped structure.
9. A vertical vent must exhaust outside the building at least 3 feet (0.91m) above the point of the exit and at least 2 feet (0.61 m) above the highest point of the roof within a 10-foot (3.05 m) radius of the termination.
10. A vertical termination less than 10 feet (0.91 m) from a parapet wall must be a minimum of 2 feet (0.61 m) higher than the parapet wall.

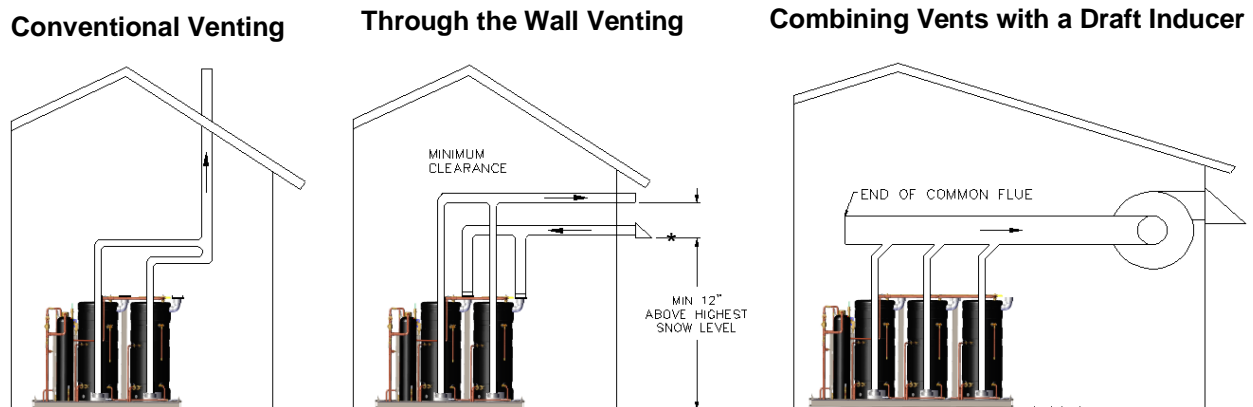
8.4. Combining Category IV Vents

1. Combined water heater Category IV gas vent systems must incorporate an Exhaust to Tjernlund or US Draft variable speed, modulating, mechanical draft inducer capable of maintaining the appropriate negative draft at the end of the common flue, to assure that all water heaters in the combined vent system operate with a negative draft. **Do not exceed negative 0.25" W.C.** See "Combining Vents with a Draft Inducer" illustration below.

2. Combining the exhaust vents of multiple LC-Q Water Heaters into a common, unpowered or “gravity” vent (i.e. venting as Category II) is never recommended unless approved by Lync System Engineering. LC-Q Water Heaters are too efficient and their flue products are too cold to generate the natural buoyancy required for such combined vent systems to function reliably and safely.
3. The common mechanical draft vent system must be interlocked, so LC-Q Water Heaters will not begin operation until the common mechanical draft vent system negative pressure is proved to be within the range of 0.04" and 0.25" W.C. When combining the exhausts of multiple LC-Q Water Heaters, do not use individual remote ducts to provide outdoor combustion air.
4. When exhaust vents are combined, it is necessary to either:
 - a) Draw all combustion air for each LC-Q Water Heater from the mechanical room in which they are installed, or
 - b) Use a common air supply system that is designed and installed by a qualified professional firm and that meets all the requirements contained in Subsection **Combining Remote Air Ducting**, which is located in Section 7: *Combustion and Ventilation Air* of this manual.

⚠ WARNING!

Do not connect multiple LC-Q Water Heater vents into a single unpowered or fixed speed powered vent unless isolation dampers are installed on each unit. This could cause unsafe operation and the potential for poisonous carbon monoxide to enter occupied areas. Such improper installation can cause property damage, exposure to hazardous materials, personal injury or death.



* See Section 8.3 for additional vent requirements.

Figure 8-1 Venting Options

8.5. Optional Concentric Vent for Combustion Air and Exhausting Flue Products (Except Water Heater Models LC9Q and LC10Q)

To provide a single sidewall or roof penetration that is capable of providing both combustion air and flue exhaust termination, each LC-Q Water Heater must be installed using an IPEX System Concentric Vent Termination Kit. Both the IPEX System PVC and CPVC Flue Gas Venting Systems are third party tested and listed to the appropriate standard. They comply with the non-metallic vent listing requirements in CSA B149.1 Natural Gas and Propane Installation Code.

The following IPEX System Concentric Vent Termination Kits are available from Lync:

Part No.	Description
150862	KIT,VENT CONCENTRIC 4 PVC IPEX #397021 for PVC (4" x 36")
150863	KIT,VENT CONCENTRIC 4 CPVC IPEX #197021 for CPVC (4" x 36")

Each IPEX System vent kit includes or specifies the required pipe, fittings, hardware, adhesives and Installation instructions. Follow the IPEX Installation instructions and use only the materials and adhesives it specifies. Additional copies of the Installation Guide for the IPEX System concentric vent kit and additional information is available from your local Lync representative.

When using concentric vent termination kits, all combustion air duct, all exhaust vent pipe and the IPEX concentric vent kit material types must be the same. If the Lync LC-Q Water Heating Solution is installed with a PVC exhaust vent pipe, then the combustion air duct and the IPEX concentric vent kit must also be made of PVC. If the Lync LC-Q Water Heating Solution is installed with a CPVC exhaust vent pipe, then the combustion air duct and the IPEX concentric vent kit must also be made of CPVC.

⚠ WARNING!

Follow the Installation instructions, termination requirements and, if applicable, multiple concentric vent kit spacing requirements provided with the listed IPEX Concentric Vent Kit. Also, must use only the pipe, fittings and cement included or specified in the IPEX installation instructions. Failure to follow the IPEX installation instructions or to use pipe, fittings or cement not included or specified in the IPEX installation instructions could result in an unreliable vent assembly or installation that can cause the potential for hazardous products of combustion to enter occupied areas and can cause property damage, exposure to hazardous materials, personal injury or death.

The following information describes the components for the IPEX System Concentric Vent Termination Kit:

ITEM NO.	DESCRIPTION
1	Wye-(Concentric)
2	Rain Cap
6	Exhaust Vent Pipe (Inner)
4	Fresh Air Intake Pipe (Outer)
5	Stainless Steel Screw & Nut

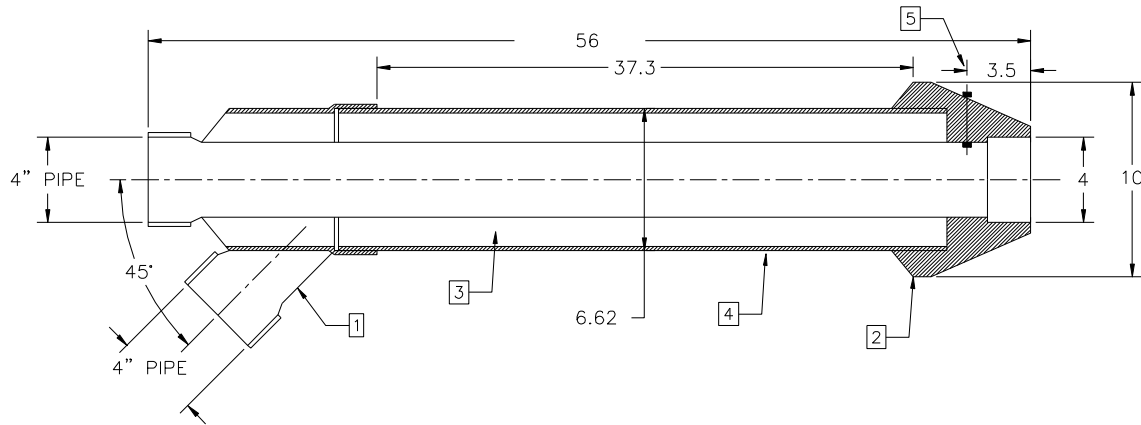


Figure 8-2 Concentric Vent Dimensions

Concentric Vent Connections to the Vent pipe and Remote Air Inlet Duct

1. LC-Q Water Heaters can obtain combustion air and exhaust products of combustion through 4" exhaust IPEX System Concentric Vent Termination Kit. This option is not currently available for water heater models LC9Q and LC10Q.
2. Do not exceed the maximum allowed combustion air duct and vent pipe equivalent lengths provided in the Combustion and Ventilation Air and the Venting sections of this Installation & Maintenance Manual. Remember to include the IPEX System Concentric Vent Termination Kit in the maximum equivalent calculation. When calculating the additional length added by the IPEX kit, use the diameter of the IPEX kit combustion air duct connection as the combustion air duct diameter.
3. Select a concentric vent kit from the list above that matches the material type of the water heater's flue gas pipe, as described above, and is the same size as the flue gas pipe. Six inch venting can be used with a 4" IPEX concentric vent kit.
4. When using an IPEX System Concentric Vent Termination Kit connected to 6" PVC or CPVC vent and remote air duct, use locally available fittings of the same material as the Kit to reduce from 6" to 4", immediately before connecting to a 4" IPEX Concentric Vent termination Kit. The reduction from 6" to 4" does not change the maximum allowed equivalent vent length or the maximum number of elbows for 6" pipe.

Concentric Vent Kit Assembly, Installation and Support

1. Follow the concentric vent kit instructions to properly assemble the kit.
2. Follow the concentric vent kit instructions to locate and cut a hole in the roof or wall large enough to accommodate the largest dimension of the kit. The size of the hole can vary greatly, depending on the roof pitch.
3. For the IPEX System 636 Concentric Vent Kit, following the procedures outlined in the System 636 Installation Guide:
 - a) Use the solvent cement specified in the installation guide to connect the inner pipe to the concentric Wye fitting, then connect the outer pipe to the concentric Wye fitting using the specified solvent cement.
 - b) Slide the assembly through the roof or wall penetration. (Install flashing if needed)
 - c) Kits must be securely fastened to structure to maintain dimensions shown below.

- d) Straps are field supplied. Use straps, clamps or equivalent that will not score or damage the pipe. Do not constrain or clamp the vent system anywhere between the LC-Q Water Heater and the vent termination point such that it is unable to expand or contract as it heats and cools during operation.
- e) The weight of the concentric kits must be supported by clamps/straps and not by the vent system it connects to.
- f) All penetrations must be sealed according to local building codes. Caulking for side wall terminations and flashing for roof penetrations are typical. Use only PVC/CPVC compatible sealing material, contact IPEX for a complete list
- g) Attach the rain cap. To mechanically attach the rain cap to allow for removal and cleaning the cap, follow the instructions located in the section titled **Mechanically Fastened Rain Cap**. The rain cap can also be permanently attached to the inner pipe with the solvent cement specified in the Installation Guide. Whether mechanically or permanently attached, the outer pipe is only a friction fit with the cap.
- h) Once the rain cap is installed and the kit secured, the kit can be connected to the venting system.
- i) For multiple horizontal installations, keep Concentric Vent Kit gaps close (up to 4" apart) or over 24" apart.
- j) When installing three or more horizontal vents consult IPEX 636 installation manual.
- k) Contact IPEX at www.ipexinc.com, if additional System 636 Concentric Vent Termination Kit assembly or installation guidance is needed.

8.6. Connecting to an Existing Vent System

Do not connect the Lync LC-Q Water Heating Solution to an existing vent system until it has been confirmed that the existing vent system complies with all requirements for a new vent system. A venting system in full compliance with the instructions provided in this manual is required for safe and reliable operation of LC-Q Water Heaters. Do not connect the Lync LC-Q Water Heating Solution to a masonry chimney.

⚠ WARNING!

Failure to confirm the existing vent system complies can result in unsafe operation and the potential for poisonous carbon monoxide to enter occupied areas and can cause property damage, personal injury, exposure to hazardous materials or death.

9. OPERATING AND SAFETY CONTROLS

9.1. Temperature and Pressure Relief Valve(s)

A Temperature and Pressure Relief Valve(s) sized in accordance with the ASME Boiler and Pressure Vessel Code, Section IV HLW is installed in the tank.

⚠ WARNING!

Secure the relief valve discharge pipe to a suitable floor drain such that very hot water does not openly splash during a significant relief valve discharge. If the relief valve discharge pipe is not routed and secured to a suitable drain, hot water discharge can result in property damage, scalding and personal injury or death.

- Follow the temperature and pressure relief valve manufacturer's installation instructions and all local, regional and national codes applicable to temperature and pressure relief valve installation and discharge piping.
- The relief valve discharge pipe must not be smaller than the relief valve opening and must be secured to prevent it from lifting out of the drain under discharge pressure and must be routed to allow complete drainage of the valve and line.
- Do not plug the relief valves or install a reducing coupling, valve or other restriction in the relief valves discharge lines, as this will eliminate the critical water temperature and pressure protection it provides.
- Thermal Expansion - A relief valve that periodically discharges may result from thermal expansion if an LC-Q Water Heater is installed in a system closed by components, such as a backflow preventer or check valve in the cold water supply. These systems must be provided with means to control expansion. Contact a water heater or plumbing professional to resolve this situation.

⚠ WARNING!

Do not plug the relief valve(s), use discharge piping smaller than the relief valve opening or install a reducing coupling, valve or other restriction in the relief valve discharge line. Failure to comply with these relief valve and discharge piping requirements can prevent the relief valve from providing its intended temperature and pressure protection, which can result in a sudden loss of pressure containment that can cause property damage, exposure to hazardous materials, personal injury or death.

9.2. Cathodic Protection

LC-Q Water Heaters do not utilize cathodic protection. However, in hot water systems utilizing cathodic protection, hydrogen gas can be produced when the hot water system has not been used for a long period of time (generally two weeks or more). **Hydrogen gas is extremely flammable.** To prevent the possibility of injury under these conditions, one of the hot water system faucets should be opened for several minutes before using any electrical device connected to the hot water system. If hydrogen is present, there will be an unusual sound such as air escaping through the pipe as the hot water begins to flow. Do not smoke, have open flames or turn electrical switches on or off near the faucet at the time it is open.

9.3. Electronic Low Water Cut-Off

When the water level is above the electrode position in the tank, the Reset pushbutton will energize the control (LED will be lit). The control remains energized until the water level drops below the electrode position (LED will not be lit). Unless otherwise specified, there is a three-second time delay on decreasing level. Water level must be below tank probe location for full

three seconds before control de-energizes. In the event that a low water condition occurs, a failure message will be displayed on the controller touch-screen. This failure lockout can be reset by pressing the LWCO RESET button located on the front control panel. Once the LWCO control board has been reset, the Main Reset button located on the front control panel can be reset as well.

The Electronic Low Water Cut-Off probe is located in the top head of each LC-Q Water Heater.

⚠ WARNING!

Turn off all electrical service to the Lync LC-Q Water Heating Solution when accessing the limit or other controls inside the control cabinet or the burner vestibule inside the top of the water heater. Close and fasten the control cabinet and burner vestibule cover before restoring electrical service. The cabinet and burner vestibule contain High Voltage wiring and terminals. If the electrical service is not turned off and these terminals are touched, a dangerous shock causing property damage, personal injury or death could occur.

9.4. Operating Temperature Control

An adjustable digital operating control is located in the front control panel. The control is factory pre-set at approximately 120°F. See the Electronic Operating System section in this manual for more information.

9.5. High Water Temperature Limit

The Electronic Operating Control System (EOS) includes a single probe that contains the limit and the operating sensor. Since both these sensors are in the same location in the heated storage tank, the EOS checks to be sure their output is within a degree or two of each other. If not, or if the maximum water temperature exceeds 200°F, the EOS will lockout and the manual Reset button on the control panel must be pressed before the water heater will resume operation.

10. THE ELECTRONIC OPERATING SYSTEM (EOS)

The electronic operating system (EOS) on each LC-Q Water Heater consists of three components:

- The Platform Ignition Module (PIM)
- A plug-in ID card,
- The Control Display.

The PIM is connected to the control display using an RJ45 patch cable. All communication between the PIM and control display as well as the power to the control display is through this cable.

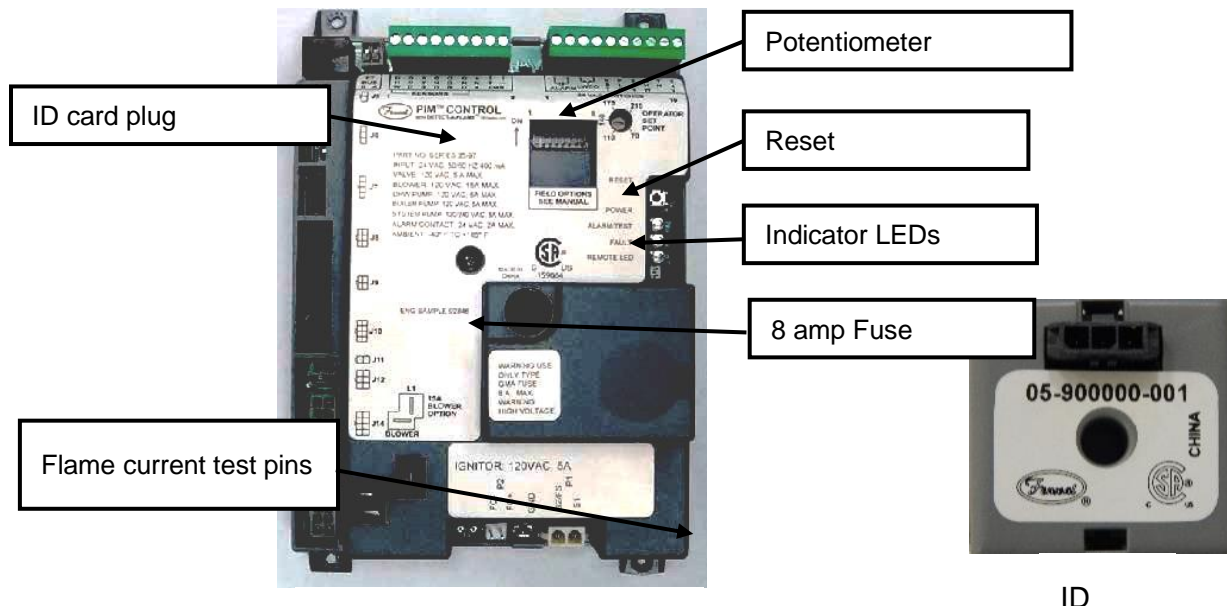
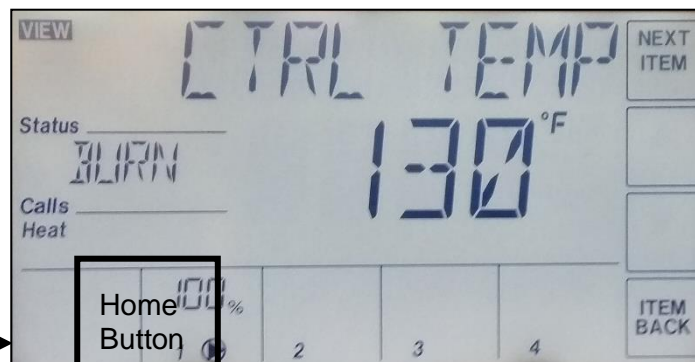


Figure 10-1 Platform Ignition Module (PIM)

Home Button

Return to the 'Home' Screen from any menu. Press and hold for 3 seconds to access the programming menus.



Digital Control Display with Touch Screen User Interface

Figure 10-2 Touch Screen User Interface (BTC II)

10.1. Touch Screen User Interface

The touchscreen of the EOS provides one touch access to view and adjust various Menu setpoints. The touchscreen displays Status Fields, Items, Water Heater Output and Number Fields. It also contains buttons for navigation & adjustment, and the Home Button to access menu selections.

10.2. Status Field Display

The Status Field displays the current operating status of the control display. Most items in the status field are only visible when in the View Menu or an alarm condition is present.

Item	Description
SANI	Sanitation Mode is active. Momentarily energizes a field installed sanitation pump and operates the water heater at an elevated setpoint temperature.
HAND	Hand Mode has been activated in the Manual Override Menu. This function allows the user to manually control the operation and firing rate of the burner.
OFF	The Off mode indicates that the system has been disabled in the Manual Override Menu.
PURG	The Purge mode indicates that individual pumps have been activated in the Manual Override Menu.
IDLE	The EOS is Idle due to no demand for heat.
ARSW	The EOS is attempting to purge but waiting for the air proving switch to prove blower air flow.
PREP	The EOS is Pre-Purging the burner system.
IGN	The Hot Surface Igniter is hot and the gas valve has opened to attempt burner ignition (4 seconds).
BURN	The Burner has ignited and the flame has been sensed.
POST	The Call for Heat has ended and the EOS is Post-Purging the burner system.

10.3. Operational Sequence Field Display

The EOS displays the following burner operational sequence, ignition status, timings, temperatures and values:

Item	Value Displayed	Description
SATISFIED	°F	No Call For Heat based on temperature sensed at control sensor at the top of the tank
CALL FOR	HEAT	Initiated when the temperature sensed at the control sensor at the top of the tank is 5 degrees less than the setpoint temperature.
BLOWER	mm:ss	Displays the pre-purge time countdown until the igniter heat up begins

IGNITION	mm:ss	Displays heat up time until gas valve opens
CURRENT	0 - 10.0 μA	Flame Current (μA)
CTRL TEMP	°F	Flame is established and the temperature sensed at the control sensor at the top of the tank is displayed.
BLOWER	mm:ss	When the call for heat has ended, the post purge time countdown is displayed.

View Menu (Home Screen - Default Display)

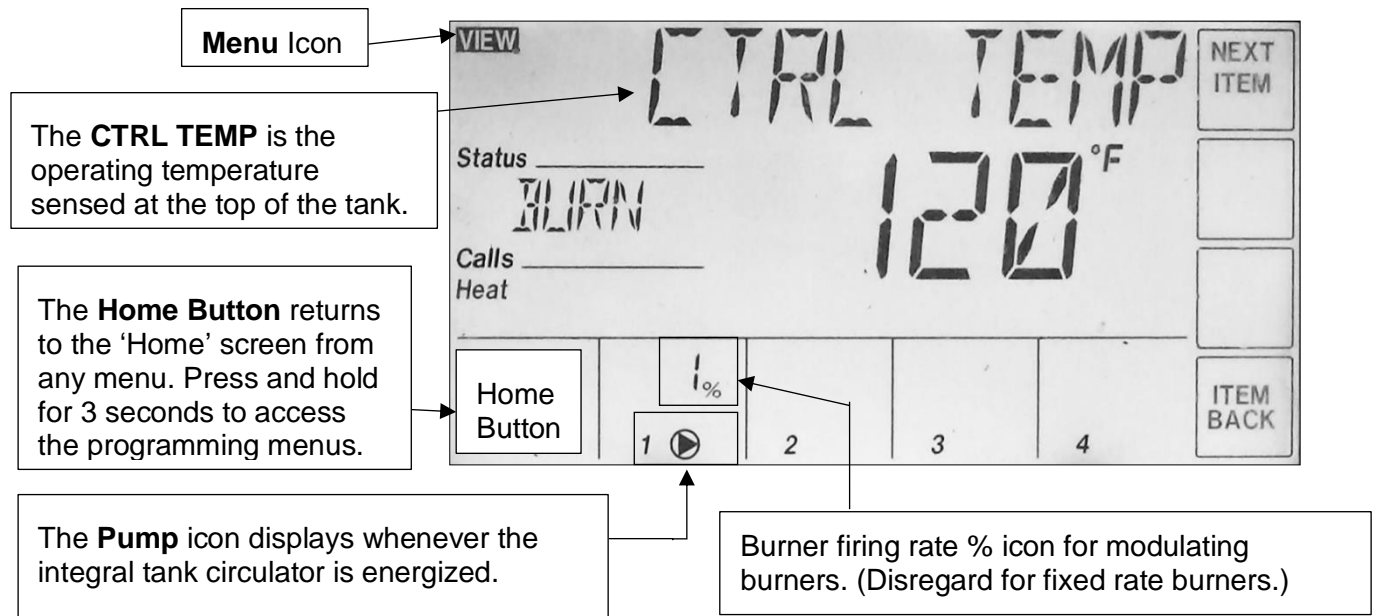


Figure 10-3 Home Screen - Default Display

The **VIEW** menu is the default display (home screen) of the EOS control system. The **VIEW** menu displays general information about the LC-Q Water Heater’s operation and status. The default display includes a **Burner** firing rate % icon for modulating LC-Q Water Heaters (disregard this icon for fixed rate burners), a **Pump** icon that is visible whenever the integral tank circulator is energized, and Failure Messages if the unit is in an alarm or error condition.

Use the **NEXT ITEM** and **ITEM BACK** buttons to scroll and view the View Menu Item Fields and their associated values. The Item Field descriptions are listed below:

Item Field	Description
SETPOINT	Display screen displays the current operating setpoint but does not allow the user to make changes in this menu.
VENT	Displays the current flue gas temperature as measured by the flue gas sensor located in the flue outlet.
TANK TOP	Displays the current temperature at the top of the LC-Q Water Heater’s tank as measured by the operating control sensor located near the hot outlet.

TANK BOT	Displays the current temperature near the bottom of the LC-Q Water Heater's tank as measured by the control sensor responsible for regulating the operation of the integral tank circulator.
TANK ΔT	Displays the current temperature difference between the TANK TOP and the TANK BOT sensors.
FLAME CUR	Displays the burner flame current in approximate μA dc. Since this is an approximation it is recommended that a flame current measurement be taken at the PIM control board using a micro-amp meter.
TIME	Displays the real time as programed in the TIME menu.

10.4. Control System Menus

The control display has multiple access levels. System critical settings will not be available for adjustment. The settings which can be adjusted by the user will display UP and DOWN adjustment arrows on the right side of the display screen. These programmable menu items are located in the Control System Menu.

To access the Control System Menu:

1. Press and hold the **HOME** button for 3 seconds.
2. Press **NEXT ITEM** to navigate to the next menu. Touch **ITEM BACK** to go reverse.
3. Press **ENTER** to enter and change user accessible menu item settings in the control system menus.
4. Most settings are in the USER access level. Other setting will be located in the INSTaller or ADVanced access level depending on the necessity for field adjustment. See Section 10.12: *Using Tool Box Menu* for details.

Control System Menu Descriptions

Menu	Description
SETUP	Displays and modifies the temperature control setpoints for the burner, integral tank circulator and the SANI functions
SOURCE	Displays many factory programmed settings for this product. The settings which can be adjusted by the user will be indicated by the appearance of the up and down adjustment arrows
MONITOR	Displays operational information such as water and vent temperatures, hours of operation, and number of cycles
TIME	Sets the time, day and year. Setting the time clock is necessary when using the scheduled setback
SCHEDULE	Allows the user to create a schedule for reducing the water heater's setpoint when a building is unoccupied for a period of time
NETWORK	Displays and modifies parameters for creating a Modbus communication connection with the water heater

OVERRIDE	Allows the user to assume manual control of the burner operation and pumps
TOOLBOX	Displays alarm message history. Changes User access level and reset to factory default settings

10.5. Changing the Vent Material Type (ADVANCED Level Access)

If the cold inlet water temperature is above 100°F, the use of solid CPVC, Polypropylene or Stainless Steel venting is required and the vent limit switch must be adjusted for the higher temperature rating allowed by these vent materials.

To Change The Vent Type Value:

1. From the **VIEW** menu, press and hold the **HOME** button for 3 seconds to enter the **CONTROL SYSTEM** menu. The first menu displayed is **SETUP** menu.
2. Touch the **NEXT ITEM** or **ITEM BACK** buttons to navigate to the **TOOLBOX** menu.
3. Touch the **ENTER** button to display the **ACCESS** screen.
4. Depending on the controls software version, the **ADVANCED** level can be selected using the **UP** and **DOWN** arrow buttons. Subsequent software revisions will require that button #4 in the bottom right corner, be pressed and held in order to place the control in the **ADVANCED** access level.
5. Exit the menu by pressing the **HOME** button.
6. Use the **NEXT ITEM** or **ITEM BACK** buttons to navigate to the **SOURCE** menu.
7. Enter the **SOURCE** menu.
8. Use the **NEXT ITEM** or **ITEM BACK** buttons to navigate to the **VENT TYPE** menu.
9. Using the **UP** or **DOWN** arrow buttons, select between the four choices: PVC (default setting), PPS, CPVC or SS.
10. To save the new value, use the **NEXT ITEM** or **ITEM BACK** buttons or press the **HOME** button.

10.6. Changing the Operating Setpoint (USER Level Access)

LC-Q Water Heaters operate to satisfy the stored water temperature setpoint of the EOS control. The value of the controls' setpoint is the desired stored tank water temperature. LC-Q Water Heaters ship with a factory setpoint of 120°F.

Although the setpoint can be displayed in the **VIEW** menu, it is necessary to enter the **CONTROL SYSTEM** MENU in order to make adjustments to the water heater's setpoint and other operational parameters.

To Change the LC-Q Water Heater's Setpoint:

1. From the **VIEW MENU**, press and hold the **HOME** button for 3 seconds to enter the **Control System Menu**. The first menu displayed is the **SETUP MENU**.
2. Touch the **ENTER** button to display the **SETPOINT MENU**.
3. Adjust the setpoint value using the **UP** and **DOWN** arrow buttons.

- To save the new value, touch the **NEXT ITEM** or **ITEM BACK** buttons or exit the menu by pressing the **HOME** button.

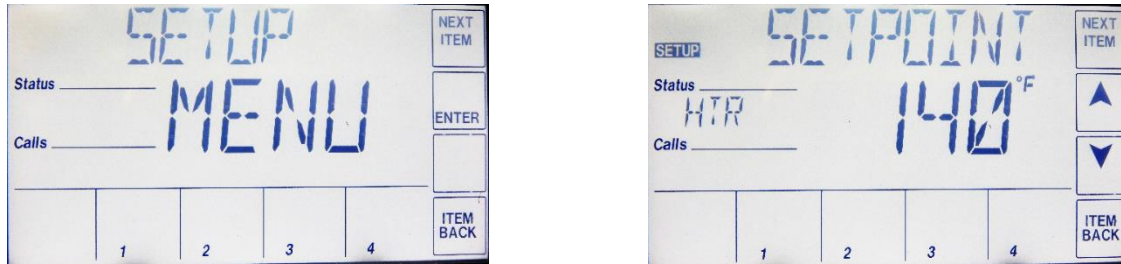


Figure 10-4 Changing the Setpoint

10.7. Setting the Real Time Clock (User & Installer Level Access)

The TIME MENU allows the user to program the time of day, the date and the year. A 12 or 24 hour time clock as well as daylight saving time can be selected. When selected, the time clock can be displayed in the VIEW MENU.

- Press and hold the **HOME** button for 3 seconds to enter the **CONTROL SYSTEM** Menu. Use the **NEXT ITEM** button to scroll to the **TIME** menu. Press the **ENTER** button to enter the **TIME** menu.
- Use the **NEXT ITEM** button to move to the first screen. Use the UP & DOWN arrow buttons to set the hour, then press the **NEXT ITEM** button to enter the value and move to the minute. Once the parameters for the time screen have been entered, move to the date and year screen and enter settings in the same manner.
- To display the real time clock in the **VIEW** menu, select daylight saving time or choose between a 12 and 24 hour clock, use the **NEXT ITEM** button to move to the correct screen and then the arrow button to select. Save and exit the menu by pressing the **HOME** button.

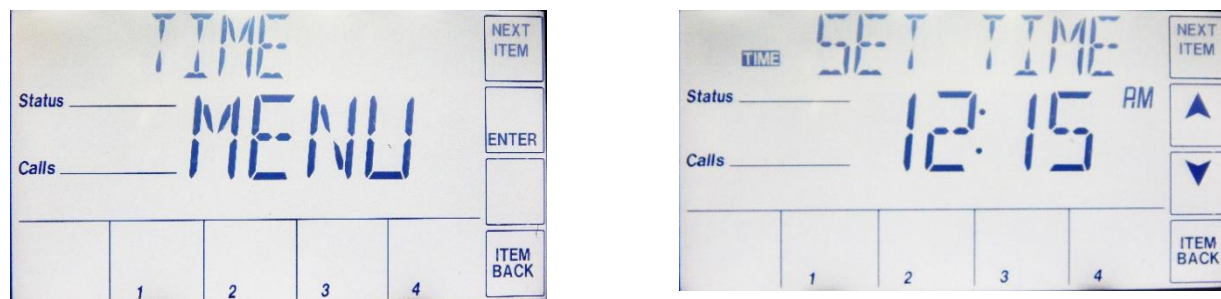


Figure 10-5 Setting the Clock

10.8. Scheduled Setback (USER Level Access)

The **SCHEDULE MENU** allows the user to program the LC-Q Water Heater to automatically lower the operating setpoint for times when a facility is not occupied or the use of hot water is curtailed.

- Press and hold the **HOME** button for 3 seconds to enter the Control System Menu. Use the **NEXT ITEM** button to scroll to the **SCHEDULE** menu. Activate the schedule function by first turning on the **HEAT SCHD** using the arrow buttons.

2. There are four setback schedule types. 24hr, 5-2, 5-11 and 7DAY. The 24hr schedule is a daily schedule that will follow the same program every day of the week. The default schedule on the SCHD TYPE screen is the 24hr. All other schedule types are selected using the arrow buttons. The 24hr schedule allows for a 2 or a 4 EVENT/DAY. With the 2 event day, the user can have one occupied time and one unoccupied time per day. The 4 event day will allow for two occupied times and two unoccupied times per day.

NOTE: The unoccupied setpoints are programmed in the SETUP menu in the same manner that the occupied setpoint is adjusted.

For example, a 24hr type and a 4 event day schedule might look like this:

- a) The 1st occupied time begins at 6:00am and the 1st unoccupied time begins at 11:00am, therefore, from 6:00am to 11:00am the occupied setpoint will be used.
- b) The 2nd occupied period begins at 4:00pm and the 2nd unoccupied time begins at 10:00pm.
- c) Between the 1st unoccupied time of 11:00am and the beginning of the 2nd occupied period, the unoccupied setpoint will be used.
- d) At 4:00pm the 2nd occupied period will begin and the occupied setpoint will be used until the 2nd unoccupied period begins at 10:00pm.
- e) From 10pm until 6:00am, the unoccupied setpoint will then be used.

Notice that schedule times and setpoints are identified as occupied (**Occ**) or unoccupied (**UnOcc**) here.

3. The 5-2 schedule type gives the user the ability to program a 2 or 4 EVENT/DAY but will also allow for one schedule to be followed Monday – Friday and then another Saturday and Sunday.
4. The 5-11 schedule type gives the user the ability to program a 2 or 4 EVENT/DAY but will also allow for one schedule to be followed Monday – Friday and then separate schedule Saturday and another Sunday.
5. The 7DAY schedule type gives the user the ability to program a 2 or 4 EVENT/DAY for each day of the week, Monday through Sunday.

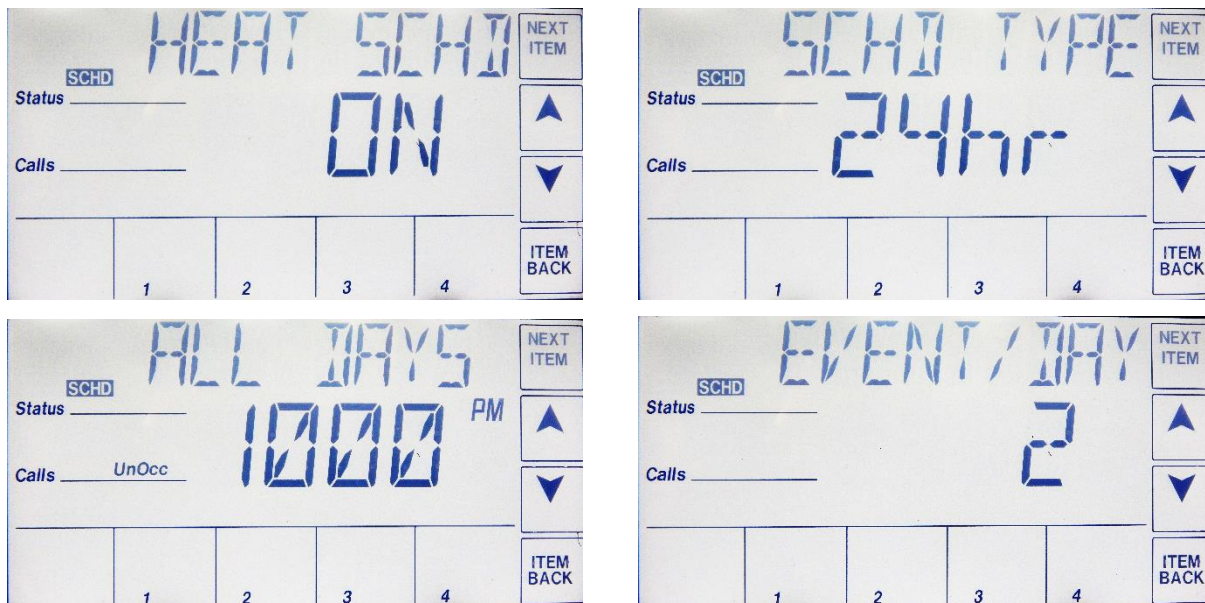


Figure 10-6 Scheduled Setback

10.9. Using the Manual Override Menu (ADVanced Level Access)

The **OVERRIDE MENU** is helpful during the initial commissioning as well as anytime burner adjustment is necessary. Manual override controls for the integral tank circulator and the optional SANI pump.

To access the Manual Override menu and enter the Advanced Level access:

1. Press and hold the **HOME** button for 3 seconds.
2. Touch the **NEXT ITEM** or **ITEM BACK** buttons to navigate to the **TOOLBOX** menu.
3. Touch the **ENTER** button to display the ACCESS screen.
4. Depending on the controls software version, the ADVANCED level can be selected using the **UP** and **DOWN** arrow buttons. Subsequent software revisions will require that button #4 in the bottom right corner, be pressed and held in order to place the control in the ADVANCED access level.
5. Exit the menu by pressing the **HOME** button.
6. Use the **NEXT ITEM** or **ITEM BACK** buttons to navigate to the **OVERIDE** menu.
7. Enter the **OVERRIDE MENU**. Using the arrow buttons, select between the three choices. The default setting is **AUTO**. In the **AUTO** position the operating temperature control will work to control the water temperature based on the active setpoint. When manual control of water heater operation is complete, always return this parameter to the **AUTO** setting.
8. The second setting is **OFF**. This setting will stop all control function and prevent the burner from operating.
9. The third setting is **HAND**. Once enabled, use the **NEXT ITEM** button to scroll to the next screen. The **TIMEOUT** setting is a safety precaution that will disable the override function at the end of the specified time period if the **MAN OVR** setting is not returned to **AUTO**.
10. The next screen is **SAN PUMP**. To force on the SANI pump, turn this setting to **ON**.
11. The next screen is **HTR PUMP**. To force on the integral tank circulator turn setting to **ON**.
12. The next screen is **HTR MOD**. This setting will override the operating control and using the up and down arrow buttons, force the burner to fire at the selected firing rate. This function is useful when tuning the operation of the burner at a range of firing rates.

NOTE: If the **HTR MOD** control is activated while the burner is firing, the burner will shut down and recycle.

⚠ WARNING!

When adjustments are complete and before putting the LC-Q Water Heater into service, return the **MAN OVR** function back to "AUTO" Failure to return the **MAN OVR** function to "AUTO" can cause high water temperatures that can result in property damage, scalding, injury or death.

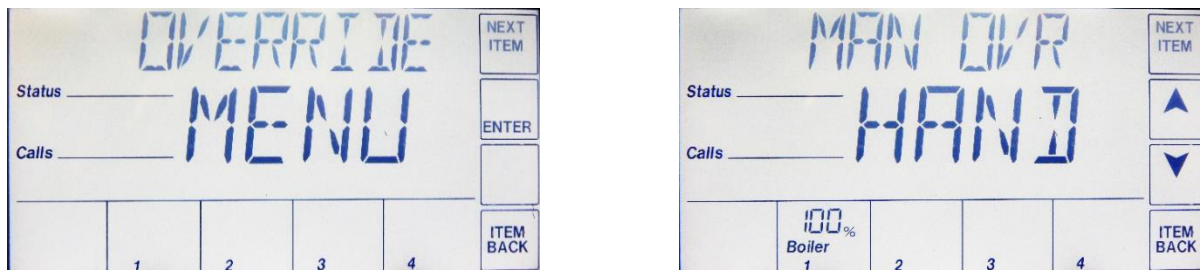


Figure 10-7 Manual Override Menu

10.10. Potentiometer (Operating Setpoint for Standalone Operation)

The PIM Ignition Control will continue to operate the LC-Q Water Heater at a 120 degree internal setpoint should the touch screen control fail, or communication between the two devices is interrupted. This internal setpoint can be adjusted using the potentiometer to maintain a different operating temperature under these circumstances if desired. This feature is intended to be used on a temporary basis, since accuracy of temperature control is dependent upon the touch screen control.

IMPORTANT: It is recommended that at the time of commissioning, the startup technician adjusts the potentiometer to the desired setpoint displayed in the **OPERATOR** screen located in the **SOURCE** control system menu. The standalone setpoint can be adjusted independently of the touchscreen but a specific setting may be difficult to achieve using the temperature index on the PIM.

NOTE: If the operating setpoint is ever changed after initial commissioning, the potentiometer should be readjusted as well.



Figure 10-8 Setting the Setpoint

10.11. Using Tool Box Menu

The **TOOL BOX** menu contains several adjustable parameters as well as up to the 15 past alarm messages logged.

1. The first screen in the Tool Box is for the **ACCESS** level. The three choices available here are USER, INSTaller and ADVanced. Depending on the controls software revision, the ADVanced level can be selected using the UP and DOWN arrow buttons for the first revision. Subsequent software revisions require that button #4 in the bottom right corner be pressed and held in order to place the control in the ADVanced access level. Consult factory before changing any settings requiring an ADVanced access level. Depending on the access level selected, different parameters will become visible and adjustable. Selecting the appropriate access level will make menu navigation easier and minimize the possibility that parameters will be unintentionally changed, resulting in improper operation.
2. The second screen will display the software revision for the touch panel display. Press the **ENTER** button to view.
3. The third screen allows the user to turn the display backlight ON continuously, OFF or TMPY will keep the backlight on only during use.
4. The fourth screen allows the user to choose between Fahrenheit and Celsius.
5. All of the following screens will display the most recent alarm messages up to 15. The Status field will show messages beginning with the most recent. This screen will display the time and date of the failure.

10.12. Basic Operational Reference Information

Ext Enable: Terminals R1 – R2, Jumper to enable. LC-Q Water Heaters ship with jumper on this. An external enable/disable can be attached to this. You can monitor the state of this input. 1 = enabled.

- **Upper Tank Temp:** is a temperature probe in the top of the tank.
- **High Limit Temp:** is a 2nd sensor in the same mechanical probe as the **Upper Tank Temp** probe. This is used as a safety.
- **Lower Tank Temp:** Temperature of the mid-section of the tank, this sensor controls the integral tank circulator pump.
- **Vent Temp:** Temperature of the Flue gasses exiting the water heater.
- **Modulation:** Represents the signal sent to fan motor. *(Not used on LC4Q prefix models)*
- **Pump Status:** This is the integral circulating pump ON/OFF.
- **Pump Runtime:** Hours on for integral circulating pump.

Discrete connections:

Enable/Disable: R1 – R2 (Input to water heater) Closed = ENABLE.

Alarm: A1 & A2 (Output from water heater) Closed = ALARM.

Remote Equipment / Burner ON: P1 – P2 (Output from water heater) Closed – water heater is heating.

Remote Proving: C1 – C2 (Input to water heater).

- **Closed** = Remote device is ready, it is OK to operate the burner.
- **Open** = Remote device is not ready. If the water heater has a call for heat, this will cause an error if not resolved within a few minutes.

11. COMMUNICATIONS AND DIAGNOSTICS

11.1. Indicators

The PIM has three LED indicators to display operational status and to help diagnose system error conditions:

- **Green LED – Power:** Indicates the PIM module is receiving 24 VAC power.
- **Amber LED – Alarm/Test:** Indicates the PIM is in Commission Test Mode or that a diagnostic alarm (fault) is present.
- **Red LED – Diagnostic Code:** Normally off. During a control or system fault condition, this LED flashes the error codes.

11.2. Alarm Messages – Diagnostic Codes (Flashes)

ALARM MESSAGE	DESCRIPTION OF ALARM	LED Flashes	MODBUS CODE #
ID CARD	The ID card is connected to the PIM control board when the system is initialized for the first time, the ID card selects the control profile to be used. An ID card error may occur when the original card is replaced with an incorrect card or has been disconnected from the PIM control board.	Red LED ON, Green LED OFF	20
INTERNAL FAIL	The PIM control board may have failed. Replace the control board if manually resetting the control does not correct the fault.	Red LED ON	21
CTL SETUP FAIL	Try resetting the defaults in the TOOL BOX menu. If unable to correct, replace the control display	N/A	1
VENT LIM	The vent temperature sensor is approaching the programmed limit. This will force the burner to operate at a reduced firing rate to prevent overheating.	N/A	5
AIR FLOW FAIL	During purge and burner operation, the blower speed tachometer is not reaching the minimum blower speed for operations. This could be caused by a faulty blower.	1	9
FLAME FLSE	A false flame signal is usually cause by a leaky gas valve which propagates a flame after the call for heat cycle has ended. Check for leakage through the gas valve. If no mechanical cause can be found, replace flame control.	2	19

FLAME FAIL	Flame failure indicates that during the burner ignition process, the burner either failed to light or it did light but no flame signal was detected. If the burner fails to light it is likely that the hot surface igniter (HSI) is faulty or the burner fuel/air mixture is too far out of adjustment to ignite. If the burner lights but immediately go out, check for an inadequate gas supply, faulty gas valve or regulator or poorly adjusted combustion.	3	15
FLAME LOSS	Flame loss indicates that sometime after flame has been established and the burner is operating, the flame signal is lost. This can be caused by a faulty igniter, damaged refractory or combustion that becomes poorly adjusted as the burner modulates to higher inputs.	3	16
LOW HSI	The PIM control board is not sensing the correct amp draw from the HSI (Hot Surface Igniter). This is most likely caused by a faulty or disconnected igniter.	4	
LOW 24VAC	The 24VAC supply to the PIM control is below the threshold for reliable control operation. This may be caused by low voltage to the water heater or a faulty 120/24VAC supply transformer.	5	17
VENT MAX	The vent temperature sensor is used to protect low temperature vent systems from damage caused by high flue gas temperatures. When this alarm occurs, first confirm that the vent material is suitable for the application as well as the limit setting for this control. When this product is operated with high return or inlet water temperature, the flue gas can exceed the rating of low temperature vent systems.	6	18
HTR MAX	The water heater high limit temperature safety has exceeded its limit. This condition may be caused by a sensor failure or a faulty control board.	7	11
HTR TOP	Indicates a problem with the top temperature sensor, possibly a broken or shorted sensor wire or failed sensor. NOTE: The top sensor and the high limit sensor or located in the same probe body.	8	14
HI LIMIT	Indicates a problem with the high limit temperature sensor, possibly a broken or shorted sensor wire or failed sensor. NOTE: The top sensor and the high limit sensor or located in the same probe body.	8	14
HTR BOT	Indicates a problem with the bottom temperature sensor, possibly a broken or shorted sensor wire or failed sensor.	8	
VENT	Indicates a problem with the vent temperature sensor, possibly a broken or shorted sensor wire or failed sensor.	8	

LOGASPRES FAIL	The low gas pressure safety switch (optional) is not sensing the minimum gas pressure required for safe burner operation. Check the gas pressure to ensure that the minimum is available. If the gas pressure is adequate check for fluctuating gas pressure or a faulty pressure switch.	9	
REM PROV FAIL	The remote proving circuit, when used, is designed to check for the operation of ancillary mechanical room equipment such as a fresh air damper or flow switch. Check for the proper function and correct wiring of such equipment.	10	
LOW WATER FAIL	The electronic low water cutoff is no longer sensing water at its probe. This could also be cause by a faulty low water board or sensor	12	
HTR LOST	This could be caused by a poor connection between the PIM control and the digital control display or failure of either device.	14	
HIGASPRES	Check the gas pressure to ensure that the building supply doesn't exceed the value on the water heater rating plate. If the gas pressure is within rated limit, check for a faulty pressure switch.	15	

11.3. Replacing the Fuse

The 24 VAC input and output circuits of the PIM are protected by a 8.0 Amp fuse.

11.4. Self-Check/Control Failure

The PIM confirms the integrity of the gas valve relay contacts to insure safety. It also monitors the processor memory and software execution for proper program flow. If the control detects an error in its software or hardware, all outputs are turned off and the LED displays a steady ON condition. If this condition persists after an attempt to restart then the control must be replaced.

11.5. System Safety Checks

The PIM monitors the safety switches, temperature sensors, supply voltage, and blower speed and will go to soft lockout until the error condition is corrected. Individual LED diagnostic codes or messages on the RS485 communications help identify the problem for efficient troubleshooting.

11.6. Flame Current Measurements

The PIM supports direct measurement of flame signal strength using the flame current test pins (FC+, FC-) on connector P2. Flame current may be measured by a micro-ammeter, or alternately by using a standard digital voltmeter. The signal on P2 is calibrated to 1 micro-amp/volt, so flame current in micro-amps can be directly read on the volts scale.

The control display user interface is capable of displaying an approximation of flame current up to 5 micro-amps.

11.7. Non-Volatile Lockout/Manual Reset

The PIM normally allows for volatile ignition lockout where a lockout condition is reset by a loss in 24VAC power or the call for heat demand. In certain applications or where required by standards (such as CSD-1), it can be configured through the parameter settings for non-volatile lockout after ignition failure. In this case the lockout may only be reset by the on-board manual reset button, or the remote reset input.

11.8. ID Card

The PIM determines its operating parameters by reading the identification code of an external plug-in ID card. The ID card is connected to the PIM at the J6 connector.

NOTE: This ID card must be present for the PIM and LC-Q Water Heater to operate. This card selects the proper settings in the PIM's memory for various Lync LC-Q models. The first time a PIM is powered up attached to an ID card, the ID card setting is stored in non-volatile memory. Once set, the PIM only operates with the correct ID card installed that matches its internal ID settings. The PIM verifies the ID card at power-up and on each heating cycle.

12. NETWORK MENU

The Network Menu contains all of the settings necessary to configure a 2-wire, RS-485 communication link with this product. With no additional hardware, a Modbus RTU or BACnet® MSTP protocol can be established.

For a complete Interface Guide and Points List, see the Lync EOS Interface Guide (L-OMM-0008)..

1. Enter the Network Menu as previously explained. The first screen, ADDRESS, will allow the user to set the network address for each individual heater. There are up to 247 addresses beginning with number.
2. If there are multiple heaters in the network, each heater should have a unique address. The default value 1.
3. The second screen, DATA, sets the data format. Select between RTU (8bit) and ASCII (7bit).
4. The third screen, BAUD RATE, 2400, 9600, 19K2, 57K6 and 115K.
5. PARITY, will select between NONE (2 Stop bits), EVEN (1 Stop bit) and ODD (1 Stop bit).

The table below details wire length using 18 AWG Shielded Twisted-Pair.

Max Cable Length Without Terminating Resistors	Max Cable Length with 2 x 120 Ohm Resistors
• 115200 baud --> 177 m (580 ft)	• 115200 baud --> 1,000 m (3,280 ft)
• 57600 baud --> 353 m (1,158 ft)	• 57600 baud --> 1,000 m (3,280 ft)
• 19200 baud --> 1,000 m (3,280 ft)	• 19200 baud --> 1,000 m (3,280 ft)
• 9600 baud --> 1,000 m (3,280 ft)	• 9600 baud --> 1,000 m (3,280 ft)
• 2400 baud --> 1,000 m (3,280 ft)	• 2400 baud --> 1,000 m (3,280 ft)



Connect RS-485 wires here. If you are unable to establish a connection reverse the + & - wires

Figure 12-1 RS-485 Connection

12.1. Error Codes

Code	Description
0	No Error
Control Display Errors	
1	EEPROM
2	Outdoor Sensor
3	Supply Sensor
4	DHW Sensor
5	Vent Limiting
6	FTBus Communication
PIM Errors	
7	LWCO
8	Remote Proof
9	Air Pressure
10	Low Gas Pressure
11	Boiler Outlet/Tank Top Sensor
12	Boiler Inlet/Tank Bottom Sensor
13	Vent Sensor
14	Hi-Limit Sensor
15	Ignition Failure
16	Flame Loss
17	Vent Hi-Limit
18	Boiler/Tank Hi-Limit
19	False Flame
20	OEM Card
21	Internal Failure
22	Hi-Delta
23	Not used
24	Low Voltage
25	Blower Speed
26	High Gas Pressure
tN4 Errors (This series of errors are related to the communication links between multiple heaters in a linked system)	
27	Master Lost
28	Device Lost
29	Device Duplicate
30	Device Error

13. REMOTE CONNECTIONS – TERMINAL STRIP

13.1. Making BMS/BAS remote connections for analog and binary (on/off) signals

A terminal strip for the remote connection is located behind the bottom control panel door and is accessed by removing the two thumb screws and lifting the hinged door.

IMPORTANT: Do not use single strand bell wire for remote field connections to terminals R1-R2 and C1-C2. Use only multi-strand copper wire. See table below for wire length and gauge:

Wire Gauge	18 GA	16GA	14 GA	12 GA
Maximum Length	30 FT	50 FT	75 FT	100 FT

⚠ WARNING!

Turn off all electrical service to LC-Q Water Heaters when accessing the remote connections and close and fasten the control cabinet cover before restoring electrical service to them. The remote connection terminals are High Voltage or may become High Voltage. If the electrical service is not turned off and these terminals are touched, a dangerous shock could occur, causing personal injury or death.

13.2. Terminal Functions –

L1-L2: Used for incoming 120VAC power supply connection. Terminal **L1** is hot (Black) and **L2** is neutral (White). See the product catalog or specification document for circuit ampacity rating.

R1-R2: Used to activate / de-activate the water heater from remote master control. When switching this low current circuit, a relay with gold plated contacts or the use of two relay contacts in parallel must be used. Terminals are wired to a relay in a remote Energy Management System. When the relay closes, the circuit from R1 to R2 is completed and the unit's controls are enabled. The Lync LC-Q Water Heating Solution ships from factory with a jumper between terminals. Remove jumper when connecting to a remote controller.

A1-A2: Used to activate a remote alarm, signaling shutdown of combustion control. Provides a maximum 2 amp relay contact closure when the control system terminates operation due to a tripped safety interlock (i.e.: air proving switch, high limit switch or flame sensor, etc.).

P1-P2: Provides a 5 amp contact closure to control remote equipment (i.e. mechanical room air louvers, draft inducer or power vent, etc.). Do not directly energize pumps or motors through these terminals. If operation or repositioning of the remote equipment is required the remote equipment must send a return proving signal to terminals C1-C2, via its proving switch, to confirming proper operation or repositioning to enable LC-Q Water Heaters to energize.

C1-C2: Used for proving operation of remote device. Terminals are wired to a proving switch on a remote device such as a power venter, louvers or a combination of these in series. When all remote proving switches close, the circuit from C1 to C2 is completed and the LC-Q Water Heater's controls are enabled. LC-Q Water Heaters ship from the factory with jumper between terminals C1 and C2 that must be removed when a proving switch is connected.

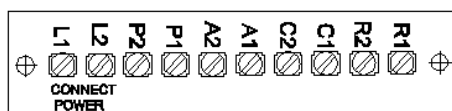
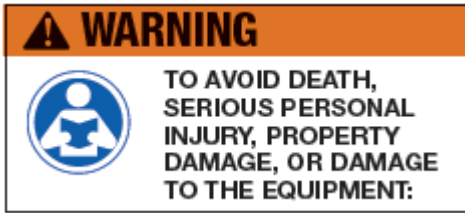


Figure 13-1 Terminal Functions










14. DigiTemp Mixing Valve

Reading & Understanding this section



- Read this section and all product labels and follow all safety and other information.
- Learn how to properly and safely use the equipment BEFORE installing set up, using, or servicing.
- Keep this material available for easy access and future reference.
- Replace missing, damaged, or illegible materials and product labels.

Understanding Safety Information

 <p>This safety-alert symbol is shown alone or used with a signal word (DANGER, WARNING, or CAUTION), a pictorial and/or a safety message to identify hazards and alert you to the potential for death or serious personal injury.</p>	 <p>This pictorial alerts you to the need to read the manual.</p>
 <p>Identifies hazards which, if not avoided, will result in death or serious injury.</p>	 <p>This pictorial alerts you to scalding, burn and hot water hazards.</p>
 <p>Identifies hazards which, if not avoided, could result in death or serious injury.</p>	 <p>This pictorial alerts you to burn and hot surfaces hazards.</p>
 <p>Identifies hazards which, could result in minor or moderate injury.</p>	 <p>This pictorial alerts you to electricity, electrocution, and shock hazards.</p>
<p>NOTE: Identifies practices, actions, or failure to act which could result in property damage or damage to the equipment.</p>	 <p>This pictorial alerts you to the need to perform appropriate Lock Out/ Tag Out procedures.</p>

14.1. Description and Specifications

DigiTemp* is an electronic water mixing valve that provides user-directed control and monitoring water distribution. It includes an electronic Control Module featuring a color touch screen digital display to select desired outlet water temperature, an electronically actuated valve that mixes hot and cold water, a quick response temperature sensor and check valves. DigiTemp monitors mixed outlet temperature. It also features a user programmable high temperature Sanitization mode to help limit water borne bacteria as part of a user-directed and controlled thermal eradication protocol.

**The wetted surface of this product contacted by consumable water contains less than 0.25% of lead by weight.*

DigiTemp supports building automation system (BAS) communication with BACnet MSTP and Modbus protocol, allowing remote programming and data viewing.

Adjustment of DigiTemp is the responsibility of the owner and installer and must be done by qualified personnel in accordance with the manufacturer's instructions, and complying with all governmental requirements, building and construction codes and standards. It is recommended to install the Lync LC-Q Water Heating Solution as part of an ASSE compliant water distribution system, including mixing valves and/or temperature limiting devices at all point-of-use fixtures (faucets, sinks, tubs, showers, etc.) that are approved to ASSE 1016, 1069, 1070 and 1071.

The DigiTemp owner/user is responsible for maintaining proper water quality/ condition, and deciding what temperature is safe and appropriate for the water distribution users and facility.

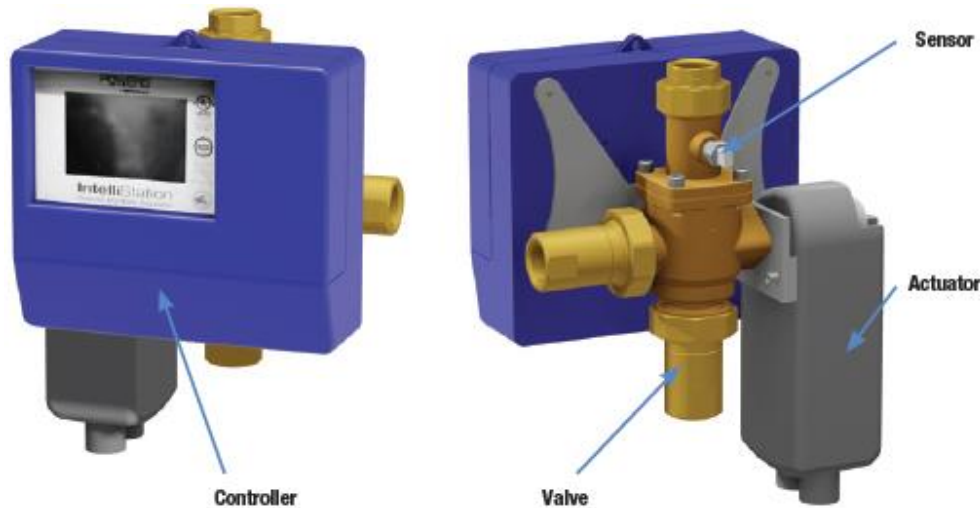


Figure 14-1 DigiTemp, Front and rear Views

Specifications

Maximum Operating Pressure	200psi (1379 kPa)
Maximum Hot Water Temperature	200°F (93°C)
Minimum Hot Water Supply Temperature**	2°F (1°C) Above Setpoint
Hot Water Inlet Temperature Range	120 – 180°F (49-82°C)
Cold Water Inlet Range	39 – 60°F (4-16°C)
Minimum Flow***	0.5 gpm (1.89 lpm)
Temperature Adjustment Range****	60 – 180°F (16-82°C)
Listing/Compliance	ASSE1017®, cUPC®, NSF®, UL60730, CE, BACnet Testing Laboratories (BTL)
Weight	LFIS075V 13lb (6kg) LFIS0100V 17lb (8kg)

** *With Equal Pressure*

*** *Minimum flow when the DigiTemp is installed at or near hot water source recirculating tempered water with a properly sized continuously operating recirculating pump.*

**** *Low limit cannot be less than the cold water temperature. For best operation, hot water should be at least 2°F above desired setpoint.*

Technical Specifications

Power..... 115-230 V (ac) ± 10%, 50/60 Hz, 20 VA
 Actuator load:..... 24 V (dc), 0.55 A, 13 W
 Ambient Temperature 32°F (0°C) to 122°F (50°C)
 Ambient Humidity 0 - 90% RH non-condensing

Suitable for indoor use only

Capacity

Flow Capacity at 50-50 mixed ratio								
		Pressure Drop Across Valve						
Model	Min System Draw+	CV	5 psi 34 kpa	10 psi 69 kpa	20 psi 138 kpa	30 psi 207 kpa	45 psi 310 kpa	50 psi 345 kpa
LFIS100	0.5	17.5	39 gpm 148 lpm	55 gpm 208 lpm	78 gpm 295 lpm	96 gpm 363 lpm	117 gpm 443 lpm	124 gpm 469 lpm
LFIS150	0.5	22.5	50 gpm 189 lpm	71 gpm 269 lpm	101 gpm 382 lpm	123 gpm 466 lpm	151 gpm 572 lpm	159 gpm 602 lpm

+ With a properly sized pump

Installation

⚠ WARNING!

The procedure below exposes personnel to the following hazards:

- Hot water and scalding
- Burns and hot surfaces
- Electrical shock and electrocution

Failure to follow all installation requirements risks possible death, personal injury, property damage, and failure of DigiTemp to perform as intended.

- Use ONLY with a potable water distribution system free of debris, foreign materials, corrosive chemicals or substances, and other adverse conditions.
- DigiTemp is electrically powered. ALWAYS take proper precautions to recognize, evaluate, and control electricity hazards during use and service/maintenance.

To connect Power supply:

- a) Press down on top of the front cover and pull out and down
- b) Lift the front cover up and away from the controller
- c) Loosen the screws at the front of the wiring cover
- d) Pull wiring cover straight out from the wiring chamber
- e) Connect live wire to terminal “L” and neutral wire to terminal “N”.
- f) Re-assemble in reverse order.



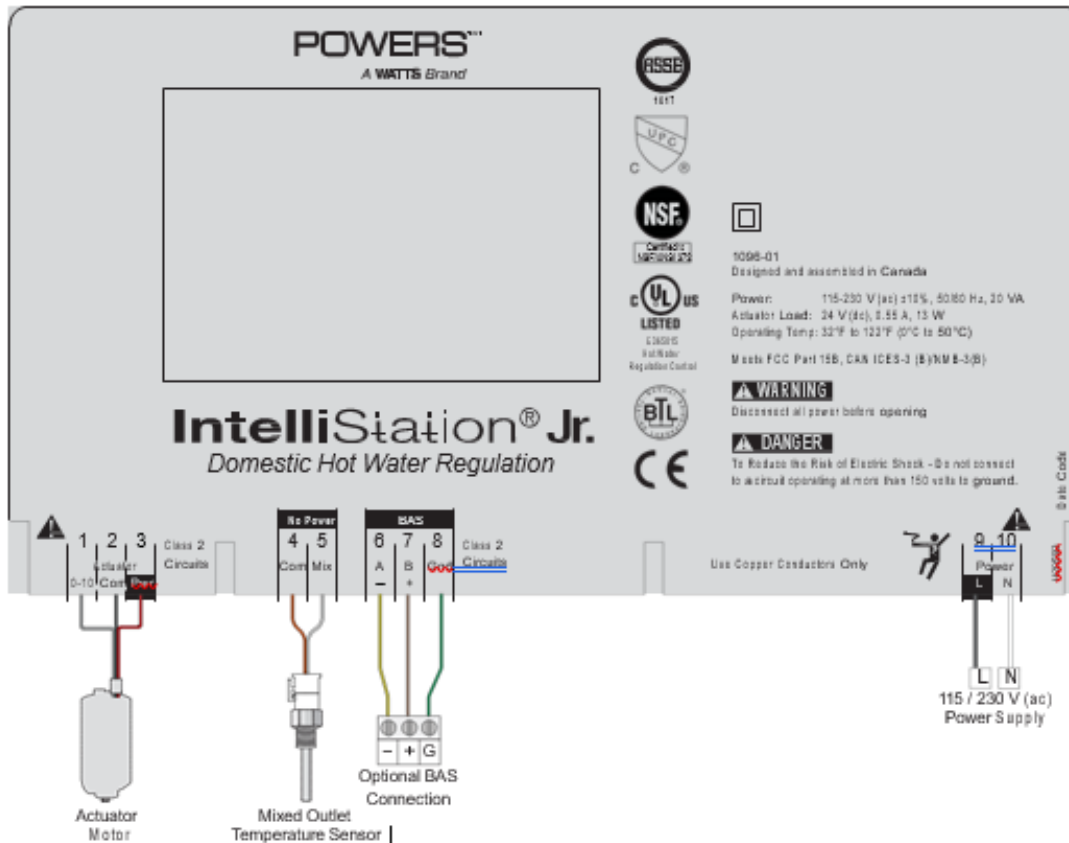
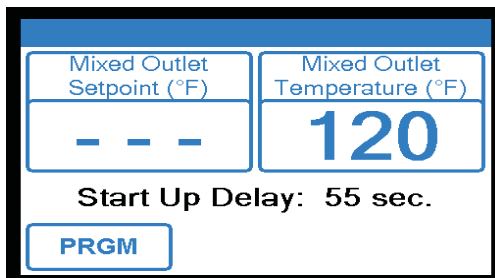


Figure 14-2 DigiTemp Control Unit Connections

14.2. Setup and Programming

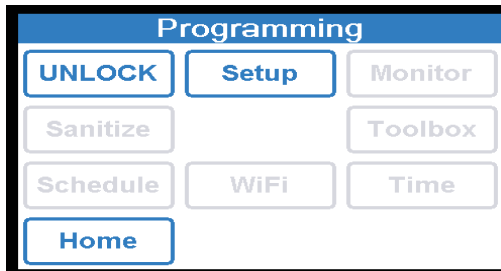
To turn on Power:

1. Turn DigiTemp's power **ON** by turning on the main switch.
2. When powered up, the display will show a 100 second countdown timer and read:



NOTE: The control will begin mixing operations automatically after 100 seconds. During the 100 seconds the user may adjust setting and configure the control by pressing the PRGM menu. If the user does nothing, the control will automatically route to the home screen after 100 seconds and begin normal operation. Efforts taken to program the device during the 100 second period will reset the 100 second clock.

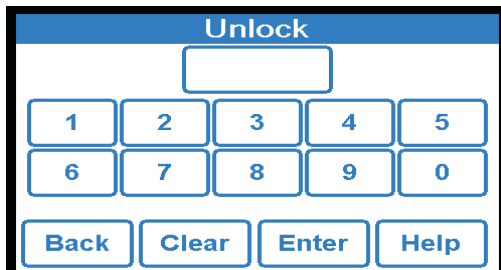
3. To program the system, press the **PRGM** button. The **Programming** screen appears.



To create a Passcode:

DigiTemp comes programmed with a factory default passcode (1017). For added security, and to help prevent unauthorized access, it is recommended that you create a unique 4 digit passcode as outlined below.

1. On the Programming menu, press the **UNLOCK** icon. The Unlock function screen appears and you are prompted to enter the passcode:



2. Enter the factory default passcode **1017** and press the **Help** icon in the lower right corner of the Unlock screen.
3. Enter a new 4-digit passcode and press **Enter** (make sure to keep your new code in a secure place).
4. Re-enter the **new** passcode and press **Enter** again to finalize the passcode change.

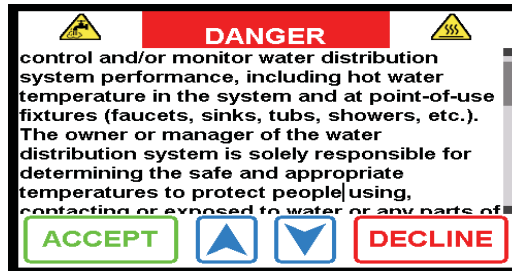
NOTE: If you make a mistake when re-entering your new passcode and it does not match your first entry, **????** appears.

To unlock the System:

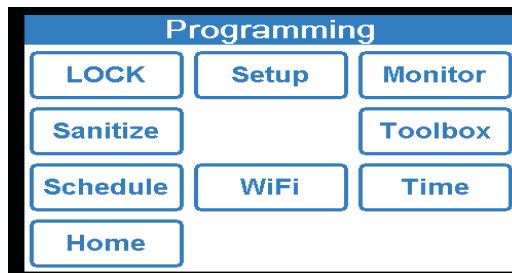
1. On the Unlock screen, enter your new passcode and then press **Enter**.

NOTE: If you need to clear your entry and start again, press the **CLEAR** icon. If you want to go back to the Programming menu, press the **BACK** icon.
If you did not set up your own passcode, you can enter the factory default passcode **1017**.

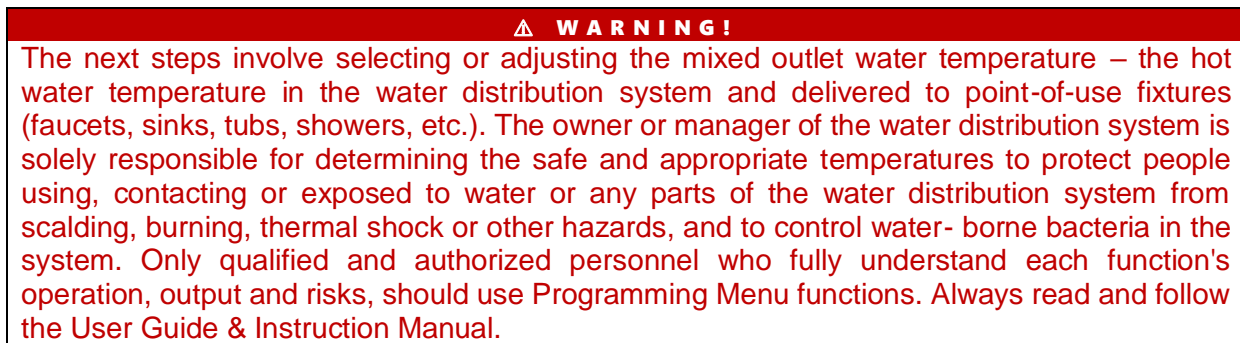
2. When the passcode is entered, you are directed to the liability and responsibility acceptance screen:



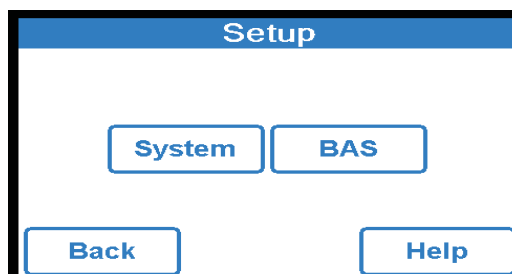
3. Press **ACCEPT** to proceed to the Programming screen; system functions now appear. Pressing the **DECLINE** icon means you will not be able to change system settings and you accept all default settings (including the outlet water temperature setpoint of 140° F/ 160° C) as safe and appropriate for the water distribution system users and the facility. You will be returned to the **Programming** screen.
4. When you press **ACCEPT**, the Programming screen appears.



System Setup Menu

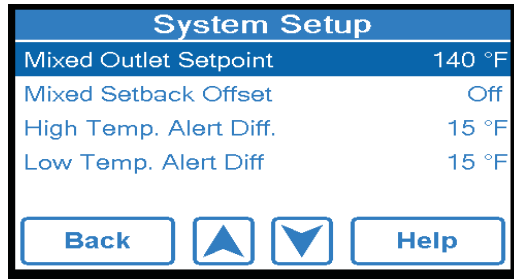


Press **SETUP**; the Setup screen now appears.



You can either setup the operation of the system by pressing the **System** button or configure the BAS connection by pressing the **BAS** button. To setup operation of the system, continue

with the system setup. To turn on and configure the BAS connection (see Section 14.3: BAS Integration).



NOTE: Mixed Setback Offset is only available if a schedule is selected.

Selecting and Setting the Outlet Water Temperature Setpoint:

⚠ WARNING!

BEFORE setting mixed outlet water temperature or electing default temperature, point-of-use mixing valves and/or temperature limiting devices **MUST** be installed at all fixtures (faucets, sinks, tubs, showers, etc.)

Set the safe, appropriate and desired outlet water temperature for your users, application and facility by pressing **Mixed Outlet Setpoint** on the System Setup menu and then using the **slider** or **UP** and **DOWN** arrows until the selected temperature is displayed. Press **Accept**.

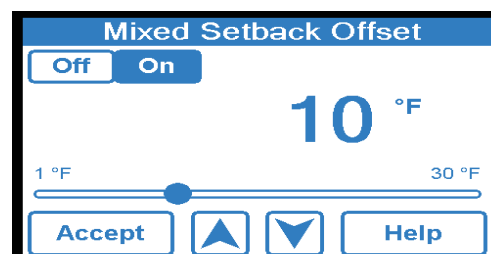


⚠ WARNING!

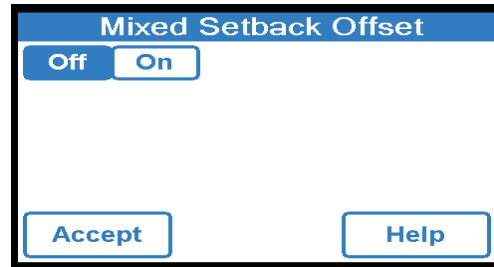
The owner or manager of the water distribution system is solely responsible for determining the safe and appropriate temperatures to protect people using, contacting or exposed to water or any parts of the water distribution system from scalding, burning, thermal shock or other hazards, and to control water-borne bacteria in the system.

Once the desired temperature is selected, press the **Accept** icon to apply the setting. The System Setup screen reappears.

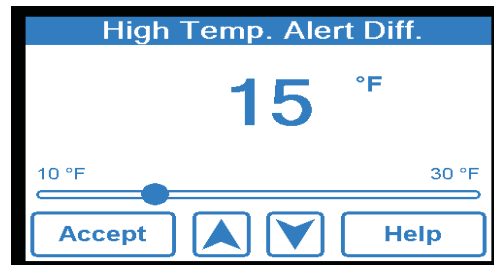
To turn on the **Mixed Setback Offset** feature (sets temperature lower during unoccupied period), press **On** and **Accept**. Change the temperature using the slider or by pressing the **UP** or **DOWN** arrows, then press **Accept** when done.



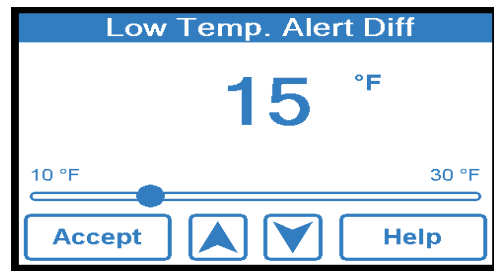
To turn the Mixed Setback Offset feature off, press **Mixed Setback Offset** on the **System Setup** menu and press **Off** and **Accept**.



To change the high temperature alert differential, press **High Temp. Alert Diff.** in the **System Setup** menu. Use the slider or **UP** or **DOWN** arrows to set the high temperature alert differential, then press **ACCEPT**.



To change the low temperature alert differential, press **Low Temp. Alert Diff.** in the **System Setup** menu. Use the slider or **UP** or **DOWN** arrows to set the low temperature alert differential, then press **ACCEPT**.



NOTE: If finished, the system will return to a locked state if not touched for 100 seconds. Or, press the **BACK** icon twice to return to the **Programming** menu, then press **LOCK**.

When the system is locked, the **Programming** menu will now display the **UNLOCK** icon, as shown:



14.3. BAS Integration

Configuring the Control for BAS communication

Configure the control to communicate using the “User Interface-BAS Menu” information within this manual and/or the “BAS Integration Manual.”

Introduction

DigiTemp can communicate with a Building Automation System (BAS) using BACnet MS/TP and Modbus RTU. This manual provides information about the measurements, control parameters, and error messages which can be assessed by building automation and/or management systems that use BACnet MS/ TP or Modbus RTU communication. DigiTemp can be configured to provide remote monitoring and remote temperature setpoint control.

BAS Connection Procedure

⚠ WARNING!

BEFORE attempting to connect BAS, a certified and qualified electrician **MUST** fully de-energize and dis- connect all electrical power from DigiTemp.

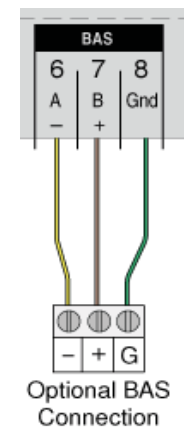
Perform required **LOCK OUT/TAG OUT** procedures.

BAS connection MUST be performed by certified and qualified electrician.

1. After completely de-energizing and disconnecting all power from DigiTemp and performing required **LOCK OUT/TAG OUT**, carefully open the DigiTemp control module to reveal BAS hook up terminals.

NOTE: Once the box is open, confirm that the unit is de-energized by measuring the AC voltage across the “L” and “N” terminals (9 and 10 respectively) using the voltmeter. Alternatively, use a voltage detector to confirm that the unit is **NOT** energized.

2. With the control module open, the BAS connections are visible on bottom side as shown.



3. The control module has a knock-out plug hole. Knock-out the plug hole and run the BAS wire to the controller.
4. If connecting the controller to a BACnet MSTP system run the A(-), B(+), GND terminals from the nearest BAS system component and connect to terminals 6, 7, and 8 (-, +, Gnd) of the DigiTemp control Module 1069.

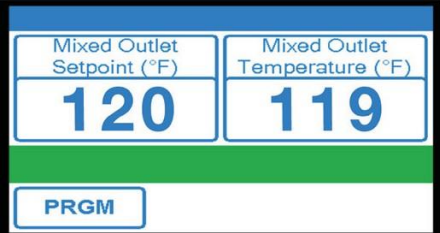
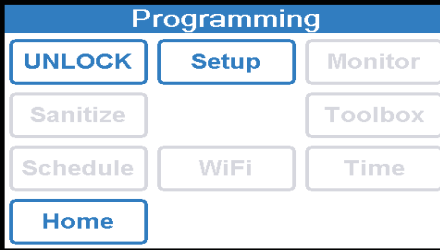
NOTE: A grommet or wire protector should be used to protect the wire from damage.

5. If connecting the controller to a Modbus BAS system, run the A(-), B(+), GND terminals from the nearest BAS system component and connect to terminals 6, 7, and 8 (-, +, Gnd) of the DigiTemp control Module 1096.

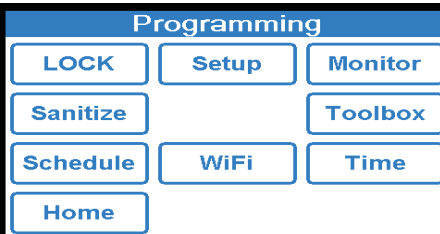
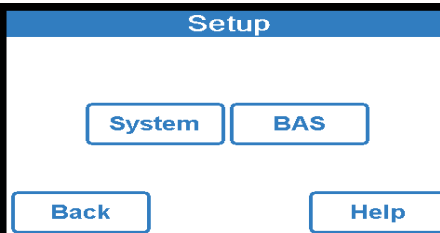
NOTE: DO NOT ground to the enclosure. Ground (“Gnd”) terminal must be connected to terminal “A” (“Gnd”).

BAS Settings in the DigiTemp Control Module Menu

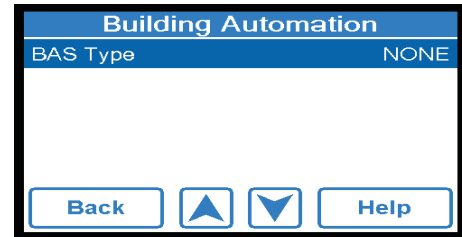
When DigiTemp powers up it displays a warning message for 100 seconds. After that, it will automatically redirect to the **Home** screen. The settings menu can be accessed prior to the time elapsing by touching anywhere on the screen.

<p>From the home screen press the PRGM icon to access the Programming menu.</p>	
<p>From within the Programming menu, only the Home, Setup and UNLOCK icons are active until the control is in the unlocked state. Note: After 100 seconds of inactivity the control automatically locks and returns to the Home screen.</p> <p>To unlock the control, press UNLOCK.</p>	

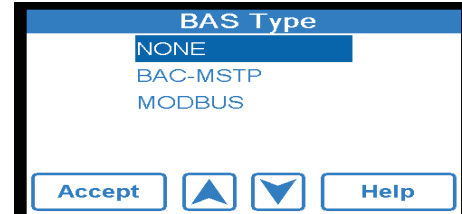
Unlock the control by entering your password and pressing the **ENTER** icon. If you have not yet set your password, see **To create a Passcode**, above. If the wrong code was entered select **Clear** to try again. Note: the **ENTER** icon will only work if the correct code is entered. Once unlocked, the control automatically redirects to the **Programming** menu but this time the **UNLOCK** icon will appear as **LOCK**, indicating that the control is unlocked, and the other icons (Setup, Monitor, Sanitize, Toolbox, Schedule, Wi-Fi, and Time) will now be active.

<p>Select the Setup icon from the Programming menu to access the Setup menu .</p>	
<p>Select the BAS icon from within the Setup menu to access the Building Automation menu.</p>	

The default **BAS Type** is **NONE**, as shown here.



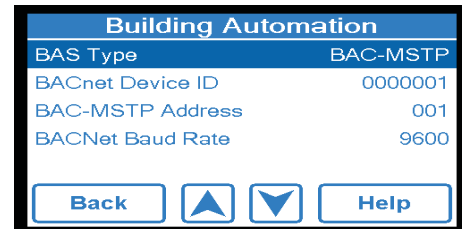
To change this setting, press **BAS Type**; the adjustment screen appears. Press the **UP** and **DOWN** arrows to scroll through the BAS types and depress the icon to configure the control to the highlighted type and return to the **Building Automation** menu.



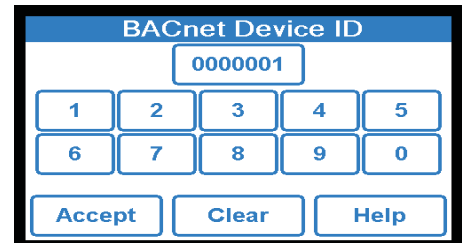
NOTE: Depending on BAS Type selected, various user configurable items will now appear within the **Building Automation** menu. A table of the user definable items is shown below.

BACnet Specific Settings

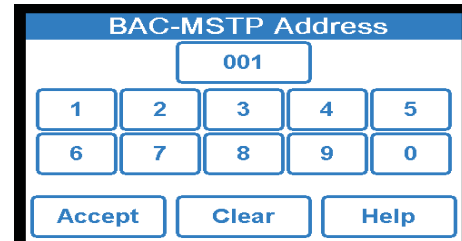
The **Building Automation** screen shows the default settings for each communication protocols supported by this control (BACnet MSTP and Modbus).



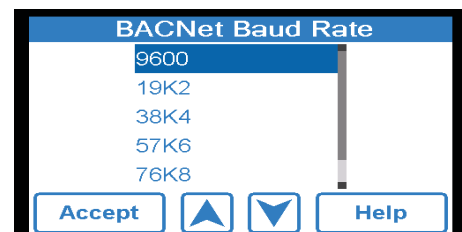
To change the BACnet Device ID, press **BACnet Device ID**, enter the device ID number, then **Accept**.



To change the BAC-MSTP Address, press **BAC-MSTP Address**, enter the address, and press **Accept**.



To change the BACNet baud rate, press **BACNet Baud Rate**, select the baud rate using the **UP** and **DOWN** arrows, and then press **Accept**.



BACnet Protocol Implementation Statement (PICS)

Vendor Name: Powers

Vendor ID: 834

Product Name: DigiTemp

Product Model Number: 109601

Application Software Version: J1277x

Product Description:

DigiTemp is a mixing control designed to deliver tempered water to plumbing fixtures. It uses a Proportional Integral (PI) logic to accurately maintain a target temperature by mixing a high temperature water source with a low temperature water source. It also offers advanced features including communication with a Building Automation System (BAS).

NOTE: DigiTemp provides user-directed control and monitoring of water distribution systems. It is the user's responsibility to select and maintain water temperatures and pressures that are safe and appropriate for the water system users, guests and facility.

DigiTemp's Sanitization mode is intended for use as part of a user-directed, controlled and supervised protocol that has been safely and properly designed. It is recommended to install DigiTemp as part of a ASSE 1070 compliant water distribution system, including point-of-use mixing valves. Always read and follow User Guide & Instruction Manual and all product warnings and labels, and comply with all governmental and safety requirements.

BAS Menu

BACnet Standardized Device Profile (ANNEX L)
BACnet Application Specific Controller (B-ASC)

Supported BIBBs (Annex K)	Name
DS-RP-B	Data Sharing-ReadProperty-B
DS-RPM-B	Data Sharing-ReadPropertyMultiple-B
DS-WP-B	Data Sharing-WriteProperty-B
DM-DDB-B	Device Management-Dynamic Device Binding-B
DM-DOB-B	Device Management-Dynamic Object Binding-B
DM-DCC-B	Device Management-Device Communication Control-B

NOTE: Device communication control password is **Powers1017**.

Segmentation Capability	Supported
Able to transmit segmented messages	No
Able to receive segmented messages	No

Standard Object Types Supported	Creatable	Deleteable
Analog Input	No	No
Analog Value	No	No
Binary Output	No	No

Data Link Layer	Supported	Device Address Binding	Supported
BACnet® IP (Annex J)	No	Static Device Address Binding	No
BACnet® MSTP	Yes		

Network Security Options	Character Set	Supported
Non-Secure Device	ANSI X3.4	Yes

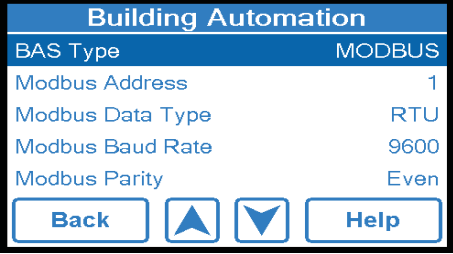
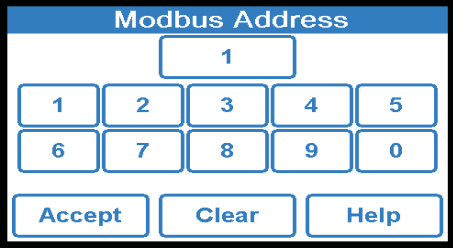
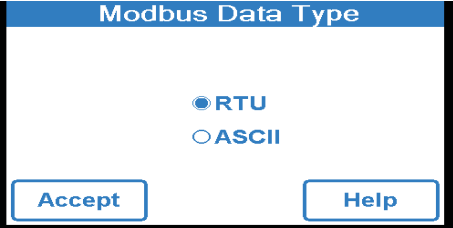
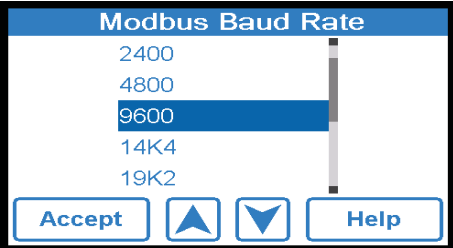
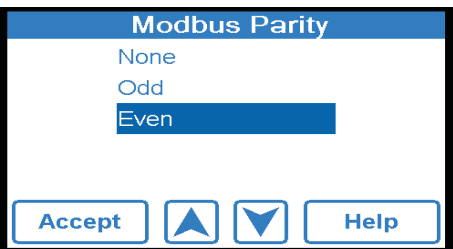
BACnet Analog Parameters

Objective Identifier	Objective Type	Objective Name	Present Value	Status Flags	Description	Range/Value	Event State	Reliability	Out_Of_Service	Units
0	analog-Input	Mixed Outlet Temperature		FFF(F/T)	Mixed Outlet Temperature	0 to 266F	EVENT_STATE_NORMAL	0, 1, 4, 5	FALSE	UNITS_DEGREES_FAHRENHEIT (64)
1	analog-Input	Valve Position		FFF(F/T)	Analog signal provided to actuator	0.0 to 10.0 V	EVENT_STATE_NORMAL	0	FALSE	UNITS_VOLTS (5)
2	analog-Input	Mixed Outlet High		FFF(F/T)	Highest recorded mixed outlet temperature	0 to 266F	EVENT_STATE_NORMAL	0	FALSE	UNITS_DEGREES_FAHRENHEIT (64)
3	analog-Input	Mixed Outlet Low		FFF(F/T)	Lowest recorded mixed outlet temperature	0 to 266F	EVENT_STATE_NORMAL	0	FALSE	UNITS_DEGREES_FAHRENHEIT (64)
4	analog-Input	High Temperature Alert Differential		FFF(F/T)	High Temperature Alert Differential	10 to 30 F	EVENT_STATE_NORMAL	0	FALSE	UNITS_NO UNITS (95)
5	analog-Input	Low Temperature Alert Differential		FFF(F/T)	Low Temperature Alert Differential	10 to 30 F	EVENT_STATE_NORMAL	0	FALSE	UNITS_NO UNITS (95)
6	analog-Input	High Temperature Alert Count		FFF(F/T)	High Temperature Alert Count	0 to 65535	EVENT_STATE_NORMAL	0	FALSE	UNITS_NO UNITS (95)
7	analog-Input	Low Temperature Alert Count		FFF(F/T)	Low Temperature Alert Count	0 to 65535	EVENT_STATE_NORMAL	0	FALSE	UNITS_NO UNITS (95)
8	analog-Input	Error Code		FFF(F/T)	Numerical error code (see error code table)	1 to 4	EVENT_STATE_NORMAL	0	FALSE	UNITS_NO UNITS (95)
Others	analog-Input	ERROR	ERROR	ERROR	Communication error	ERROR	ERROR	ERROR		

Analog Valve Objects

Objective Identifier	Objective Type	Objective Name	Present Value	Status Flags	Description	Range/Value	Event State	Out_Of_Service	Units
0	analog-value	Mixed Outlet Setpoint		FFF(F/T)	Target Temperature	70 to 180F	EVENT_STATE_NORMAL	true to false	UNITS_DEGREES_FAHRENHEIT (64)
Other	analog-value	ERROR	ERROR	ERROR	Communication error	ERROR	ERROR	ERROR	

Modbus Specific Settings

	
<p>To enter the Modbus address, press Modbus Address on the Building Automation screen, enter the Modbus address then press Accept.</p>	
<p>To select the data type, press Modbus Data Type from Building Automation screen, enter the desired data type and press Accept.</p>	
<p>To select Modbus baud rate, press Modbus Baud Rate on the Building Automation screen. Select the desired Modbus Baud Rate using the UP or DOWN arrows and then press Accept.</p>	
<p>To enter the Modbus parity, press Modbus Parity on the Building Automation screen and select the desired Modbus parity using the UP or DOWN arrows, then press Accept.</p>	

Modbus Specifications

Communication Protocol	Modbus over RS485
Physical Layer	RS485 Two-Wire plus Signal Ground
Baud Rate	2400, 9600, 19200, 57.6k, 115k) (default 19200 bps)
Recommended Cable	18 AWG Shielded Twisted-Pair (STP)

Transmission Mode	RTU or ACSII (default RTU)
Maximum Cable Length	Without terminating resistors
	- 115,000 baud --> 177 m (580 ft)
	- 57,600 baud --> 353 m (1,158 ft)
	- 19,200 baud --> 1,000 m (3,280 ft)
	- 9,600 baud --> 1,000 m (3,280 ft)
	- 2,400 baud --> 1,000 m (3,280 ft)
	With 2 x 120 Ohm resistors
	- 115,000 baud --> 1,000 m (3,280 ft)
	- 57,600 baud --> 1,000 m (3,280 ft)
	- 19,200 baud --> 1,000 m (3,280 ft)
	- 9,600 baud --> 1,000 m (3,280 ft)
	- 2,400 baud --> 1,000 m (3,280 ft)
Start Bit	1 Bit
Data Length	8 Bits for RTU Mode
	7 Bits for ACSII Mode
Parity	None (2 Stop Bits)
	Even (1 Stop Bit)
	Odd (1 Stop Bit)
	(default Even)
Addressing	1 to 247 (default 1)

Modbus Parameters

Read= R Read/Write= R/W

Analog Input Objects

Parameter	Read/Write	Units	Range	Type	Register	Format
Holding Registers						
Mixed Outlet Setpoint	R/W	°F	70 to 80°F	Holding	1	U16
Input Registers						

Mixed Outlet Temperature	R	°F	0 to 266°F	Input	1	U16
Valve Position	R	Vdc X 10	0 to 100	Input	2	U16
Mixed Outlet High	R	°F	0 to 266°F	Input	3	U16
Mixed Outlet Low	R	°F	0 to 266°F	Input	4	U16
High Temperature Alert Differential	R	°F	10 to 30°F	Input	5	U16
Low Temperature Alert Differential	R	°F	10 to 30°F	Input	6	U16
High Temperature Alert Count	R	Counts	0 to 65535	Input	7	U16
Low Temperature Alert Count	R	Counts	0 to 65535	Input	8	U16
Error Code	R	Enum	Numerical Error Code (See Error Code List)	Input		U16
Model	R	Num	1096	Input	10	U16
Firmware Revision	R	Num	SVN Revision	Input	11	U16

Modbus Troubleshooting

If there is no communication, check the following:

- Check that the polarity on the Modbus + and - terminals is correct
- Check that the Modbus GDN terminal is securely connected.
- Check that the Baud Rate on both devices is the same.

If the communication is intermittent, check the following:

- Check that the communication cable is twisted pair type.
- Reliable communication depends on the cable length & Baud Rate used. Long cable length may require a lower baud rate.

Error Codes

Code	Description
1	NVM Error
2	Faulty Mixed Outlet temperature sensor
3	High Temperature Alert
4	Low Temperature Alert

14.4. Sanitization

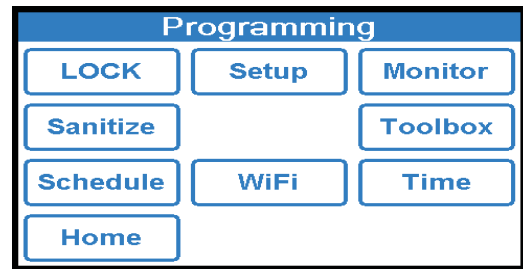
The Sanitization function produces high water temperatures and is intended ONLY for use as part of a user- directed, controlled and supervised thermal eradication protocol that has been safely and properly designed to help limit water-borne bacteria within the tempered water distribution system. The instructions contained in this Manual for the Sanitization function are not intended to be a thermal eradication protocol.

Selecting, directing, and controlling a safe and properly designed thermal eradication protocol is the sole responsibility of the people who own, manage or control the water distribution system. It is their responsibility to protect water distribution end-users, facility employees or contractors, and bystanders from scalding, burning, thermal shock, or other hazards from possible exposure to water or any parts of the water distribution system during Sanitization and cool.

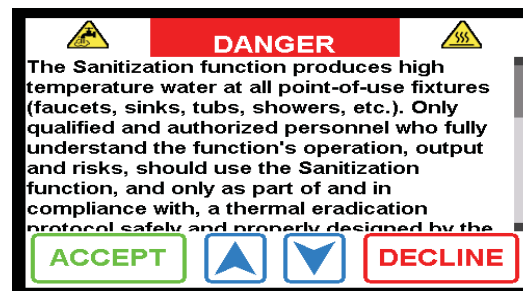
⚠ WARNING!

The Sanitization function produces high temperature water at all point-of-use fixtures (faucets, sinks, tubs, showers, etc.). Only qualified and authorized personnel who fully understand the function's operation, output and risks, should use the Sanitization function, and only as part of and in compliance with, a thermal eradication protocol safely and properly designed by the owner or manager of the water distribution system. The owner or manager of the water distribution system has sole responsibility to protect end-users, facility employees or contractors, personnel performing the Sanitization, and bystanders from scalding, burning, thermal shock, or other hazards from possible exposure to water or any parts of the water distribution system during Sanitization and cool down period, until system water returns to a safe and proper outlet water temperature set point. Always read and follow the User Guide & Instruction Manual.

1. On the **Programming** screen, press **Sanitize**; you are direct to the Responsibility And Liability Acceptance page.

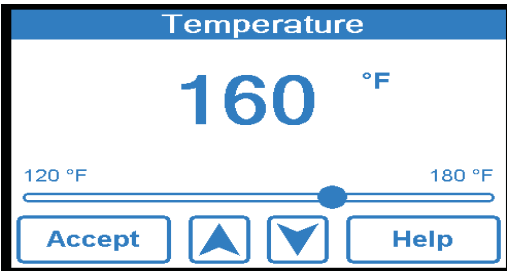

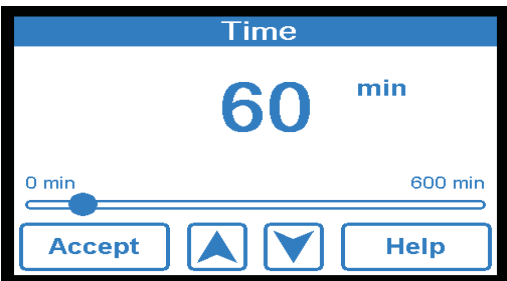


2. You must press **ACCEPT** to proceed with the Sanitization function. Pressing **DECLINE** means you will not be able to utilize the Sanitization function and you will be returned to the **Programming** menu. When you press **ACCEPT**, you are directed to the **Sanitization** screen.




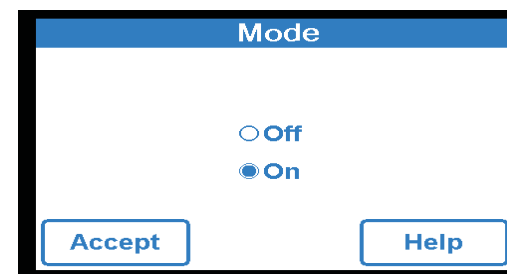
3. Select the sanitization setpoint by pressing **Temperature** on the **Sanitization** screen.

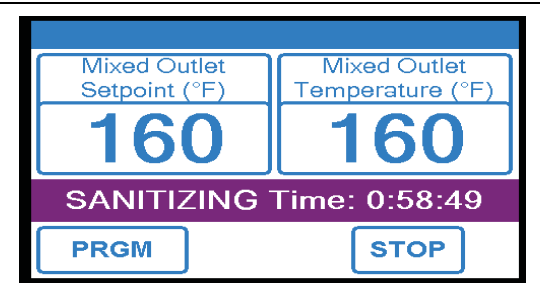
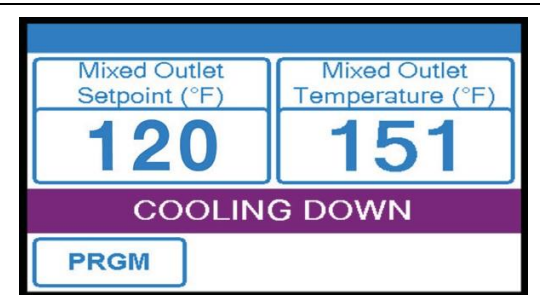


<p>4. Use the slide bar or Up and Down arrows to select the desired outlet water temperature. Press Accept to confirm the adjustment.</p>	 <p>The screen displays 'Temperature' at the top. The current temperature is '160 °F'. Below this is a horizontal slider bar with '120 °F' on the left and '180 °F' on the right. A blue dot on the slider is positioned at 160. At the bottom, there are four buttons: 'Accept', an up arrow, a down arrow, and 'Help'.</p>
<p>5. Next, select the run time by pressing Time from the Sanitization menu.</p>	 <p>The screen displays 'Sanitization' at the top. It lists three items: 'Temperature' with a value of '160 °F', 'Time' with a value of '60 min', and 'Mode' with a value of 'Off'. The 'Time' item is highlighted with a blue background. At the bottom, there are three buttons: 'Back', an up arrow, a down arrow, and 'Help'.</p>
<p>6. Use the slide bar or up and down arrows to select the desired run time. Press Accept to confirm the adjustment.</p>	 <p>The screen displays 'Time' at the top. The current time is '60 min'. Below this is a horizontal slider bar with '0 min' on the left and '600 min' on the right. A blue dot on the slider is positioned at 60. At the bottom, there are four buttons: 'Accept', an up arrow, a down arrow, and 'Help'.</p>

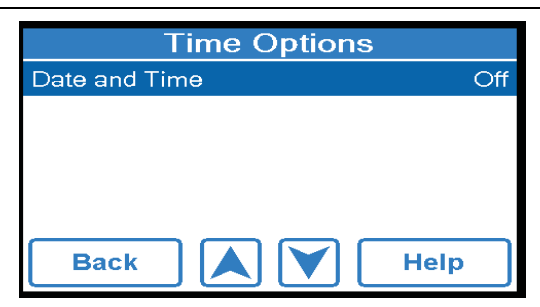
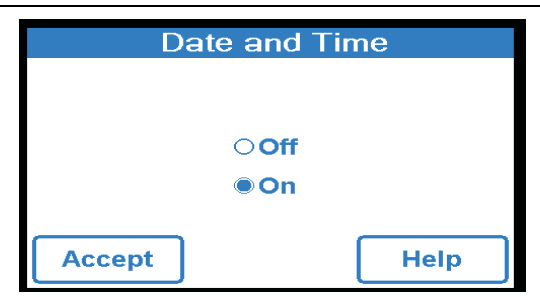
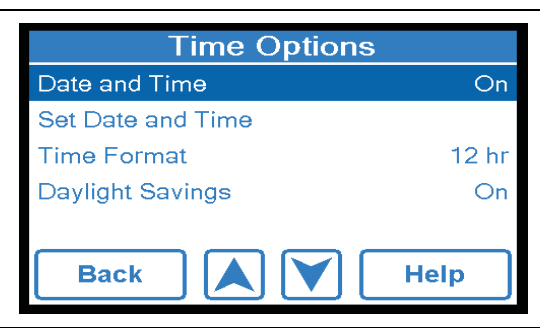
⚠ WARNING!

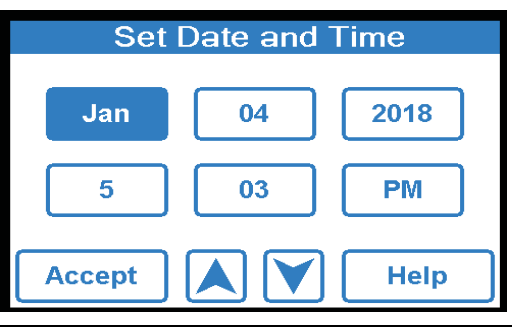
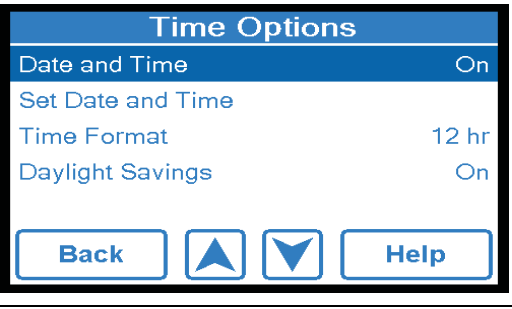
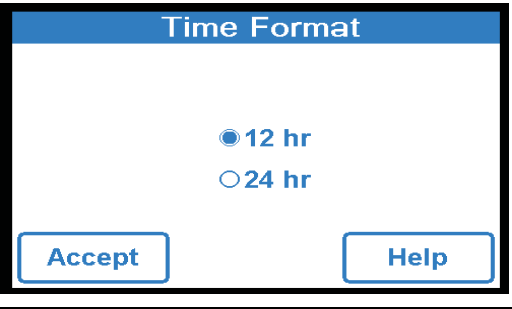
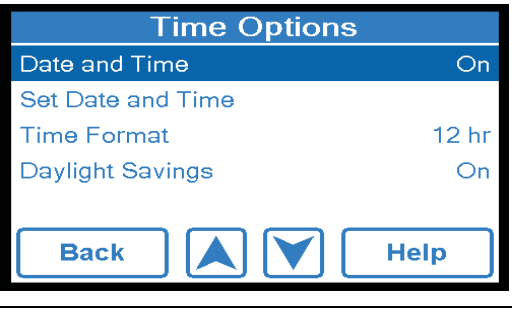
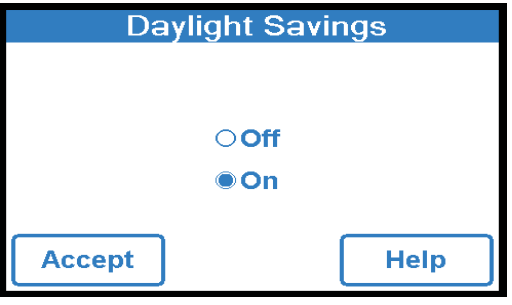
BEFORE starting the Sanitization function, make sure you are in full compliance with a safely and properly designed thermal eradication protocol, protecting end-users, facility employees or contractors, personnel performing the Sanitization, and bystanders from scalding, burning, thermal shock, or other hazards.

<p>7. To start the sanitization function, select Mode from the Sanitization menu.</p>	 <p>The screen displays 'Sanitization' at the top. It lists three items: 'Temperature' with a value of '160 °F', 'Time' with a value of '60 min', and 'Mode' with a value of 'Off'. The 'Mode' item is highlighted with a blue background. At the bottom, there are three buttons: 'Back', an up arrow, a down arrow, and 'Help'.</p>
<p>8. Once in the Mode menu, toggle the radio button to ON and then press Accept.</p>	 <p>The screen displays 'Mode' at the top. There are two radio button options: 'Off' (which is currently selected) and 'On'. At the bottom, there are two buttons: 'Accept' and 'Help'.</p>

<p>9. The Sanitization Mode is now fully functional. Note, the HOME screen will indicate you are Sanitizing the water delivery system and indicate Mixed Outlet Temperature.</p>	
<p>10. After Sanitization Mode has completed (user selected run time has elapsed), DigiTemp goes into a Cool Down Mode to return to the Mixed Outlet temperature prior to returning to normal operation.</p>	

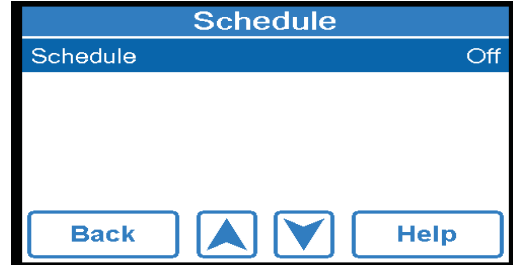
14.5. Time Function

<p>Press the TIME icon on the Programming Menu to access the Time Function.</p> <p>To turn on the Date & Time functionality, press Date & Time from the Time Options menu.</p>	
<p>Once in the Date and Time menu, toggle the radio button to ON and then press Accept.</p>	
<p>To set date and time, press Set Date and Time from the Time Options menu.</p>	

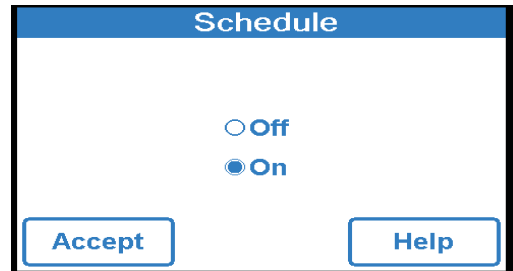
<p>To set date and time, select month, date, year, hour, minute and AM/PM icons one at a time and change with UP or DOWN arrows, then press Accept.</p>	 <p>The 'Set Date and Time' screen features a grid of buttons for date and time selection. The date is set to Jan 04, 2018, and the time is 5:03 PM. Navigation is controlled by up and down arrows, and the process is confirmed with the 'Accept' button.</p>
<p>To select the time format, press Time Format from the Time Option menu.</p>	 <p>The 'Time Options' menu lists 'Date and Time' (On), 'Set Date and Time', 'Time Format' (12 hr), and 'Daylight Savings' (On). The 'Time Format' option is highlighted, and the 'Back' button is visible at the bottom.</p>
<p>To select time format, toggle to the 12hr or 24hr radio button and press Accept.</p>	 <p>The 'Time Format' screen shows two radio button options: '12 hr' (selected) and '24 hr'. The 'Accept' button is located at the bottom left.</p>
<p>To select daylight savings time, press Daylight Savings from the Time Options menu.</p>	 <p>This 'Time Options' menu is identical to the previous one, but the 'Daylight Savings' option is highlighted, and the 'Back' button is visible at the bottom.</p>
<p>Once in the Daylight Savings menu, toggle the On radio button and press Accept.</p>	 <p>The 'Daylight Savings' screen shows two radio button options: 'Off' and 'On' (selected). The 'Accept' button is located at the bottom left.</p>

14.6. Schedule Function

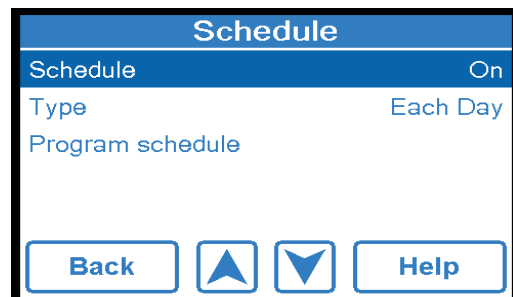
Press the **SCHEDULE** icon on the **Programming** Menu to access the Schedule function. To turn on **Schedule**, press **Schedule** from the **Schedule** menu.



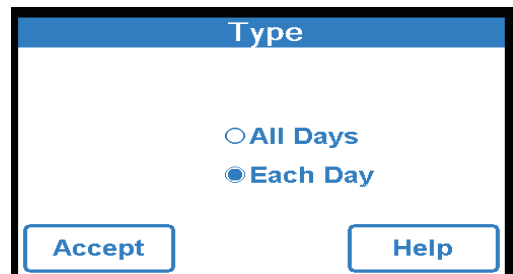
Once in the schedule menu, toggle the radio button to **On** and then press **Accept**.



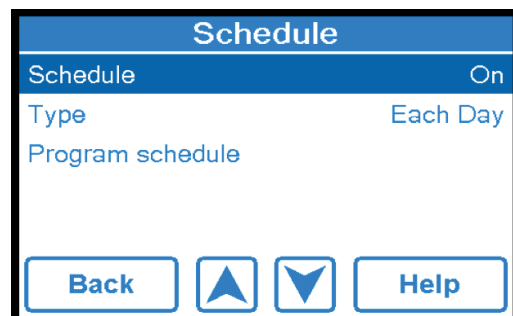
To select the type, press **Type** from the **Schedule** menu.

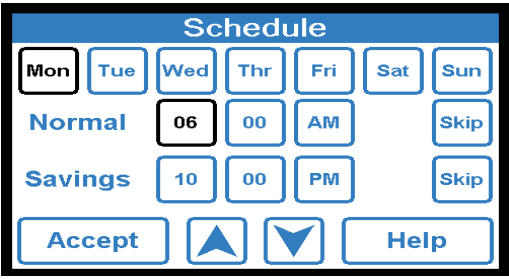
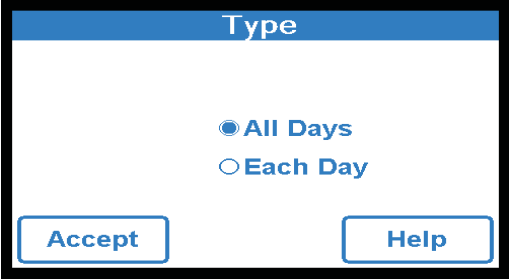
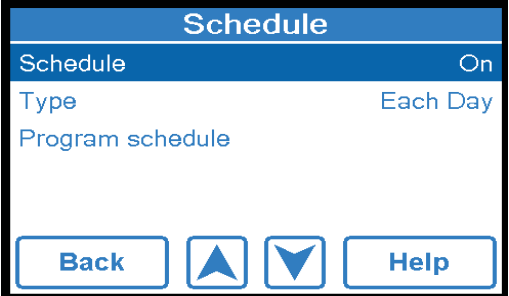


Once in the **Type** menu, toggle to the **Each Day** radio button and then press **Accept**.



To program **Each day**, press **Program Schedule** from the **Schedule** menu.

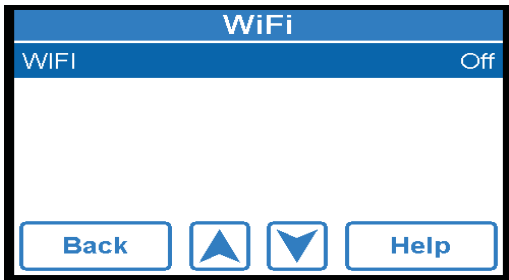


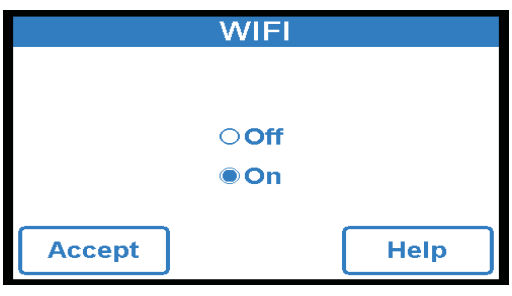
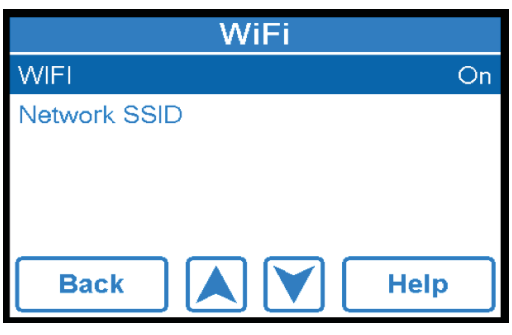
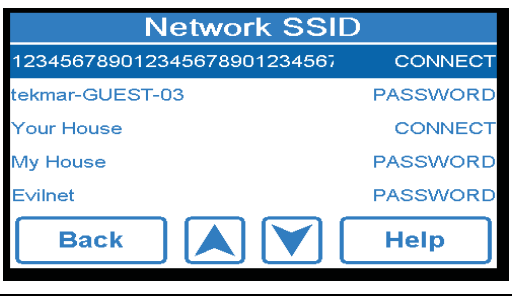
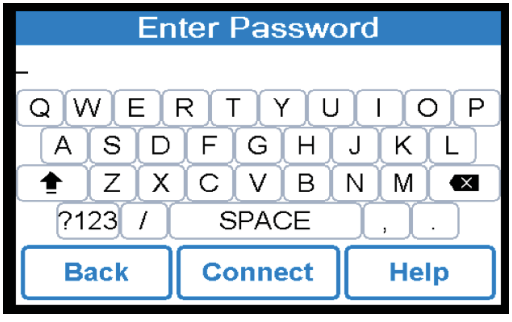
<p>Schedule Normal and Savings time and then press Accept.</p>	
<p>If you prefer all day, toggle to the All Day radio button and then press Accept.</p>	
<p>To program All day, press Program Schedule from the Schedule menu.</p>	

Schedule **Normal & Savings** time and then select **ACCEPT**

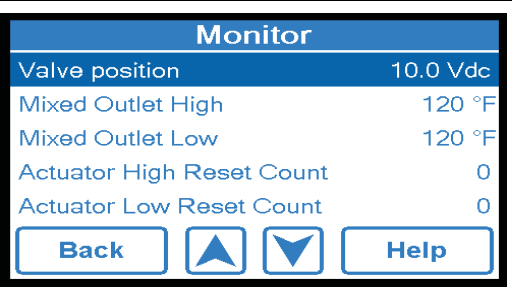
14.7. WiFi Function

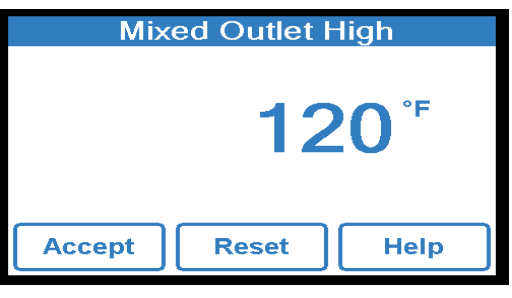
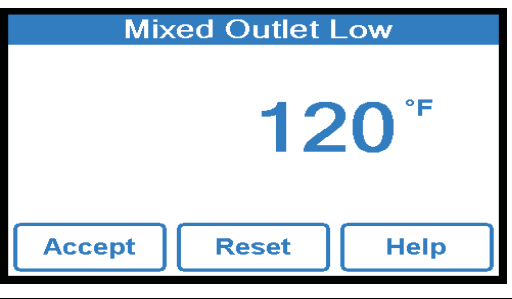
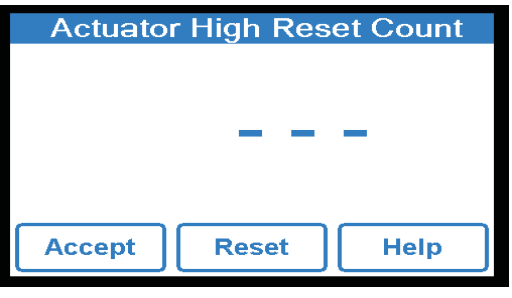
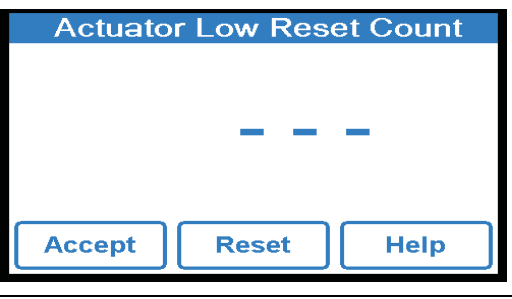
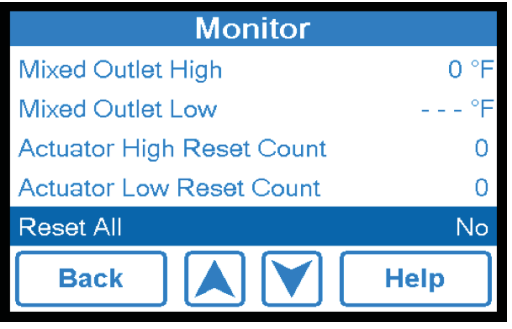
NOTE: The Wi-Fi function should only be enabled to complete software updates. It should not otherwise be turned on.

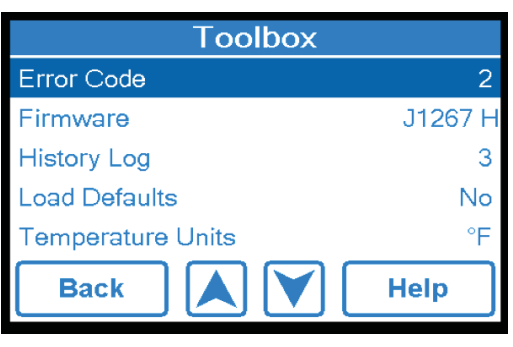
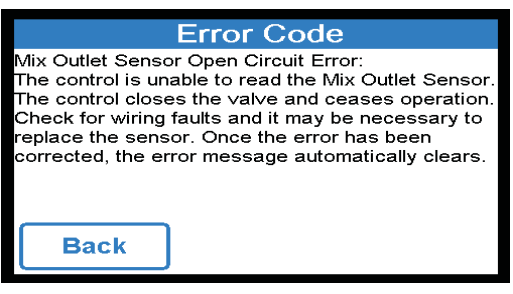
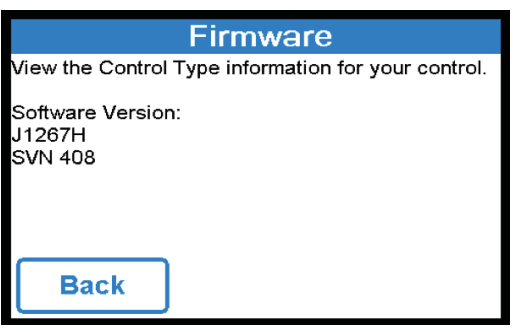
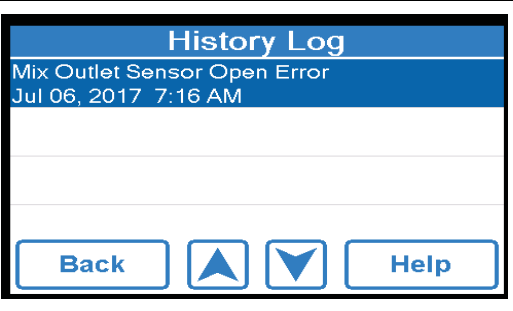
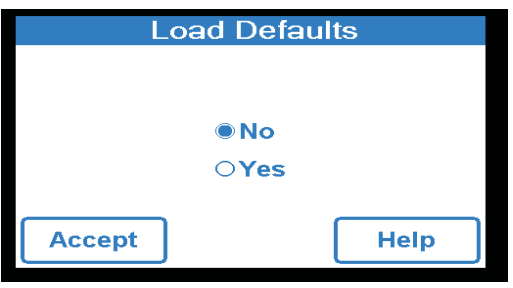
<p>Press the Wi-Fi icon on the Programing menu to access the Wi-Fi screen.</p>	
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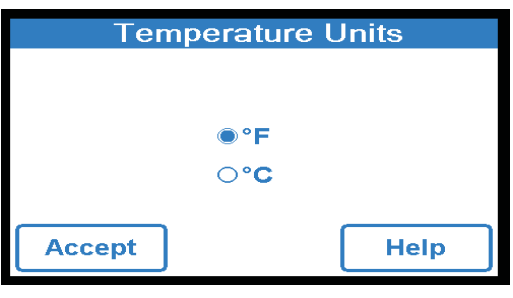
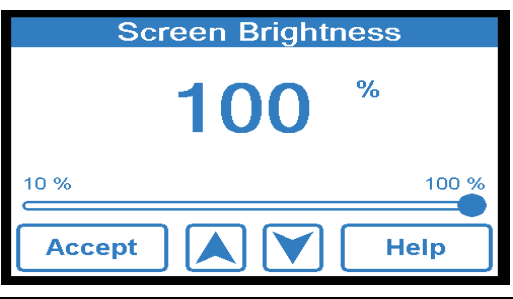
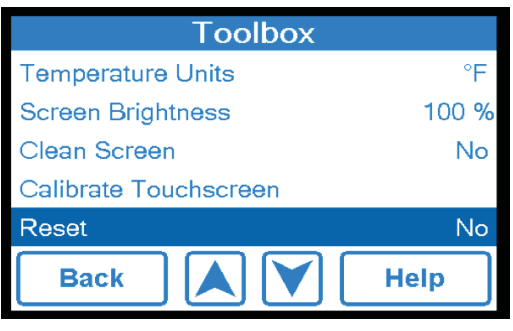
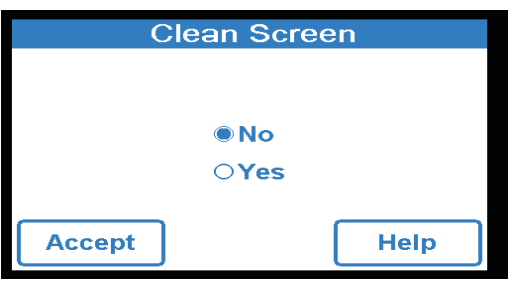
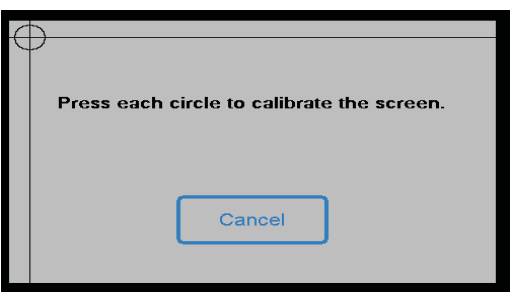
<p>In the Wi-Fi menu, toggle the radio button to On and then press Accept.</p>	
<p>At this point Wi-Fi is on. Press Network SSID from the Wi-Fi menu.</p>	
<p>Select the network from the list you want to connect.</p>	
<p>Once connected, enter password and press Connect. Once the connection is verified it will say Ok.</p>	

14.8. Monitor Function

<p>Press the MONITOR icon on the Programming menu to access the Monitor function.</p>	
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<p>For mixed outlet high, press Mixed Outlet High from the Monitor menu then press Accept or Reset to zero.</p>	
<p>For mixed outlet low press Mixed Outlet Low on the Monitor menu, then Accept or Reset to zero.</p>	
<p>To monitor actuator high reset count, press Actuator High Reset Count from the Monitor menu then press Accept or Reset to zero.</p>	
<p>To monitor actuator low reset count, press Actuator Low Reset Count from the Monitor menu, then press Accept or Reset to zero.</p>	
<p>To select reset all, scroll down through the Monitor menu and press Reset All.</p>	

<p>Press the TOOLBOX icon on the Programming menu to access the Toolbox Function. Scroll through the Toolbox menu using the UP and DOWN buttons to access each option.</p>	
<p>To find out error code, press Error Code from the Toolbox menu. When done, press Back.</p>	
<p>To view the control type information for your controls, press Firmware from the Toolbox menu and then press Back.</p>	
<p>To access the history log, press History Log from the Toolbox menu then press Back.</p>	
<p>To select load default press Load Defaults in the Toolbox menu. Toggle the radio button to No for no load or Yes for Load Defaults, then press Accept.</p>	

<p>To select load temperature units of measure, press Temperature Units in the Toolbox menu. Toggle the radio button to °F for Fahrenheit or °C for Celsius, then press Accept.</p>	
<p>To adjust the screen brightness, press Screen Brightness from the Toolbox menu. Move the slider or use the Up or Down arrows to adjust the brightness, press Accept.</p>	
<p>To clean dirty screen, press Clean Screen on the Toolbox menu.</p>	
<p>Toggle to Yes to lock the screen to clean, or press No to keep it unlocked, then press Accept.</p>	
<p>To calibrate the touchscreen, press Calibrate Touchscreen on the Toolbox menu. Press each circle to calibrate the touch screen.</p>	

To reset all, press **Reset** on the **Toolbox** menu. Toggle the radio button to **Yes** or toggle to **No** to retain the current settings.



Problem:

Outlet temperature below setpoint temperature/low temperature alarm has been activated

Solution:

1. Depending on the heating plant plumbing and location, it may take several minutes for the hot water to reach the LC-Q Water Heater. Ensure that you have allowed enough time (5 minutes) for the system to come up to temperature.
2. On the Home screen, check **Mixed Outlet Setpoint** and the hot water supply temperature. The hot water supply temperature needs to be above the setpoint or the unit will not be able to reach the set- point.
3. If the hot water supply temperature is **BELOW Mixed Outlet Setpoint**:
 - a) Raise the hot water temperature at least 2°F (1°C) above the mixed outlet temperature.
 - b) Ensure that the hot water is flowing.
 - c) Check the hot water source setpoint temperature and ensure that the hot supply line has no obstructions or closed valves restricting flow to DigiTemp
4. If the hot water supply temperature is **ABOVE the Mixed Outlet Setpoint**, there are no obstructions preventing hot water from reaching the unit, and there is sufficient flow through the unit, reset the control by pressing the PRGM icon to access the **Programming** menu. Unlock the control and then select the “Toolbox” to navigate to the “Toolbox” menu. From within the “Toolbox” menu use down arrow to high- light “Reset” then press enter. This will access “Reset” menu. Press **YES** and then press **Accept**. The controller will reset and begin a startup sequence.

NOTE: Alternately, the control can be reset by opening and closing the circuit breaker switch and waiting 100 seconds to resume normal operation.

Always use proper precautions when accessing circuit breaker box.

5. If problem persists after conducting the above outlined problem solving procedures, contact Powers, Technical Support at 800-669-5430 or info@PowersControls.com.

15. AquaSolve Anti-Scale Operation and Maintenance

15.1. Introduction

The Lync AquaSolve Anti-Scale System provides protection from scale formation on internal plumbing surfaces. It prevents scale by transforming the normal dissolved hardness minerals into undissolved crystal microparticles. These crystals stay suspended in the water and have a greatly reduced ability to react and attach to surfaces like dissolved hardness does. Therefore the problem of internal buildup of scale in pipes, water heaters and on fixtures and glass is greatly reduced.

AquaSolve Anti-Scale is not a water softener or a chemical additive (like antiscalants or sequestrants). It is a scale prevention device with proven third party laboratory test data and years of successful residential and commercial installation. AquaSolve Anti-Scale is the one water treatment device that effectively provides scale protection and is a great salt free alternative to water softening (ion exchange) or scale sequestering chemicals. Laundry and warewashing chemistry will likewise require adjustments.

15.2. AquaSolve Anti-Scale Benefits

AquaSolve Anti-Scale provides chemical-free scale prevention and protection by converting hardness minerals into harmless, inactive microscopic crystals, thus making it an effective alternative water softener technology for the prevention of scale due to water hardness. Its advantages include:

- Virtually maintenance free – no control valve
- Uses environmentally friendly technology by using no salt or other chemicals to constantly add, no electricity and no wastewater
- Improves efficiency of all water using appliances – both hot** and cold
- Safe for landscaping and lawn watering, no need for costly bypass plumbing.
- Compatible with all on-site and community wastewater treatment systems
- Perfect system for towns or communities where water softeners are banned or restricted
- AquaSolve Anti-Scale does not remove minerals or add sodium to the water supply
- AquaSolve Anti-Scale can be installed as pre-treatment to commercial reverse osmosis systems (contact your local Lync representative for further details)

** For hot water applications where feed water temperature is 100° - 140°F (38° - 60°C), please contact your local Lync representative.

⚠ WARNING!

Do not use with water that is microbiologically unsafe or of unknown quality without adequate disinfection before or after the system. Systems are certified through WQA against NSF/ANSI Standard 61, CSAB483.1, and to 372 for Lead Free compliance.

15.3. Specifications

The AquaSolve Anti-Scale system must operate in an upflow manner and does not require additional water to backwash, flush, or regenerate once put into service. The system does not require any chemical additives and does not require electricity for operation.

15.4. Standards

Independent scientific testing has confirmed Media Assisted Crystallization (MAC) technology provides scale reduction of over 95+%. Testing was conducted under protocol based on DVGW W512 test to assess control of scale formation.

NOTE: Spotting may occur on external plumbing surfaces.

The AquaSolve Anti-Scale system performs best in single pass potable water applications with NO additional chemical additives. Depending on hardness, soft scale spotting may occur. Soft scale spots in most cases can be easily wiped down with a damp cloth and will not form hard scale deposits. A Point of Use (POU) Water Softener should be used on mandatory spot-free applications (e.g. glass stemware, dishware).

CAUTION

- Not for use on closed loop systems.
- Do not let the system freeze. Damage to the tank may result.
- System must be operated in a vertical position. Do not lay it down during operation. The system may be placed in any position for shipping and installation but must be operated in the vertical position.
- Place system on a smooth, level surface. Because the system operates in an upflow, fluidized bed mode, a level surface is more important than with a softener or media filter.
- A bypass valve should be installed on every system to facilitate installation and service.
- Observe all local plumbing and building codes when installing the system.

⚠ WARNING!

Due to the unique properties of AquaSolve Anti-Scale, there are some unique requirements for using AquaSolve Anti-Scale in conjunction with other forms of water treatment:

1. AquaSolve Anti-Scale must be the last stage in the treatment chain. Do not install any filters after AquaSolve Anti-Scale or before any devices for which scale prevention is required. POU filters, e.g. carbon, RO or Ultraviolet (UV) are exempt from this requirement.
2. Do not apply any other antiscalants before or after AquaSolve Anti-Scale.
3. The addition of soaps, chemicals, or cleaners, before or after AquaSolve Anti-Scale treatment, may reverse its anti-scale treatment effects and/or create water with a heavy residue or spotting potential. Any adverse conditions caused by the addition of soaps, chemicals, or cleaners are the sole responsibility of the end user.
4. AquaSolve Anti-Scale is not a water softener and does not soften the water. Water treatment chemistry (e.g. antiscalants, sequestrants, soaps, chemicals or cleaners etc.) will most likely have to be changed to be compatible with AquaSolve Anti-Scale treated water. Laundry and ware-washing chemistry will likewise require adjustments.

15.5. Equipment Specifications

AquaSolve Anti-Scale systems are complete, self-contained, loaded with media, and ready to use. Review operating pressures, temperatures and water chemistry limitations for compatibility.

LC-Q Feed Water Chemistry Requirements	
pH	6.5-8.5
Hardness (maximum)	30 grains (513 ppm CaCo3)*
Alkalinity	100 ppm
Water Pressure	15 psi to 150 psi (1.03 to 10.34 bar)
Temperature	40°F to 100°F (5°C to 38°C)
Free Chlorine	≤ 1 ppm
Chloride	≤ 200 ppm
Iron (maximum)	0.3 ppm**
Manganese (maximum)	0.05 ppm**
Copper	1.3 ppm***
Oil & H ₂ S	Must be Removed Prior to AquaSolve Anti-Scale
Total Phosphates	< 3.0 ppm
Sulfate	< 250 ppm
Silica (maximum)	20 ppm****
TDS	1500 mg/l*****

NOTE: Water known to have heavy loads of dirt and debris may require pre-filtration.

* Systems using AquaSolve Anti-Scale technology are effective at controlling lime-scale formation inside the plumbing system at influent hardness levels up to 75 grains per gallon (1282 mg/l) of calcium carbonate. Due to variances in water chemistry, 30 grains per gallon is a recommended hardness maximum due to potential aesthetic issues related to soft scale residue formation outside of the plumbing system. Testing should be performed to determine proper application where hardness levels exceed 30 grains per gallon.

** Just as with conventional water softening media, AquaSolve Anti-Scale media needs to be protected from excess levels of certain metals that can easily coat the active surface, reducing its effectiveness over time. Public water supplies rarely, if ever, present a problem, but if the water supply is from a private well, confirm that the levels of iron (Fe) and manganese (Mn) are less than 0.3 mg/L and 0.05 mg/L, respectively.

*** Pursuant to the EPA drinking water standards, the copper concentration permitted is up to 1.3 ppm. Typically originating from new copper plumbing, high levels of copper can foul AquaSolve Anti-Scale media. For applications with copper concentration greater than 1.3 ppm,

please consult Watts Water Quality Technical Service. To further minimize any problem with excess copper, avoid applying excessive flux on the inner surfaces of the pipe and use a low-corrosivity water soluble flux listed under the ASTM B813 standard.

**** AquaSolve Anti-Scale media does not reduce silica scaling. While silica tends to have a less significant effect on scale formation than other minerals, it can act as a binder that makes water spots and scale residue outside the plumbing system difficult to remove. This 20 ppm limitation is for aesthetic purposes.

***** All other contaminants must meet the requirements of the USEPA Safe Drinking Water Act. Specific Mineral and Metal MCL's, identified in Watts published Feed Water Chemistry Requirements, supersedes the USEPA SDWA.

NOTE: Systems using AquaSolve Anti-Scale technology prevent hard water scale formation inside the plumbing system at influent hardness levels of 30 grains per gallon of calcium carbonate and less. Due to vari-ances in water chemistry, certain aesthetic conditions external of the plumbing system may not be attained. AquaSolve Anti-Scale is designed for the treatment of potable water that meets the requirements of the current USEPA Safe Drinking Water Act.

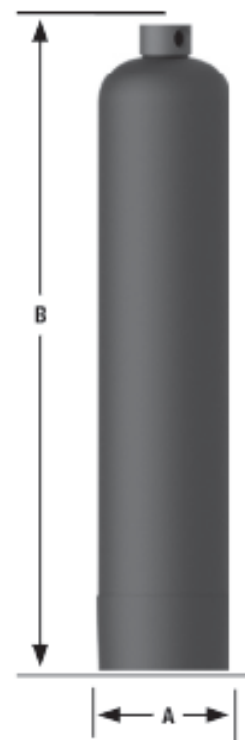
LC-Q models LC-Q-800-2 and LC-Q-1000-2 use AquaSolve model **LM8414TM-COM**.

All other LC-Q models (LC-Q-1200-2 - LC-Q-2400-3) use AquaSolve model **LM8416TM-COM**

Mechanical Specifications		
Model	LM8414TM-COM	LM8416TM-COM
Dry Weight	124 lbs / 56 kg	145 lbs / 66 kg
Service Weight	458 lbs / 208 kg	550 lbs / 250 kg
Inlet/Outlet Connection	2" FNPT	2" FNPT

Replacement Media		
A	M8414-COM-RM	Replace media every 3 years
B	M8416-COM-RM	Replace media every 3 years

Dimensions (nominal - inches)		
Model	LM8414TM-COM	LM8416TM-COM
A	14	16
B	73.1	73.1



Max. Service Flow (gpm) vs. Water Temp. (°F)

System	40°	45°	50°	55°	60°	65°	70°
LM8414TM	40	44	48	50	50	50	50
L M8416TM	45	51	56	59	63	69	75

Intermittent Duty Systems	
LM8414TM-COM	50 gpm at all temperatures
LM8416TM-COM	75 gpm at all temperatures

Max. Flow Rate***		
LM8414TM-COM	50 gpm	189 lpm
LM8416TM-COM	75 gpm	284 lpm

*** Exceeding maximum flow can reduce effectiveness and void warranty.

Pressure drop at peak flow rate is less than 22 psi.

Pressure drop reading taken with inlet and outlet gauges installed at a common elevation and 80 degree feed water.

16. SEQUENCE OF OPERATION

The following is the sequence of operation for each Water Heater in the Lync LC-Q Water Heating Solution:

1. Incoming 120VAC

- a) Full time power to the Fuse
- b) Full time power to the Main Control Switch

2. Power On - When the main control switch is turned on:

- a) 120V is applied to the step-down transformer (24V)
- b) 120V is applied to the L.W.C.O. terminal L1 (if used)
- c) 24V and 120V is applied to the Platform Ignition Module (PIM). The circulator, blower and HSI circuits are 120V.
- d) The PIM performs a processor and memory self-test to insure proper operation. The PIM confirms the presence of a valid ID card which matches the configuration previously stored in memory. If the valid ID card is not present, the PIM generates a diagnostic fault. The non-volatile memory is checked for an active lockout condition. A lockout indicates the previous attempt to light was unsuccessful, or a hi-limit or other system fault occurred. The PIM stays in lockout until a manual reset is performed.

3. Control Device Pre-check – The following control circuits are checked for closer before the control system will initiate a Call for Heat.

- a) The PIM continuously monitors the flame status to verify no flame is present during Standby. If an erroneous flame is detected, the PIM generates a flame error fault.
- b) The Electronic Low Water Cut-Off control is a self-contained electronic device which senses the presence of water at the top of the storage tank. When the presence of water is confirmed, the contacts close on the ELWCO and is sensed by PIM control.
- c) The High Temperature Limit is combined in a common probe body with the upper tank sensor. The PIM will compare the high limit thermistor temperature with the upper tank thermistor temperature. If the two temperatures are not the same, a sensor failure will result.
- d) When the High Temperature Limit operation has been verified by comparison, the limit temperature will then be confirmed to be under the maximum allowable temperature.
- e) Terminals P1-P2 are closed to activate any connected remote devices.
- f) The circuit between Terminals C1-C2 is closed by any connected remote proving switches, enabling the water heater to continue the sequence of operation.

4. Call For Heat - If the operating control senses that the temperature at the upper tank sensor is below the water heater setpoint and the previous control interlocks and safeties are satisfied, the following sequence will begin:

- a) Terminals P1-P2 are closed to activate any connected remote devices.
- b) The circuit between Terminals C1-C2 is closed by any connected remote proving switches, enabling the water heater to continue the sequence of operation.
- c) The High Gas Pressure and Low Gas Pressure Switch (if equipped) are energized and their monitored pressures are proved. The individual safety circuits will close when satisfied and be sensed by the PIM control.

- d) When the burner blower is energized and operation is verified to close within 60 seconds to prove flow.
 - e) The ignition pre-purge delay takes place.
 - f) The voltage level of the 24 VAC supply input is confirmed to be above 18.0 VAC.
 - g) The Ignition cycle begins.
5. **Heat-Up** - Following the pre-purge delay, the hot surface igniter will be energized:
- a) The flame control will send 120V to the hot surface igniter for approximately 20 seconds.
 - b) The HSI Element proving current is verified.
 - c) The heat-up delay takes place to allow the hot surface element to reach ignition temperature.
6. **Ignition** - When dwell time is complete a 4-second Trial for Ignition (TFI) period is initiated:
- a) Gas Safety Valves are energized.
 - b) The hot surface element is de-energized during the last second of the TFI period.
 - c) During TFI the flame safeguard control will monitor the flame using flame rectification through the hot surface igniter.
 - d) If the flame control senses the presence of flame before the end of the TFI period, the igniter will be de-energized and the flame control will continue to monitor the flame, through the igniter, until the operating thermostat ends the call for heat condition.
7. **Heating**
- a) The flame status, airflow switch, LWCO switch, water pressure switch and other safety switches are continually monitored for proper state.
 - b) The High Limit sensor is confirmed to read below the High Limit set-point.
 - c) The temperature of water in the tank is compared to the temperature control setpoint to determine when to begin firing in heating mode.
 - d) The water heater remains in heating mode and, with extended operation, condensation begins to fill the condensation trap and drain line; (a normally operating booster water heater does not create condensation). The water heater stops firing when the tank water temperature matches the temperature control setpoint.
 - e) The gas valve(s) are immediately disabled.
 - f) A Blower Post-purge is completed and the control proceeds to Standby mode.
8. **Integral Circulating Pump** – Controlled independently of the call-for-heat.
- a) When the main control switch is turned on, the control system will continuously monitor the water temperature in the tank and attempt to maintain a uniform water temperature within the tank by using the integral circulating pump.
 - b) If the temperature sensed in the tank drops 5 degrees or more below the temperature set-point, the pump is energized and a pump circulator icon will illuminate on the control display touch screen.
 - c) The operation of the integral circulating pump may occur before, during or after the call-for-heat period.

9. Flame Failure / Flame Loss

- a) If the igniter fails to sense flame during an attempt to light the burner (Ignition Trail Fail), the ignition control will end the ignition sequence and the gas valve will be closed. Immediately following the end of the first failed ignition cycle, a new ignition sequence will be initiated to attempt to relight the burner. The standard LC-Q Water Heater configuration allows for three ignition failures before lockout. Since LC-Q Water Heaters include the CSD-1 option, this ignition failure will result in a lockout and require manual reset to attempt operation again.
- b) If the burner successfully lights and operates but the flame is lost, the gas valve will be closed and the blower will continue to operate in order to purge any remaining combustion products from the water heater. Since LC-Q Water Heaters include the CSD-1 option, this flame loss will result in a lockout and require manual reset to attempt operation again. The standard LC-Q Water Heater configuration allows for three (Main Flame Loss) occurrences before lockout. Following each (Main Flame Loss) the PIM will purge and initiate the ignition sequence until the maximum of three flame loss events occur.

17. INITIAL STARTUP

17.1. Initial Startup Requirements

Installation must be complete prior to performing initial startup; and the startup must be complete prior to placing the Lync LC-Q Water Heating Solution into service. Starting LC-Q Water Heaters without proper piping, combustion air, venting or electrical connections or control settings can be dangerous and may void the product warranty. The following startup instructions must be followed precisely in order to achieve proper and efficient operation to assure trouble-free service life.

⚠ WARNING!

Proper startup must be made by a qualified installer or service agency, who must read and follow the supplied instructions and unit markings. Failure to complete proper startup before use, tampering with controls or not following all instructions and markings may damage this equipment, void the warranty and may result in property damage, personal injury or death.

17.2. Tools and Instrumentation Required

- Stack Temperature Gauge
- Stack Draft Gauge
- Electronic Combustion Analyzer
- Two U-tube Manometers or pressure gauges
- AC/DC Multi-meter (with 20,000 OHM/Volt rating)
- Amp Meter
- Normal Hand Tools

17.3. Resources

- Product Installation & Maintenance Manuals
- Start-up Report with instructions
- Local, State, & Federal Codes
- Website: <https://lyncbywatts.com/support>
- Technical Support: 1-800-433-5654

17.4. On Site Considerations

- Electrical Supply in accordance with the Nameplate Rating
- Adequate uncontaminated indoor or outdoor combustion air
- Adequate Fuel Supply
- Adequate Water Supply
- Exhaust Vent that complies with the installation instructions
- Condensate drainage that complies with the installation instructions

17.5. Pre-Startup Checklist

IMPORTANT: Before starting the LC-Q Water Heaters, ensure that they are properly and completely installed. If a unit is not installed properly, **DO NOT** attempt startup. Contact your installer immediately.

Before starting each unit, check for adequate electrical service, confirm if any external control wiring connections exist, confirm the tank is filled with water, check all tank connections for leaks, and ensure the condensate trap is installed properly and that the gas supply meets the product rating decal requirements as follows:

CHECK ELECTRICAL SERVICE:

Complete the following on each LC-Q Water Heater in the system:

1. Start by checking the electrical service to each LC-Q Water Heater. The standard electrical service required is a 120 volt, single phase, 60 Hertz power supply that is electrically grounded. See the rating decal on the front of the LC-Q Water Heater for the electrical service requirements for your specific product.
2. Next, shut off the electrical service to the Lync LC-Q Water Heating Solution and turn the power switch on each water heater to the **OFF** position.
3. Remove the panel screws to lower the hinged upper control enclosure panel.
 - a. Locate the document packet containing the control circuit fuse and fuse cap. A wiring diagram is also attached to the back of the front panel.
 - b. Remove the fuse and fuse cap from the packet and install them into the fuse holder on the front of the panel.
 - c. Check the back of the digital control display board on the hinged panel to see if a 2-wire, RS-485 communication cable is connected. These wires must be removed to isolate the water heater from the Building Automation System during startup. Remember to reconnect the communication cable to the digital control display board after startup is complete.
 - d. Visually check that all components are intact and no damage has occurred during transit and installation.
 - e. Also check to ensure all wire connections within the control cabinet are tight. A loose connection could cause sporadic shutdowns and malfunctions.
 - f. Close the hinged upper control enclosure panel and secure the panel screws.
4. Now remove the panel screws on the hinged bottom control enclosure panel.
 - a. Check to see if terminals **R1** and **R2** are jumped. If they are, nothing more needs to be done. If the terminals are not jumped but have wires connected to them, this indicates that a remote on/off relay is controlling the water heater from the Building Automation System. These wires must be removed prior to startup and the terminals must be jumped. Remember to remove the jumper and reconnect the remote controlling wires after startup is complete.
 - b. Once again, visually check to ensure that all components are intact in this area and that all wire connections are tight.
 - c. Now close the hinged bottom control enclosure cover and secure the panel screws.

CONFIRM THE TANKS ARE COMPLETELY FILLED WITH WATER

For LC-Q Water Heater models applied as a Booster Water Heater:

When filling a LC-Q Water Heater applied as a booster water heater, the fill water supplied by the general purpose water heater should be a minimum of 140°F.

If colder water enters the booster water heater inlet during startup, or at other times, condensation may occur and may cause a burner lockout. To remove this startup condensation, after startup is complete and the booster water heater storage tank has reached its intended maximum water temperature, turn the booster water heater off, remove the condensation drain plug, allow any condensation to drain, replace drain plug and turn the booster water heater on.

IMPORTANT: Using the T&P Relief valve alone to vent the tank will NOT allow the tank to completely fill!

1. Close each individual water heater's drain valve (see Figure 4-2).
2. Fully open the shutoff valves on the cold water inlet and hot water outlet piping to the LC-Q Water Heaters.
3. Open the T&P valve to vent the tank. Close the valve when flow is observed.
4. Open a nearby hot water faucet(s) to allow trapped air to escape from the piping.
5. A steady flow observed from the hot water faucet(s) indicates the tank is full.
6. Close the hot water faucet(s).

CHECK TANK FLANGES AND PLUMBING CONNECTIONS FOR LEAKS

Be sure all connections into the tank are tight, as leaks at tank fittings will damage the insulation.

CHECK THE CONDENSATE TRAP

A condensate trap assembly ships with the Lync LC-Q Water Heating Solution and must be installed on the condensate drain to prevent flue gasses from escaping and creating a hazardous condition in the installed space. The condensate drain is located at the bottom rear of each LC-Q Water Heater, near the flue outlet.

Connect the condensate trap assembly to the PVC fitting on the condensate drain pipe. Then rotate the trap so that it contacts the floor. Connect 1/2" ID clear vinyl tubing, rated for 170 degrees or higher, or an optional Condensate Neutralization System to the barbed hose connection at the end of the condensate trap.

CONFIRM THE GAS TYPE

Confirm the gas type supplied matches the rating label requirement on the front of one of the LC-Q Water Heaters. LC-Q Water Heaters require either **Natural Gas** or **Propane** gas.

If the available gas type is not correct, the LC-Q Water Heaters will require a conversion. Contact your Lync representative for instructions for converting to/from **Natural Gas** or **Propane** Gas.

CONFIRM THE SUPPLY GAS PRESSURE

⚠ WARNING!

If you smell gas: Do not try to light any LC-Q Water Heater. Do not touch any electrical switch or use a phone in your building. Immediately call your gas supplier and follow their instructions.

For **Natural Gas**, the maximum inlet static gas pressure must not exceed **14.0** inches water column and must not drop below **3.5** inches water column during operation.

For **Propane Gas**, the maximum inlet static gas pressure must not exceed **13.0** inches water column and must not drop below **8.0** inches water column during operation.

Complete the following on any water heater on the skid to check the supply gas pressure:

1. First, shut off the main gas supply to the Lync LC-Q Water Heating Solution.
2. **For models LC4Q through LC8Q**; remove the cover plate at the top of the water heater to access the burner and gas train components.
3. Ensure that both the manual gas valve at the burner, and the manual gas valve at the inlet of the gas train is closed.
4. Attach a 1/8" NPT pilot shutoff test valve and tube to the test port on the manual shutoff gas valve at the inlet of the gas train. Attach a second 1/8" NPT pilot shutoff test valve and tube to the manual shutoff gas valve downstream of the gas train at the burner. Close both test valves.
5. Attach U-tube manometers or gas pressure gauges to both of the pilot shutoff test valves.
6. Open the main gas supply to the water heaters and check for gas leaks on all joints upstream of the manual shutoff gas valve at the inlet of the gas train.
7. Now open the 1/8" pilot shut-off test valve at the inlet of the gas train and measure the supply gas pressure.

IMPORTANT: If the supply gas pressure is outside of the allowable range, notify the building maintenance personnel or installer to reduce the gas pressure to the water heaters.

8. Now open the manual gas shut off valve, at the inlet of the gas train, and check the gas train for leaks using a soap solution. If any bubbles are detected, close the manual gas valve, tighten the leaking connection, then open the manual gas shutoff valve again and check for leaks.
9. Now open the 1/8" pilot shut-off test valve connected to the manual shutoff gas valve, downstream of the gas train closest to the burner, and note the gas pressure measured by the monometer. Check the gas pressure again after about 15 minutes. A gas pressure increase of 0.5" W.C. or more indicates one of the gas solenoid valves is leaking by. Isolate and replace the leaking gas valve. After any leaking valve is replaced, the reassembled gas train must be leak tested again before start-up is attempted.

NOTE: Some flame controls read the flame signal in micro amps and some in volts DC.

AQUASOLVE START-UP

NOTE: Check the head on top of the tank. It's common for it to loosen during shipment. If necessary, tighten the head with a strap wrench as needed.

In systems with new copper piping, such as new construction or recently repaired domestic hot water piping, copper and flux may temporarily increase the copper content of the supply water above the recommended operating limits for the AquaSolve scale prevention system. In these cases it is highly recommended to put the AquaSolve in a bypass mode for the first 6 weeks of

operation to allow the new copper piping to develop a natural protective oxide layer. After 6 weeks the AquaSolve should be returned to normal operation as per below.

Connect a hose to the hose bibb on the outlet of the tank. Run the hose to a drain and open the hose bibb.

Slowly/partially open the supply water ball valve. Allow the tank to slowly fill with water. When a steady stream of water appears at the drain, close the supply valve and hose bibb.

Open the inlet and outlet valves on the system. Transfer the bypass valves from Bypass to the Service position. Open a nearby faucet downstream from the AquaSolve Anti-Scale system to relieve any air.

Check for leaks. Repair as needed.

NOTE: Fill in install date and rebed due date on product label located on front of each tank as reminder to replace AquaSolve Anti-Scale media every 3 years. The system is now ready for service. AquaSolve Anti-Scale media should be replaced every 3 years.

17.6. Startup Procedure

1. Begin by turning the Lync LC-Q Water Heating Solution power switch to the **OFF** position.
2. Drill a small test hole in the flue vent approximately two feet from the vent connection and insert the combustion analyzer probe into the vent test hole.
3. Simulate a Safety Shutoff Ignition Fail Test on each LC-Q Water Heater:
 - a. With the manual gas valve at the burner closed, turn on the electrical service to the water heater, and then turn the Lync LC-Q Water Heating Solution power switch to the **ON** position.
 - b. The EOS Temperature control touch screen will energize. If the tank temperature is 5 degrees or more below the factory setpoint of 120 degrees, the Call-For-Heat sequence will initiate.
 - c. With no gas pressure, the ignition control will attempt to ignite the burner three times before proceeding to a safety shutoff. Following the third failed attempt, the display screen immediately shows a **LOCKOUT** condition has occurred.
 - d. In a few seconds an **ERROR** code flashes in the Status field, and a **FLAME FAIL** alarm message is displayed followed by the troubleshooting message "**IGNITION TRIAL FAIL**" which scrolls across the top of the screen.
 - e. **IMPORTANT:** Before restarting the LC-Q Water Heaters, ensure there is a way for the system to dissipate heat. This can be accomplished by opening one or more nearby hot water faucets.
4. When the call for heat sequence begins, the burner blower is energized.
 - a. When the **BLOWER** operation is verified by the tachometer, the **Ignition Pre-Purge** sequence and **Hot Surface Igniter Heat up Period** begins. The **BLOWER** message is displayed during this pre-purge period.
 - b. Following a pre-purge and Hot Surface Igniter Heat Up countdown of about 36 seconds, a 4-second trial for Ignition period is initiated. During this sequence the screen displays **IGNITION** while the gas valves are being energized.
 - c. When ignition occurs and flame is proven, the Status field shows the **BURNER** is firing and the flame **CURRENT** is displayed in micro amps for about 8 seconds.

- d. As the burner fires, the modulating firing rate percentage displayed at the bottom of the screen will increase and then decrease as the LC-Q Water Heater reaches its setpoint temperature of 120 degrees. Disregard this display for inputs with On-Off burner control systems.
- e. The **CONTROL TEMPERATURE** sensed at the top of the tank will continue to display throughout the burner run cycle and after shutdown when the LC-Q Water Heater returns to a satisfied and idle state.

5. Burner Combustion Adjustment – General

⚠ WARNING!

If at any point carbon monoxide is in excess of 200 ppm, do not continue to operate the LC-Q Water Heaters and contact your Lync representative for assistance.

Carbon monoxide is a colorless, odorless and poisonous gas that commonly results from gas combustion. High concentrations of Carbon Monoxide are extremely dangerous to humans and animals. Operation of a LC-Q Water Heater at carbon monoxide levels above 200 ppm can cause unsafe operation and the potential for poisonous carbon monoxide to enter occupied areas. Such improper installation can cause property damage, personal injury, exposure to hazardous materials or death.

- a. With the burner firing, measure the flow gas pressure at the beginning of the gas train. If the inlet flow gas pressure for Natural Gas is equal to or greater than 3.5 inches water column, or if the inlet flow gas pressure for Propane Gas is equal to or greater than 8.0 inches water column, continue with the startup. If the inlet flow gas pressure drops below these minimum requirements, a supply gas volume or piping problem may exist and must be corrected before the startup can continue.
 - b. Next, with the burner firing, monitor the combustion analyzer readings. The desired Carbon Dioxide level, CO₂, in the combustion products must be between 8.5 and 9.5% for Natural Gas, and between 9.5 to 10.5% for Propane Gas. If the CO₂ level is in this range, no adjustment is required or recommended. If the CO₂ level is outside of these ranges, the combustion must be optimized.
6. Optimizing Combustion: LC-Q Water Heaters use a modulating burner control system with a larger gas regulator and separate safety solenoid gas valves. The CO₂ level on these models must be adjusted at both Low Fire and High Fire. The firing rate adjustment is done in the **Manual Override** menu, accessed through the EOS Touch Screen Digital Control.

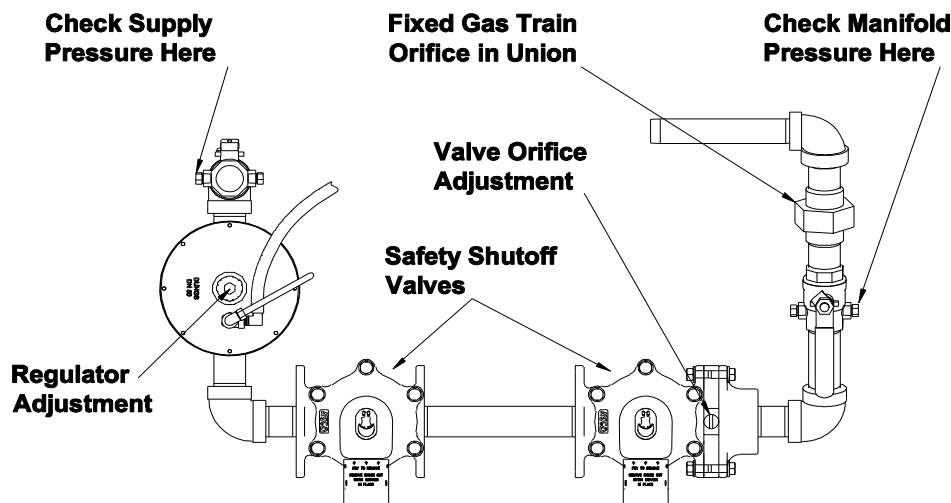
To access the Manual Override Menu:

- a. Press and hold the **HOME** button for 3 seconds.
- b. Press the **NEXT ITEM** or **ITEM BACK** buttons to navigate to the **TOOLBOX** menu.
- c. Press the **ENTER** button to display the **ACCESS** screen.
- d. Now use the **UP** or **DOWN** arrow buttons to select the **ADVANCED** setting.
- e. Exit the menu by pressing the **HOME** button.
- f. Use the **NEXT ITEM** or **ITEM BACK** buttons to navigate to the **VERRIDE** menu.
- g. Press the **Enter** button to display the **MANUAL OVERRIDE** screen and use **UP** or **DOWN** arrow buttons to select the **HAND** setting.
- h. Use the **NEXT ITEM** or **ITEM BACK** buttons to navigate to the **HEATER MODULATION (HTR MOD)** menu. This setting will override the operating control, and using the up or down arrow buttons, force the burner to fire at a selected firing rate.
NOTE: If the **HTR MOD** program is activated while the burner is firing, the burner will shut down and recycle.

- i. Using the **UP** or **DOWN** arrow buttons adjust the firing rate from **OFF** to the minimum firing rate of 10% for **Low Fire**. With the burner firing rate stabilized at **Low Fire**, adjust the **Gas Regulator** screw clockwise to increase gas flow and increase CO₂, or counter-clockwise to decrease flow and decrease CO₂.
 - j. Once the desired combustion levels are achieved at Low Fire, return to the touch screen and increase the **HTR MOD** firing rate to the maximum High Fire firing rate setting allowed for the specific product. **NOTE:** The maximum factory-set **High Fire** firing rate may not be 100%. With the burner firing rate now stabilized at High Fire, turn the Gas Valve Orifice Adjustment screw clockwise to decrease gas flow and decrease CO₂, or counter-clockwise to increase gas flow and increase CO₂. For models LC5Q to LC8Q loosen the set screw on the side of the shutter valve body before attempting to adjust the shutter. Be sure to tighten the set screw on the valve body when adjustments are complete.
 - k. Once the desired combustion is reached at **High Fire**, return to **Low Fire** to confirm the settings again.
 - l. When all combustion adjustments are complete, go back to the **MANUAL OVERRIDE** screen and return the function back to the "**AUTO**" setting.
7. Check The Vent Pressure. With the combustion properly adjusted, now use the test hole in the flue vent to measure the vent pressure. With the burner firing, confirm the vent pressure does not exceed .5" W.C. Pressure in excess of .5" W.C. indicates a venting sizing issue that must be addressed by the installer before operating the water heater.

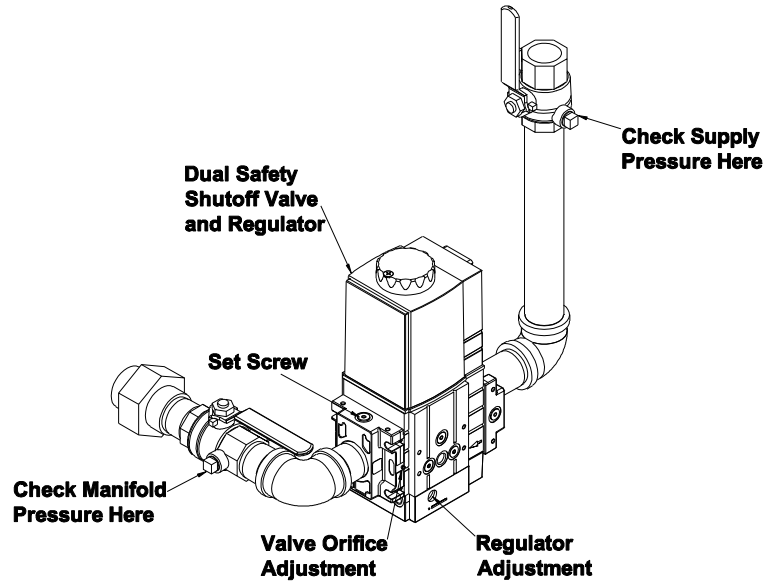
⚠ WARNING!

When adjustments are complete and before putting the water heater into service, return the MAN OVR function back to "AUTO". Failure to return the MAN OVR function to "AUTO" can cause high water temperatures that can result in property damage, serious injury or death.



(Optional components may not be shown)

Figure 17-1: Gas Train Illustration, Models LC5Q through LC8Q



(Optional components may not be shown)

Figure 17-2: Gas Train Illustration for Models LC9Q through LC10Q

18. POTENTIOMETER (Adjusting the Setpoint)

The PIM Ignition Control will continue to operate the LC-Q Water Heater at a 120 degree internal factory setpoint should the touch screen control fail, or communication between the two devices is interrupted. This internal setpoint can be adjusted using the potentiometer to maintain a different operating temperature under these circumstances if desired.

To Adjust The PIM Potentiometer Set-point:

1. From the View Menu, press and hold the **HOME** button for 3 seconds to display the **SETUP** Menu.
2. Using the **NEXT ITEM** or **ITEM BACK** buttons navigate to the **TOOLBOX** menu, then press the **ENTER** button to display the **ACCESS** menu.
3. Now use the **UP** or **DOWN** arrow buttons to select the **INSTALLER** setting.
4. Press the **HOME** button to return to the **TOOLBOX** menu, then use the **NEXT ITEM** or **ITEM BACK** buttons to navigate to the **SOURCE** menu.
5. Press **ENTER** to enter the source menu and use the **NEXT ITEM** or **ITEM BACK** buttons to navigate to the **OPERATOR** screen to display the potentiometer set-point.
6. Open the hinged upper panel of the control enclosure and locate the potentiometer on the PIM Ignition Module.
7. Using a small blade screwdriver, manually adjust the PIM Potentiometer to a desired stand-alone setpoint temperature as you view the adjusted temperature setting in the **OPERATOR** screen.
8. Exit the menu by pressing the **HOME** button.

19. TROUBLESHOOTING PROCEDURE

Before troubleshooting the system, check the following items:

- Verify all mechanical and electrical connections are secure and tight.
- Verify all system wiring is correct.
- Verify there is a proper system ground. The igniter, flame sensor, and ignition module must share a common ground with the burner. *Nuisance shutdowns are often caused by a poor or erratic ground.*
- Follow the “Initial Startup” instructions in section 15 as the first step in any troubleshooting.
- Verify that the system is powered and that the thermostat is calling for heat.
- If the control displays an error code on the red diagnostic LED, troubleshoot per Section 11.2 Alarm Messages – Diagnostic Codes. The LED will flash on for 1/10 second, then off for 2/5 second during a fault condition. The pause between fault codes is 8 seconds.

19.1. General Troubleshooting

Symptom	Probable Cause	Corrective Action
Starting or Pre-purge Failure	Power Supply	Check fuse and/or circuit breaker.
	On-Off Switch	Check if On-Off switch is illuminated when on. If not check panel fuse or incoming power.
	Temperature Control	Check that the operating temperature control is set higher than the temperature of the water heater.
	Remote enable/disable open	Enable water heater or place jumper between terminals R1-R2.
	Electronic Low Water Cut-off (Red LED is off)	Check internal ELWCO board. Red LED not lit indicates a failure. Manual reset is required.
	Gas Pressure Switches (when installed)	Gas pressure switches are attached to the gas train. Check for a tripped condition indicated by the manual reset button on the switch. Correct low gas pressure condition at the supply.
	High Temperature Limiting Device	The high limit device is set at 200°F. This device is located at the control flange on the top head of the tank. A high temperature condition may be caused by a failure of the Temperature Control sensors or the circulation pump. This failure requires manual reset.
Combustion Air blower		Check if fan control relay is closed.
		Blower motor may have failed.

	Blower Speed Tachometer (if blower is functioning)	Check for loose with between blower and control. Check blower speed measurement with Hz meter. Consult factory.
	Remote Proving Interlock	When terminal C1 and C2 are used a proving circuit for remote equipment, failure to close this circuit within the allotted time for Call-for-Heat will prevent operation and cause an alarm indication. Check for proper operation and proving of remote equipment.
	Loose Wire Connections	Check connections to all components.
	Power Supply	120 VAC is required for operation. Low voltage can cause failure. Voltage below 110 VAC must be investigated.
Flame Failure	Hot Surface Igniter	Check resistance at room temperature and then the amperage draw during heat-up. Replace if the measured amperage is not within 3.5 to 5.0 Amps or if measured resistance is not within 40-100 ohms (at room temperature). Also, check for overheating condition due to damaged refractory around igniter.
	Blower Speed Proving	EOS fault code will identify blower speed err. May be faulty blower.
	Gas Pressure	Check for proper inlet static and dynamic gas pressure, 3.5" W.C. minimum.
	Combustion	Inadequate flame signal may result from improper combustion. Adjust to proper CO2 levels. Inability to achieve proper CO2 levels may be caused by a defective gas valve, a defective regulator or blockage in the in the burner or combustion air supply.
	Grounding	Check for proper ground from flame control to burner housing.
	Condensate Accumulation	Check that the condensation path from the heater to the drain is not blocked. For a LC-Q Water Heater applied as a booster heater, verify inlet water general purpose water heater is 140°F or higher.

19.2. LED Error Code Listing

The following table lists the errors detected by the Platform Ignition Module (PIM) control and the associated LED indications.

Error Mode	LED Code	Recommended Troubleshooting
Normal Operation	Off	
ID Card Fault	Red LED Steady ON, Green	Check that the proper ID card is securely connected.

	Power LED OFF	Perform a power and system reset.
Internal Control Failure	Steady ON	Perform a power and system reset. If fault remains, replace the PIM.
Airflow Fault	1 flash	Check Blower operation.
False Flame Error	2 flashes	Check for proper gas valve closure. Clean burner and electrodes.
Ignition Lockout Fault	3 flashes	Check the gas supply. See Table 6-1 for more information.
Ignition Proving Current Fault	4 flashes	Check HSI element. Replace with a new element of the proper rating.
Low Voltage Fault	5 flashes	Check the 24 VAC input voltage. The voltage must be above 18.0 VAC
Vent Temperature Fault	6 flashes	Check for a blocked flue. Check the vent sensor and connections.
Hi-Limit Fault	7 flashes	Check for proper water flow. Check hi-limit and outlet sensors.
Sensor Fault	8 flashes	See the digital control display for fault identification. Check sensors and wiring.
Safety #1 Fault	9 flashes	Check gas pressure. Verify proper safety switch operation.
Water Pressure Fault	10 flashes	Check piping for leaks. Check pressure switch and connections.
Blower Speed Fault	11 flashes	Verify tachometer signal and connection on J5.
LWCO Fault	12 flashes	Check LWCO switch and connections. Check the water level.
Hi-Temperature Delta Fault	13 flashes	Check pump operation. Confirm proper water flow across heat exchanger.
Ft-bus Communications Fault	14 flashes	Verify the digital control display is connected and operating. Check the cable between the control display and J1.
Safety #2 Fault	15 flashes	Check gas pressure. Verify proper safety switch operation.

19.3. DigiTemp Troubleshooting

PROBLEM: Outlet temperature above setpoint

SOLUTION:

1. Ensure flow is above the minimum rated flow by opening the hot water valve on two to four fixtures being supplied with tempered water from the panel.
2. Ensure that the cold supply is flowing.
3. Check cold water temperature and ensure that it is lower than the setpoint temperature and supply line has no obstructions or closed valves restricting flow to DigiTemp
4. Unlock the control and then select the "Toolbox" to navigate to the "Toolbox" menu. From within the "Toolbox" menu use down arrow to highlight "Reset" then press enter. This will access "Reset" menu. Press the "YES" and then press accept. The controller will reset and begin start up sequence.

NOTE: Alternately, the control can be reset by opening and closing the circuit breaker switch and waiting 100 seconds to resume normal operation. Always use proper precautions when accessing circuit breaker box.

5. If problem persists after conducting the above outlined problem solving procedures, contact Powers, Technical Support at 800-669-5430 or info@PowersControls.com.

PROBLEM: Screen displays "---" instead of a measured value

SOLUTION:

1. Sensor is not connected or functioning properly.
2. Check the connection at the sensor and the connection within the control module.

⚠ WARNING!

BEFORE attempting to open the Control Module, a certified and qualified electrician MUST fully de-energize and disconnect all electrical power from DigiTemp

Perform required LOCK OUT/TAG OUT procedures.

When done, reconnecting and reenergizing DigiTemp MUST be performed by certified and qualified electrician.

3. Disconnect all power and fully de-energize DigiTemp BEFORE opening the control module. Open the Control Module and locate the sensor.
4. Unlock the control and Power up the system and then select the "Toolbox" to navigate to the "Toolbox" menu. From within the "Toolbox" menu use down arrow to highlight "Reset" then press **Enter**. This will access "Reset" menu. Press **YES** and then press **Accept**. The controller will reset and begin start up sequence.

NOTE: Alternately, the control can be reset the control by opening and closing the circuit breaker switch and waiting 100 seconds to resume normal operation. Always use proper precautions when accessing circuit breaker box.

5. Wait 1-5 minutes for the control to resume normal operation. Also, ensure that there is a load (at least one tap on the mixed outlet system) present while the control is resuming normal operation.
6. If problem persists after conducting the above outlined problem solving procedures, contact your Lync representative.

Error Codes

If the control detects a problem, an error will display on the Home screen and from within the “Toolbox” menu. To navigate to the “Toolbox” menu unlock the control and select “Toolbox”. Resolution is in the chart below.

Code	Description	Resolution	Control Behavior during Error Condition
1	NVM Error	Verify settings in applicable menu and / or load defaults.	Valve closes and operation ceases.
2	Mixed Outlet Sensor Error	Check the sensor wiring. Sensor may need to be replaced.	Valve closes and operation ceases.
3	High Temperature Alert	Check valve position. Considering increasing corresponding differential setting.	Operation continues.
4	Low Temperature Alert	Check valve position. Considering increasing corresponding differential setting.	Operation continues.

20. REPLACEMENT PARTS (INDOOR MODELS ONLY)

20.1. Blower & Burner Assembly (Optional components may not be shown)

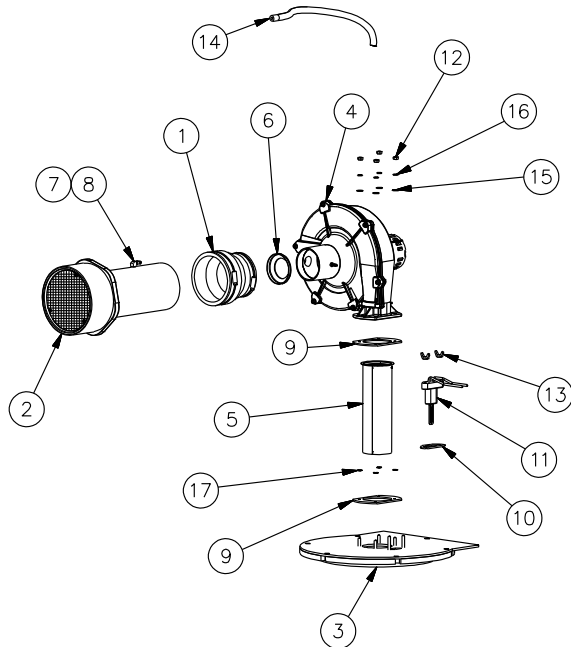


Figure 20-1: Water Heater Models LC4Q through LC8Q

ITEM	DESCRIPTION	LC4Q	LC5Q	LC6Q	LC7Q	LC8Q
1	ADAPTER, FLEXIBLE RUBBER 4 X 3	119469	119469	119469	119469	119469
2	ASSY, AIR INTAKE AGC/ACB WITH SCREEN	121852	121852	121852	121852	121852
3	ASSY, BULKHEAD AGC 400-800M W/INSULATION REV18	145177	145177	145177	145177	145177
4	BLOWER, FASCO #70530041 120-240V 4.0A 50/60HZ	140696	140696	140696	140696	140696
5	BURNER, WORGAS #PRX0113 70 X 395 MM	115276	115276	115276	115276	115276
6	CAP, ORIFICE 3 X 2 ID AGC/ACB	-	128984	128984	128985	128985
	CAP, ORIFICE 3 X 1 3/4 ID AGC	-	-	-	-	-
	CAP, ORIFICE 3 X 1 3/8 ID AGC	128983	-	-	-	-
7	CLAMP, HOSE 1/4 NYLON	120333	120333	120333	120333	120333
8	ELL, BRASS 1/8 NPT X 1/4 HOSE BARB	118016	118016	118016	118016	118016
9	GASKET, FLANGE BLOWER/BURNER 1/8	120493	120493	120493	120493	120493
10	GASKET, IGNITOR 1/8 232 CRANEGLAS Y271	111791	111791	111791	111791	111791
11	IGNITER, HOT SURFACE NORTON #271Y	107775	107775	107775	107775	107775
12	NUT, HEX 1/4 X 20 NC STEEL ZINC PLT	3475	3475	3475	3475	3475
13	NUT, WING 1/4 X 20 NC STEEL ZINC PLT	79972	79972	79972	79972	79972
14	KIT, SILICONE TUBING AGC 3/16 ID X 5/16 OD X 2 FT	128323	128323	128323	128323	128323

15	WASHER, FLAT 1/4 PLT	15607	15607	15607	15607	15607
16	WASHER, LOCK 1/4 PLT	3494	3494	3494	3494	3494
17	WASHER, STAR 1/4 SHAKEPROOF	38607	38607	38607	38607	38607

20.2. Blower & Burner Assembly, Model LC9Q & LC10Q

NOTE: Optional components may not be shown.

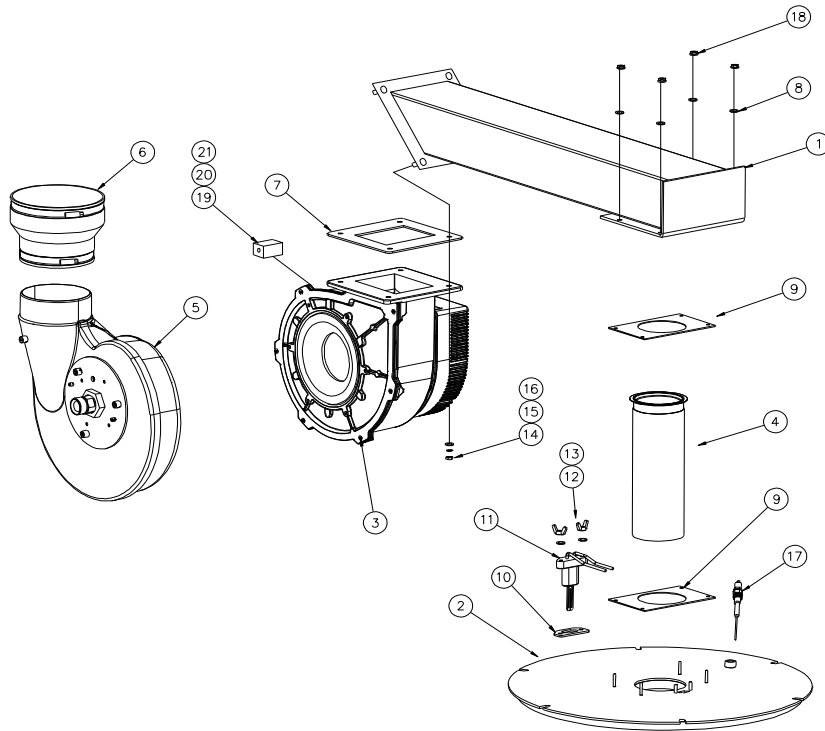


Figure 20-2: Blower & Burner Assembly

ITEM	DESCRIPTION	LC9Q	LC10Q
1	BURNER/BLOWER TRANSITION	151511	151511
2	BULKHEAD WITH INSULATION	145178	145178
3	BLOWER EBM G3G200	126337	126337
4	BURNER 100 X 348 MM	145168	145168
5	AIR INTAKE WHIRLWIND	126864	126864
6	FLEXIBLE RUBBER ADAPTER	126849	126849
7	BLOWER OUTLET GASKET	144548	144548
8	5/16 FLAT WASHER	138392	138392
9	BURNER GASKET	145270	145270
10	GASKET, IGNITOR 1/8 232 CRANEGLAS Y271	111791	111791
11	IGNITER, HOT SURFACE NORTON #271Y - 1 1/2"	107774	107774
12	WASHER, FLAT 1/4 PLT	15607	15607
13	NUT, WING 1/4 X 20 NC STEEL ZINC PLT	79972	79972

14	NUT, HEX 1/4 X 20 NC STEEL ZINC PLT	128323	128323
15	WASHER, FLAT 1/4 PLT	15607	15607
16	WASHER, LOCK 1/4 PLT	3494	3494
17	FLAME ELECTRODE CROWN	127816	127816
18	NUT, FLANGED LOCK 5/16	3476	3476
19	SCREW #8 – 32 X 1/4	144867	144867
20	BLOWER JUNCTION BASE	145356	145356
21	BLOWER JUNCTION COVER	145357	145357

20.3. Control Panel Components

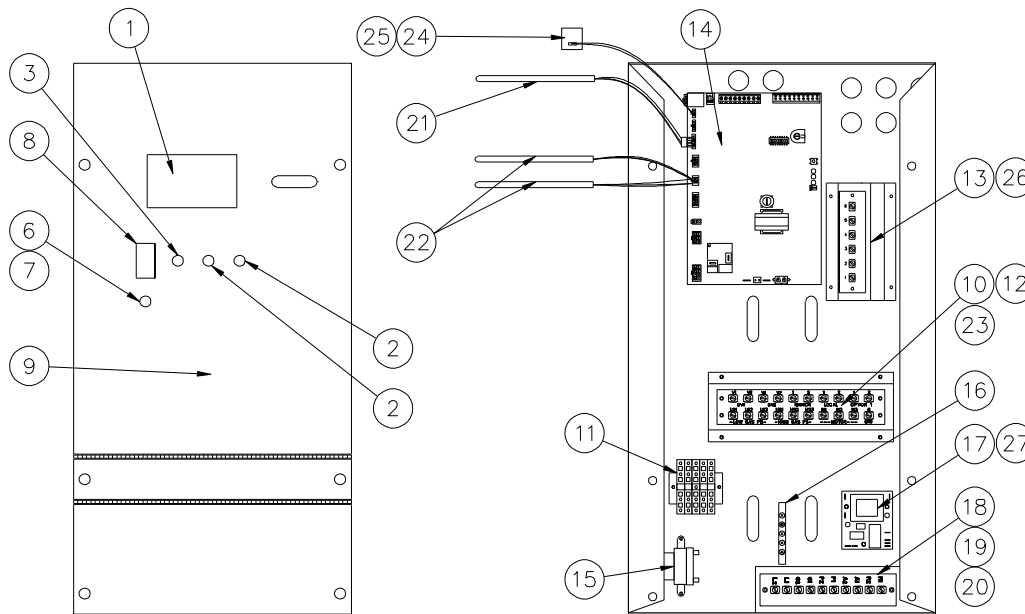


Figure 20-3: Control Panel Drawing

ITEM	DESCRIPTION	LC4Q	LC5Q	LC6Q	LC7Q	LC8Q	LC9Q	LC10Q
1	Kit, EOS BTCII User Interface	148911	147308	147309	147310	147311	147312	147313
2	Switch, SPST N.C. Momentary Contact Selecta #SS229	70573	70573	70573	70573	70573	70573	70573
3	Switch, SPST N.O. Momentary Contact Selecta #SS228	75908	75908	75908	75908	75908	75908	75908
4	Face Plate Decal	145166	145166	145166	145166	145166	126335	126335
5	Screw 10-24 X 1/2	125249	125249	125249	125249	125249	125249	125249
6	Fuseholder, Panel Type #HTB-28I	5613	5613	5613	5613	5613	5613	5613
7	Fuse, MDA 10 Amp Buss 250V	76267	76267	76267	76267	76267	76267	76267
8	Switch, Carling #LTILA51-6S-BL-AM-NBL-125N/LNDP	70565	70565	70565	70565	70565	70565	70565
9	Plate, Face AGC PIM/Digital Control Display	144569	144569	144569	144569	144569	145468	145468
10	Board, Terminal Elec-Tron #PV13080 20 Pole Feed	122346	122346	122346	122346	122346	122346	122346

ITEM	DESCRIPTION	LC4Q	LC5Q	LC6Q	LC7Q	LC8Q	LC9Q	LC10Q
11	Block, Terminal Wago #280-833 600V 20A DIN	122319	122319	122319	122319	122319	122319	122319
12	Jumper, Terminal Block Wago #280-402 23A	122320	122320	122320	122320	122320	122320	122320
13	Board, Terminal Elec-Tron #Es-70x Pv04075 6 Pole Feed Thru Type	103259	103259	103259	103259	103259	103259	103259
14	Kit, PIM Control	148412	147301	147302	147303	147304	147305	147306
15	Transformer, Step Down Triad #F5-24 115VAC 24VCT	126865	126865	126865	126865	126865	126865	126865
16	Bar, Ground Square D #PK5GTA 5 Pole	122321	122321	122321	122321	122321	122321	122321
17	LWCO, Protodesign #LW-3-C-1-A-03 120V	129013	129013	129013	129013	129013	129013	129013
18	Board, Terminal Elec-Tron #PV13140 10 Pole	140328	140328	140328	140328	140328	140328	140328
19	Bracket, Terminal Strip Mtg 3 X 6 for P/N 102011	121749	121749	121749	121749	121749	121749	121749
20	Jumper, Elec-Tron #ESJ-145	102467	102467	102467	102467	102467	102467	102467
21	Sensor, Thermistor Tekmar #91769 Direct Measure Dual	126090	126090	126090	126090	126090	126090	126090
22	Sensor, Thermistor Tekmar #91768 Direct Measure Single	126089	126089	126089	126089	126089	126089	126089
23	Jumper, Elec-Tron #ESJ-154	122746	122746	122746	122746	122746	122746	122746
24	Card, Pim Fenwal #05-900000 Water heater	143364	143364	143364	143364	143364	143365	143365
25	Card Cable Fenwal #05-900001-018	126537	126537	126537	126537	126537	126537	126537
26	Bracket, Terminal Strip Mtg 3 X 6 Angle Face for P/N 103259	145267	145267	145267	145267	145267	145267	145267
27	Probe, LWCO Warrick #3L1D002.75 w/1/8 MPT	58154	58154	58154	58154	58154	58154	58154

20.4. Gas Train Assembly

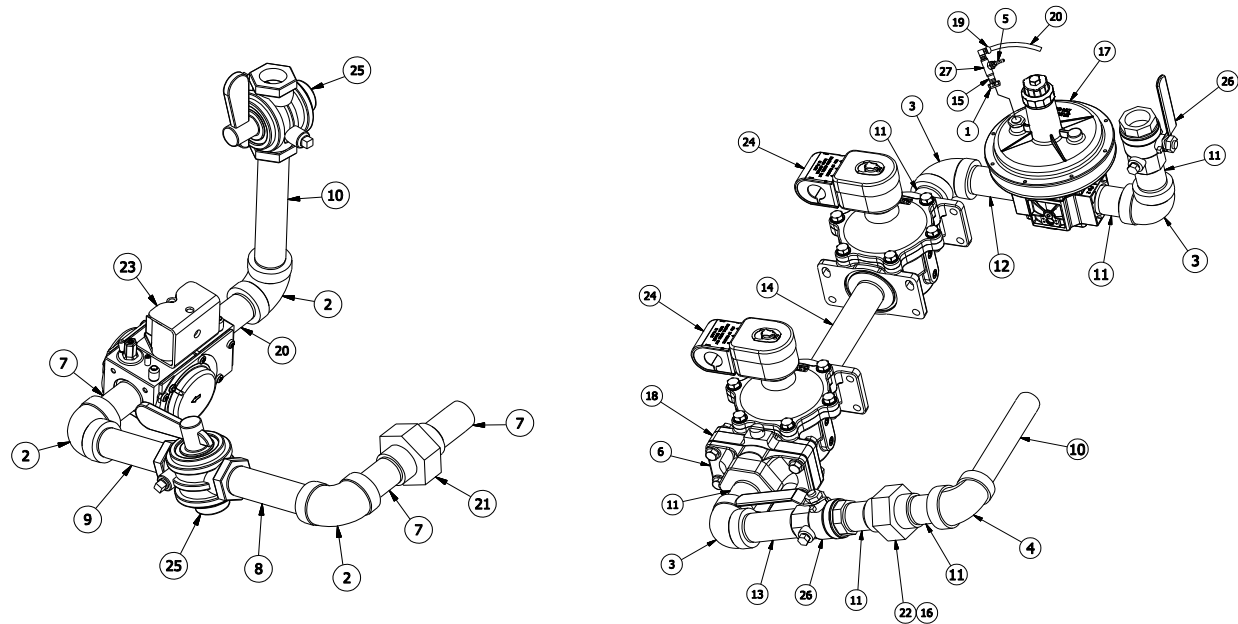


Figure 20-4: Gas Train Assembly, Water Heater Models LC4Q – LC8Q

ITEM	DESCRIPTION	LC4Q	LC5Q	LC6Q	LC7Q	LC8Q
1	BUSHING, BRASS 1/4 X 1/8	*	6547	6547	6547	6547
2	ELL, BLACK 90DEG 3/4	6160	*	*	*	*
3	ELL, BLACK 90DEG 1	*	6163	6163	6163	6163
4	ELL, BLACK 90DEG 1 X 3/4	*	6164	6164	6164	6164
5	FITTING, BRASS 1/8 NPT X 1/4 HOSE BARB	*	122828	122828	122828	122828
6	FLANGE, ADAPTER 1 ASCO #296659-002 INLET/OUTLET	*	115770	115770	115770	115770
7	NIPPLE, BLACK 3/4 X 2	5991	*	*	*	*
8	NIPPLE, BLACK 3/4 X 2 1/2	114154	*	*	*	*
9	NIPPLE, BLACK 3/4 X 3 1/2	114262	*	*	*	*
10	NIPPLE, BLACK 3/4 X 6	5995	5995	5995	5995	5995
11	NIPPLE, BLACK 1 X 2	*	6011	6011	6011	6011
12	NIPPLE, BLACK 1 X 3	*	6012	6012	6012	6012
13	NIPPLE, BLACK 1 X 3 1/2	*	6013	6013	6013	6013
14	NIPPLE, BLACK 1 X 7	*	6018	6018	6018	6018
15	NIPPLE, BRASS 1/8 X CL	*	6508	6508	6508	6508
16	ORIFICE, DISC 1.750 OD X 0.500 ID (Propane Gas)	*	123063	123063	123063	123063
	ORIFICE, DISC 1.750 OD X 0.625 ID (Natural Gas)	*	121791	121791	121791	121791
17	REGULATOR, 1 DUNGS #FRG710/6 ZERO GOVERNOR PROPORTIONATOR	*	79524	79524	79524	79524
18	SHUTTER, VALVE ASCO #HV426038001 1 TO 1 1/2 INCH	*	115786	115786	115786	115786
19	SNUBBER, 90DEG 1/4 TUBE X 1/8 MPT #80 ORIFICE ANTUNES #00200-0302	*	5196	5196	5196	5196
20	TUBING, ALUMINUM 1/4 .032 WALL X 50 FT COIL DEAD SOFT	*	3299	3299	3299	3299
21	UNION, BLACK 3/4	5928	*	*	*	*
22	UNION, BLACK 1	*	5929	5929	5929	5929

23	VALVE, GAS 3/4 EBM #55290.04007 TYPE GB-ND 057 D01 S20 XP	125504	*	*	*	*
24	VALVE, GAS 1 ASCO #JB8214250 110/120V 50/60AC	*	118269	118269	118269	118269
25	VALVE, SHUTOFF 3/4 KEY GAS #216-242111	5336	*	*	*	*
26	VALVE, SHUTOFF 1 GAS RUB #S82F41	*	148964	148964	148964	148964
27	TEE, BRASS 1/8	*	6437	6437	6437	6437

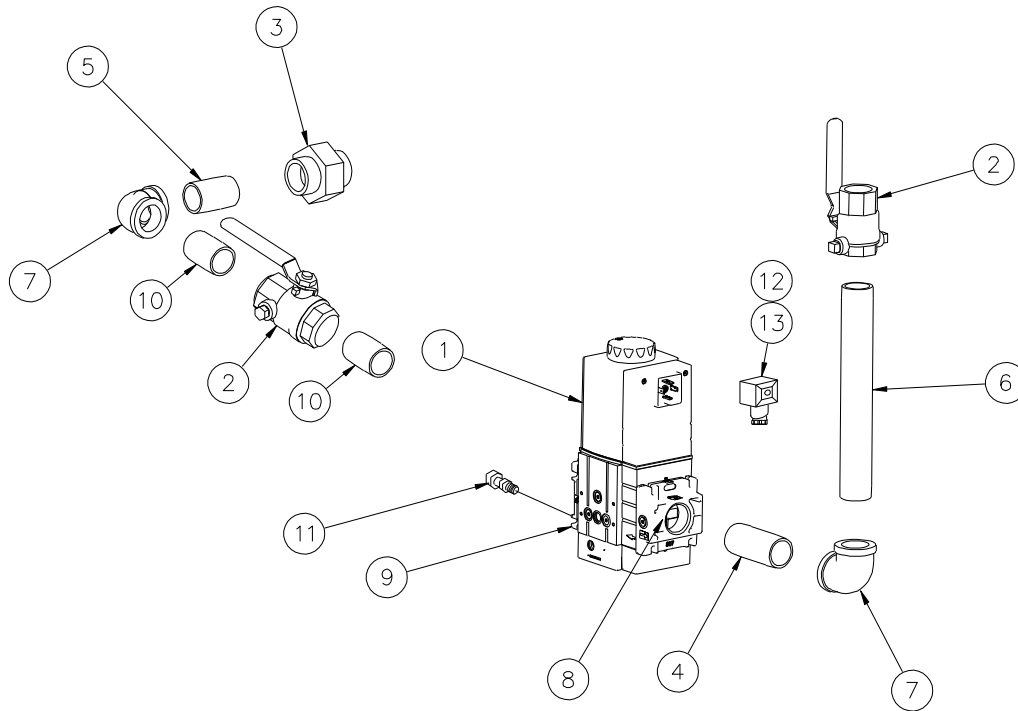


Figure 20-5L Gas Train Assembly, Water Heater Models LC9Q& LC10Q

ITEM	DESCRIPTION	LC9Q	LC10Q
1	VALVE, GAS DUNGS #259487 MBC SE 1000/602L S02 120VAC	109884	109884
2	VALVE, SHUTOFF 1 GAS RUB #S82F41	148964	148964
3	UNION, BLACK 1	5929	5929
4	NIPPLE, BLACK 1 X 2	6011	6011
5	NIPPLE, BLACK 1 X 3 1/2	6013	6013
6	NIPPLE, BLACK 1 X 9	6020	6020
7	ELL, BLACK 90DEG 1	6163	6163
8	FLANGE, VALVE 1 DUNGS #D221999	110308	110308
9	SHUTTER, FLANGE 1 DUNGS #255132	126862	126862
10	NIPPLE, BLACK 1 X CL	6009	6009
11	CONNECTOR, 1/8 MPT X 1/4 COMPRESSION	6480	6480
12	CONNECTOR, DIN DUNGS #210-319	114995	114995
13	ADAPTER, CONDUIT 1/2 DUNGS #240-671	117067	117067

20.5. Drain Valve – T & P Relief Valve – Integral Circulating Pump Assembly

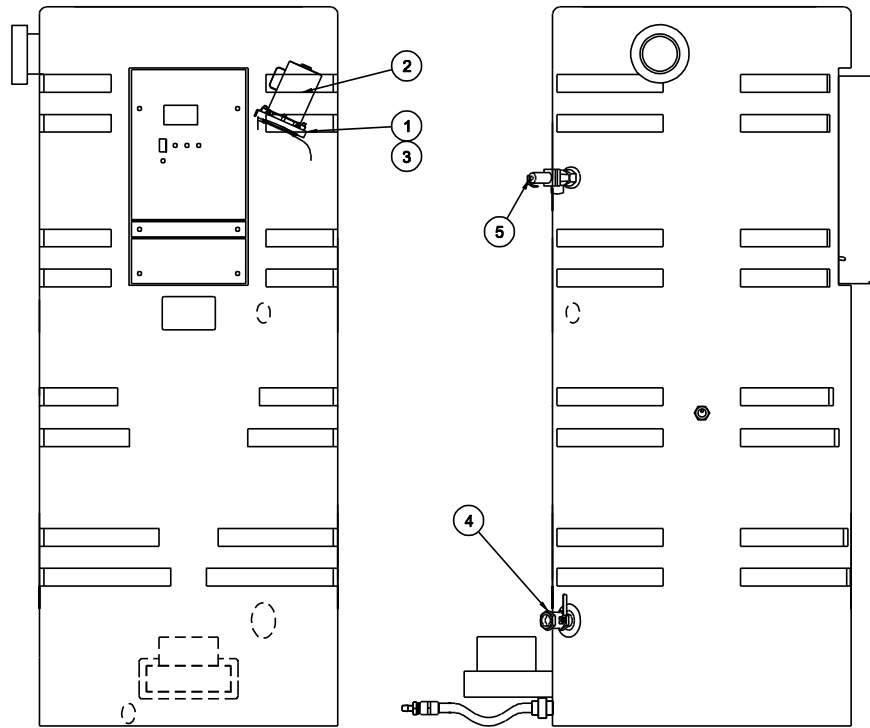


Figure 20-6: Drain and T&P Valve

ITEM	DESCRIPTION	LC4Q 130A-GCML	LC5Q - LC80Q 130A-GCML	LC9Q - LC10Q 130A-GCML
1	FLANGE, MTG BRONZE INTEGRAL PUMP PL 2 SIDE	119301	119301	119301
2	MOTOR, PUMP B & G #1BL113 MODEL #PL-75 115 VAC W/IMPELLER	120090	120090	120090
3	O-RING, GASKET 4.25 OD X 3.50 ID X .375	122423	122423	122423
4	VALVE, BALL 1 WATTS #LFFBV-3C BRASS THREADED 400 WOG	122394	122394	122394
5	VALVE, T & P RELIEF 1 WATTS	5432	709	73458

20.6. Condensate Drain Trap & Condensate Neutralizer

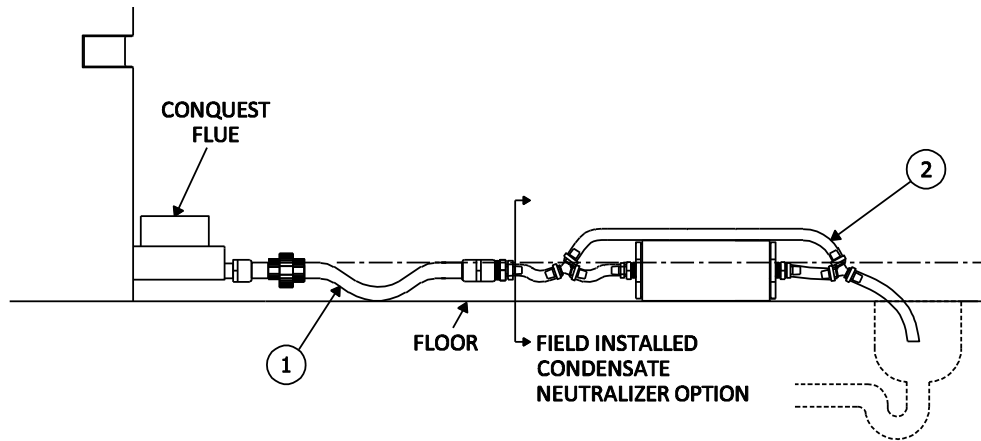


Figure 20-7: Condensate Drain trap

ITEM	DESCRIPTION	LC4Q 130A-GCML	LC5Q-LC10Q 130A-GCML
1	ASSY, COND DRAIN AGC 130 GAL 3/4 PVC	129230	140838
2	ASSY, CONDENSATE DRAIN NEUTRALIZATION 1/2	*140793	140794
		*tubing and tee fittings <u>not</u> included	

20.7. Component Wiring and Routing Details

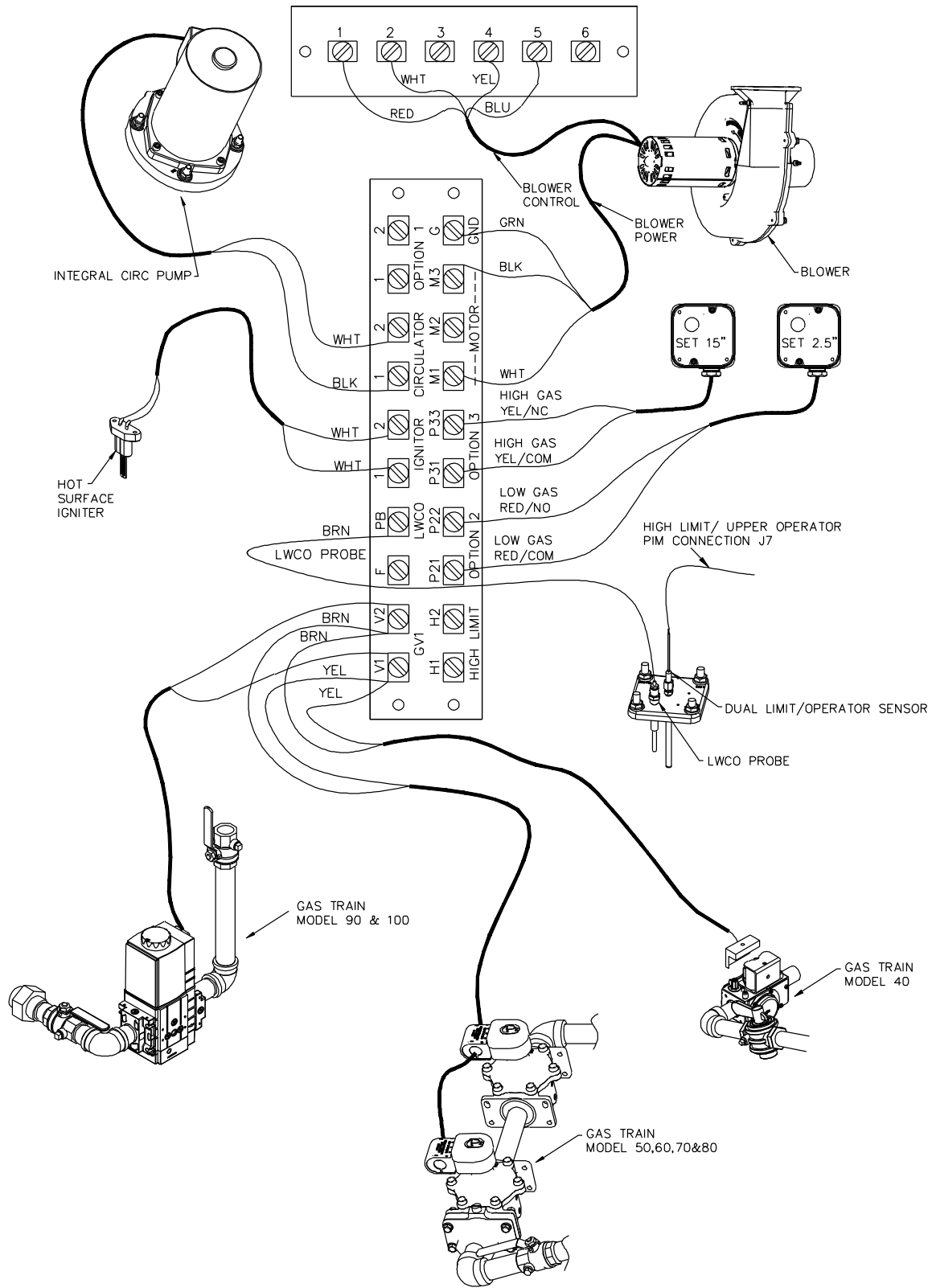


Figure 20-8 Wiring and Routing

20.8. AquaSolve Anti-Scale Part List

The AquaSolve Anti-Scale water treatment device consists of the following parts:

Part List			
Item	Qty.	Part #	Description
1	1	149692	Tank head only basket assembly is separate basket
2	2	144065	Flex hose 2" x 12"
3	1	144066	Riser and bottom distributor assembly
4a	1	144067	14" X 65" tank 4" top
4b	1	144068	16" X 65" tank 4" top

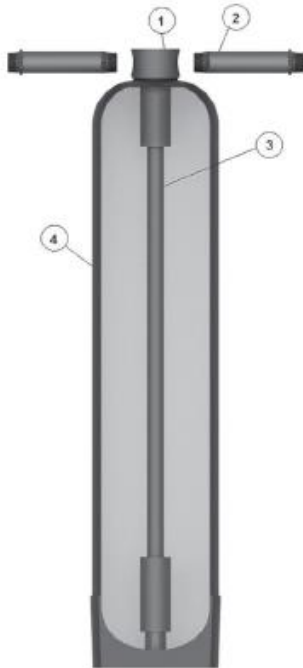


Figure 20-9 AquaSolve Anti-Scale Parts

For AquaSolve maintenance procedures, see Section 21.2: *AquaSolve Anti-Scale Maintenance*

20.9. DigiTemp Mixing Valve Part List

Replacement Part#	Description
6551290	Actuator Kit
6551291	High speed temperature sensor with wire kit
6551292	Controller kit

21. REQUIRED AND PERIODIC MAINTENANCE

21.1. General Periodic Maintenance

Listed below are items that must be checked periodically to ensure reliable operations. Maintenance must be performed by a qualified service or maintenance provider. To ensure proper maintenance, the following instructions should be posted near the LC-Q Water Heater and maintained in legible condition. Verify proper operation after servicing.

⚠ WARNING!

When servicing controls use exact factory-authorized replacement parts and label all wires prior to disconnection. Verify proper operation after servicing. Incorrect part substitution and wiring errors can cause damage, improper operation, fire, carbon monoxide, exposure to toxic fumes or other unsafe conditions that can result in fire, personal injury or death.

1. Examine the LC-Q Water Heater and venting system at least once a year. Check more often in first year to determine inspection interval.
 - a. Check all joints and pipe connections for tightness, corrosion or deterioration.
 - b. Check the electronic-ignition system for quick ignition and a proper flame signal.
 - c. Check all safety controls including thermostats for proper operation.
 - d. Check safety shut-off valves for operation and tightness.
 - e. Keep the unit area clear and free from combustible materials, gasoline and other flammable vapors and liquids.
 - f. Have the entire system, including, but not limited to, the burner, heat exchanger and venting system, periodically inspected by a qualified service agency.
2. Exposure to Dusty or Dirty Combustion Air: A unit installed in a dust or dirt contaminated atmosphere will require more frequent inspection and cleaning of the burner to prevent nuisance shutdowns or premature burner failure.
3. Any sign of soot on the heat exchanger or in the flue indicates the need for a combustion inspection. Properly installed and adjusted units seldom need heat exchanger cleaning. If soot has formed, the most common causes are restricted combustion air or excessive gas. A blocked heat exchanger can cause unsafe operation and will reduce efficiency. To inspect and clean the heat exchanger, a qualified service agent or installer should use the procedures described in items 4, 5 & 6 below.
4. All gaskets on disassembled components must be replaced on reassembly with exact, Factory Authorized, replacement parts only. Gasket kits are available from your Lync representative.
5. Burner and/or Heat Exchanger Inspection and Cleaning Procedure:
 - a. Turn off main power to unit.
 - b. Turn off gas supply.
 - c. Write notes and/or take pictures during this process to aid in correct reassembly.
 - d. Disconnect electrical components by disconnecting the wires going to terminal strip in the top control enclosure and the respective conduit connections on the back of the enclosure. If a wiring diagram is not attached to the back of the enclosure door or provided with the water heater, make careful note of the locations for all the wires.
 - e. Remove the metal cover on top of the unit by disconnecting the fasteners holding it to the plastic jacket.

- f. Remove the hot surface igniter, (HSI) from the burner. Be very careful not to bump the igniter element due to the fragility of the igniter.

6. For water heater models LC4Q through LC8Q:

- a. Break the unions that connect the gas train to the blower and the gas supply pipe. Remove the gas train.
- b. Disconnect the wires to the blower junction box.
- c. Remove the nuts that secure the burner top plate to the combustion chamber and lift the blower/burner assembly up until it is completely extracted from water heater. Inspect top plate refractory for damage. The refractory must provide a tight seal against the top edge of the burner deck.
- d. Inspect the burner surface for signs of cracking or thermal fatigue.
- e. If internal inspection of the burner is desired or the burner or blower must be replaced, remove the nuts that attach the blower to the burner top plate to remove blower. The burner can now be extracted. Be careful not to damage the refractory when removing the burner. With the burner removed, inspect the deck surface of the burner for lent or other blockage carried in the fuel air stream. If blockage has accumulated, use brush to loosen debris and use a vacuum or water to remove it from the burner cavities.
- f. Replace any damaged components and reassemble in reverse order. (4-5 ft/lbs).
- g. Cycle unit and test to verify all safety and operating controls are properly functioning and the burner top plate flange is free of leaks.

7. For water heater models LC9Q & LC10Q:

- a. Break the unions that connect the gas train to the blower and disconnect the electrical connector for the valve.
 - b. Remove the blower junction box cover and disconnected power and control cable connectors from blower. The blower can now be unbolted from the blower/burner transition.
 - c. Remove the nuts that secure the transition to the burner top plate and remove.
 - d. Remove the nuts that secure the burner top plate to the combustion chamber and lift the top plate/refractory assembly up until it is completely extracted from water heater.
 - e. Inspect top plate refractory for damage. The refractory must provide a tight seal against the top edge of the burner deck.
 - f. Inspect the burner surface for signs of cracking or thermal fatigue.
 - g. Replace any damaged components and reassemble in reverse order. (4-5 ft/lbs).
 - h. Cycle unit and test to verify all safety and operating controls are properly functioning and the burner top plate flange is free of leaks.
8. Inspect the integral circulation pump for gasket leaks or failure or the pump motor. Rotation of the pump is indicated by the cooling fan on the back of the motor. See Section 19: Troubleshooting Procedures for information about operation of the pump.
 9. Inspect low water cutoffs and relief valves for proper operation at every six months, or more often if indicated by inspection.
 10. The temperature and pressure relief valve should be checked at regular intervals to determine its condition for safe operation. Take proper precautions while operating relief valve to avoid contact with hot water coming out of the relief valve and to prevent water damage. The openings inside the valve may become inoperative. If the valve does not

open and close properly when tested, it must be replaced. If a relief valve discharges periodically, this may be due to thermal expansion in a closed water supply system. Contact the water supplier or local plumbing inspector on how to correct the situation. Do not plug the relief valve. Replace relief valve with a like kind or one meeting the requirements stated on the rating decal located adjacent to the relief valve mounting location.

11. Keep the area around the unit clear and free of combustible materials, gasoline and other flammable vapors and liquids.
12. Check frequently to be sure flow of combustion and ventilation air is unobstructed to unit.
13. When electrical controls are serviced or replaced, label all connections as they are removed, to know the proper placement on the replacement part.
14. All replacement parts are available through your Lync representative. If you need assistance identifying or contacting your local dealer, you may contact Lync representative directly at the address and telephone number on the first and last page of this manual.
15. If the unit is to be shut down for an extended period of time, the primary gas valve and the water supply should be shut off. When the unit is returned to service, any standing water in the tank must be flushed and a thorough inspection of all utilities and general unit condition should be conducted.

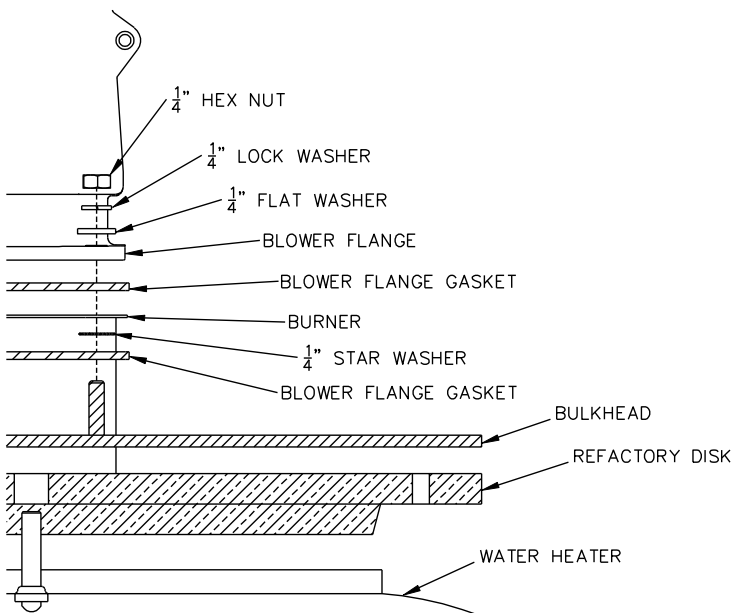


Figure 21-1: Burner Attachment Layering Illustration

21.2. Periodic Maintenance Schedule

Regular service by a qualified service agency and routine maintenance must be performed to ensure safe, reliable and efficient operation.

Yearly (Every 12 Months): Schedule annual service call by qualified service agency.

1. Check for piping leaks around pumps, relief valves, and tank connections. Repair, if found.

2. Check to ensure area is free from combustible materials, gasoline, and other flammable vapors or liquids.
3. Visually inspect venting system for proper function, deterioration or leakage.
4. Check temperature and pressure relief valve. Refer to manufacturer's instructions on valve.
5. Inspect condensate drain and ensure condensate is directed to an appropriate condensate system or drain, as required by local codes.
6. Check all operation of safety devices. Refer to manufacturer's instructions.
7. Inspect burner and gas train components for wear or deterioration.
8. Check the electronic-ignition system for quick ignition and proper flame signal.
9. Check gas safety shut-off valves for proper operation and tightness.
10. Follow startup procedure in the Installation & Maintenance Manual.

Semi-Annually (Every Six Months):

1. Test Low-water-cut-off (if equipped). Refer to manufacturer's instructions and reset.
2. Test the electronic-ignition flame failure detection system. Refer to manufacturer's instructions and reset.

Monthly:

1. Check condensate drain system and refill the condensate neutralizer with replacement media (change interval as needed).
2. Visually inspect venting system for proper function, deterioration or leakage.
3. Confirm the low-water cutoff and alarm are operating.

Daily:

1. Check for any obstruction to the flow of combustion or ventilation air to the unit.
2. Check to ensure area is free from combustible materials, gasoline, and other flammable vapors or liquids.
3. Check gauges, monitors and indicators.

As Required:

1. Flush and clean tank as required.

21.3. AquaSolve Anti-Scale Maintenance**Replacing the AquaSolve Anti-Scale Media**

1. Shut off the primary feed supply going to the AquaSolve Anti-Scale tank.
2. Open up a downstream spigot or faucet to release pressure in the tank and in the distribution lines before and after the system.
3. Shut the isolation valves immediately before and after the tank.

4. Disconnect the unions on the inlet and outlet of the tank, and then disconnect flex connectors from head.
5. Use a step ladder and strap wrench to remove the threaded head assembly connection (turning counter-clockwise) and remove complete upper assembly including grey-colored PVC strainer. Rinse parts in a nearby sink or bucket of water. Do not drain the tank.
6. Remove the distributor tube with the bottom strainer. Rinse these parts in a nearby sink or bucket of water.
7. Get a 6 ft. length of 3/4" sch. 40 PCV and a length of 1" polyvinyl hose. The length of hose depends on the distance to the nearest floor drain. (Both can be obtained at chain hardware stores.)
8. Insert one end of the pipe inside the hose and put the other end of the pipe into the top of the tank and down into the media. Put the other end of the hose inside a rice bag and put the rice bag on the floor drain.
9. Get a garden hose and put it on the open end of the poly hose to fill the hose and pipe with water. Air will bubble out of the tank. Once all the air is out of the hose and pipe, you can start a siphon to remove the media. Put the garden hose in the top of the tank and turn it on to keep the tank full of water. Push the pipe up and down in the media to get it all out. The rice bag will catch the media and allow the water to go down the drain.
10. Try not to be too aggressive when extracting the media. You need to take it out in small bites. If you let the whole pipe/ hose fill with media it will plug up. You need to let slugs of water flush out the pipe as you go.
11. When all the old media is removed turn off the garden hose and continue to siphon until the tank is about half full with water.
12. Using the step ladder again, reinstall the distributor tube with bottom strainer that was removed in step #6. Center the distributor tube in the bottom of the tank. Keeping any and all media from entering the distributor tube, carefully pour-in a new bag(s) of media that specifically meets the replacement requirement of the tank. For example, an M8416TM-COM system requires (x1) M8416-COM-RM Replacement Media.
13. Inspect the threaded connection on the top of the tank to ensure no loose beads of media are stuck to the internal threads. If visible, wipe away the beads with a damp cloth.
14. Re-attach head assembly onto distributor tube and thread the head assembly back onto the tank. Hand-tighten until the final turn when a strap wrench can help tighten the connection.
15. Reconnect the flex connectors and union connections.
16. Open the feed water inlet (slowly) to fill the tank.
17. Purge the air at a downstream faucet close to the system.
18. Once the tank is full, wait 4 hours for media to "hydrate". Put the tank in service.

Alternative Method for Replacing Media

Follow steps 1 – 6, above, then:

- Remove center distributor tube and lower basket and siphon all water from tank
- Lay tank down on its side and tip upside down while using hose to flush media out
- When all the old media is removed, stand tank back up and install in original position. Fill the tank so that it is about half full with water.

Then continue with steps 12 – 19.

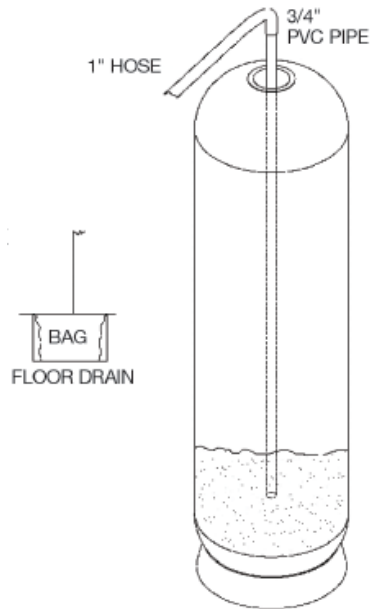


Figure 21-2 AquaSolve Anti-Scale Media

21.4. DigiTemp Testing, Inspection and Maintenance

Testing/Inspection

⚠ WARNING!

Need for Periodic Inspection/Maintenance: This product must be tested periodically in compliance with local codes, but at least once per year or more as service conditions warrant. All products must be retested once maintenance has been performed. Corrosive water conditions and/or unauthorized adjustments or repair could render the product ineffective for the service intended. Regular checking and cleaning of the product's internal and external components helps assure maximum life and proper product function.

Maintenance: Actuator and/or Valve Removal

NOTE: Valves and actuators are not field serviceable. They must be removed and replaced.

Tools Required:

- 10mm and 3/8" sockets, elbow and torque wrench. Not required if replacing both valve and actuator
- T30 Torx driver. Not required if replacing both valve and actuator
- 2.5mm Allen key. Not required if replacing both valve and actuator
- 1/8" (3.2mm, #2) slot screwdriver. Not required for valve only replacement
- Wire Stripper and snips. Not required for valve only replacement
- AC Voltmeter. Not required for valve only replacement
- Five to ten 4" zap straps (cable ties)
- 4" monkey wrenches (gas grips)
- 3" adjustable wrenches (shifting spanner)
- Teflon Tape. Not required for actuator only replacement

⚠ WARNING!

1. BEFORE attempting to open Control Module, a certified and qualified electrician MUST fully de-energize and disconnect all electrical power from DigiTemp
2. Perform required LOCK OUT/TAG OUT procedures.
3. When done, reconnection and reenergizing of DigiTemp MUST be performed by certified and qualified electrician.

1. Disconnect all power and fully de-energize DigiTemp.
2. Once de-energized and disconnected, the display will become inactive and the control box can be opened.

NOTE: Skip step 3 and 4 if only removing actuator for valve replacement.

3. Pop open the controller cover and then loosen two screw to expose actuator connection.

NOTE: As an additional safety check, once the box is open, use a voltmeter to confirm that the LC-Q Water Heater is de-energized by measuring the AC voltage across the “L” and “N” terminals (46 and 45 respectively). Alternatively, use a voltage detector to confirm that the unit is NOT energized.

4. Using the slot screwdriver loosen terminals 1 to 3 in the upper left side of the control module. Take note of the wire colors connected to each of the terminals.

This connection should be as follows:

- 1) Grey
- 2) Black
- 3) Red



5. Remove the Actuator Cables from the control box.
6. Remove the actuator from the valve as follows:
 - a) Using the T30 Torx driver remove the two actuator support plate T30 Torx screws b. Using the 10mm wrench loosen the actuator armature clamping nut
 - b) Using the T30 Torx driver completely remove the support plate T30 Torx screws
 - c) At this point the actuator should be free to slide off the valve stem away from the valve. If not, further loosen the actuator armature clamping nut
 - d) Carefully remove the actuator and set it aside.



Figure 21-3 Actuator

Valve Replacement

1. Follow actuator replacement above.
2. Remove bracket and controller from the valve
3. Un-plug sensor from the valve.
4. Remove valve and replace. Install bracket, controller and plug sensor.
5. **Install actuator.** Using the T30 Torx driver, install the support plate T30 Torx screws (see below) until snug. Ensure that the support plate bolts are sufficiently loose to allow for very slight movement between the support plate and the actuator. This play will allow the actuator to find the proper position when the armature clamping nut is tightened down.

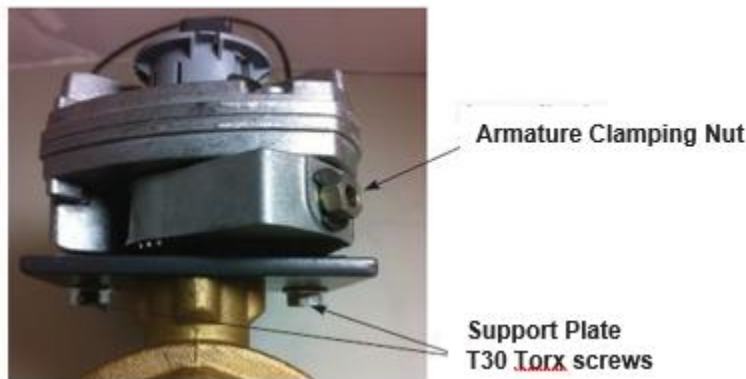


Figure 21-3 Actuator Installation

6. The actuator armature must be positioned in the un-powered rest position. Make sure "T" marking on the valve stem is pointing towards mixed outlet. See picture below.

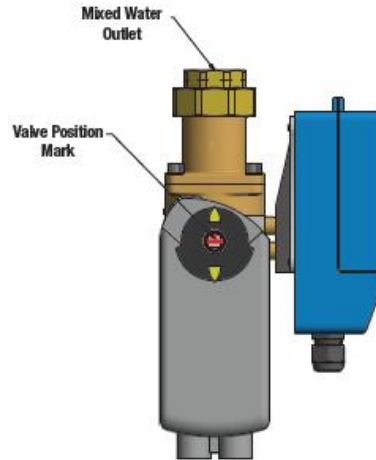


Figure 21-4 Actuator Armature Position

7. Tighten down the armature clamping nut using the 10mm socket and torque wrench to 50 in-lbs (5.65 N-m)
8. Using the 3/8" socket, elbow and torque wrench, torque the support plate nut to 50 in-lbs.

NOTE: Take caution not to over tighten and strip these nuts

9. Run the control wires up to the control along the same path as when removed.
10. Wire to terminal blocks as follows:

1. Grey
2. Black
3. Red



NOTE: Pink and orange actuator wires are not used by this control

11. Utilize cable ties to secure the wires and close the control module. Once the box is closed, re-energize the LC-Q Water Heater.
12. Resume normal operation and observe that the actuator and valve are now working properly