YORK BY JOHNSON CONTROLS	CENTRIFUGAL LIQUID CHILLERS	
INSTALLATION INSTRUCTIONS	Supersedes: 160.75-N1 (311)	Form 160.75-N1 (414)

MODEL YK (STYLE G)
R-134a

WITH OPTIVIEW™ CONTROL CENTER FOR ELECTRO-MECHANICAL STARTER, SOLID STATE STARTER AND VARIABLE SPEED DRIVE

LD15222

Metric Conversions

Issue Date:
April 30, 2014

IMPORTANT!

READ BEFORE PROCEEDING!

GENERAL SAFETY GUIDELINES

This equipment is a relatively complicated apparatus. During installation, operation maintenance or service, individuals may be exposed to certain components or conditions including, but not limited to: refrigerants, materials under pressure, rotating components, and both high and low voltage. Each of these items has the potential, if misused or handled improperly, to cause bodily injury or death. It is the obligation and responsibility of operating/service personnel to identify and recognize these inherent hazards, protect themselves, and proceed safely in completing their tasks. Failure to comply with any of these requirements could result in serious damage to the equipment and the property in which it is situated, as well as severe personal injury or death to themselves and people at the site.

This document is intended for use by owner-authorized operating/service personnel. It is expected that these individuals possess independent training that will enable them to perform their assigned tasks properly and safely. It is essential that, prior to performing any task on this equipment, this individual shall have read and understood this document and any referenced materials. This individual shall also be familiar with and comply with all applicable governmental standards and regulations pertaining to the task in question.

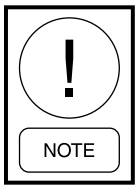
SAFETY SYMBOLS

The following symbols are used in this document to alert the reader to specific situations:

Indicates a possible hazardous situation which will result in death or serious injury if proper care is not taken.

Identifies a hazard which could lead to damage to the machine, damage to other equipment and/or environmental pollution if proper care is not taken or instructions and are not followed.

Indicates a potentially hazardous situation which will result in possible injuries or damage to equipment if proper care is not taken.



Highlights additional information useful to the technician in completing the work being performed properly.

External wiring, unless specified as an optional connection in the manufacturer's product line, is not to be connected inside the OptiView cabinet. Devices such as relays, switches, transducers and controls and any external wiring must not be installed inside the micro panel. All wiring must be in accordance with Johnson Controls' published specifications and must be performed only by a qualified electrician. Johnson Controls will NOT be responsible for damage/problems resulting from improper connections to the controls or application of improper control signals. Failure to follow this warning will void the manufacturer's warranty and cause serious damage to property or personal injury.

CHANGEABILITY OF THIS DOCUMENT

In complying with Johnson Controls' policy for continuous product improvement, the information contained in this document is subject to change without notice. Johnson Controls makes no commitment to update or provide current information automatically to the manual owner. Updated manuals, if applicable, can be obtained by contacting the nearest Johnson Controls Service office or accessing the Johnson Controls QuickLIT website at http://cgproducts.johnsoncontrols.com.

Operating/service personnel maintain responsibility for the applicability of these documents to the equipment. If there is any question regarding the applicability of these documents, the technician should verify whether the equipment has been modified and if current literature is available from the owner of the equipment prior to performing any work on the chiller.

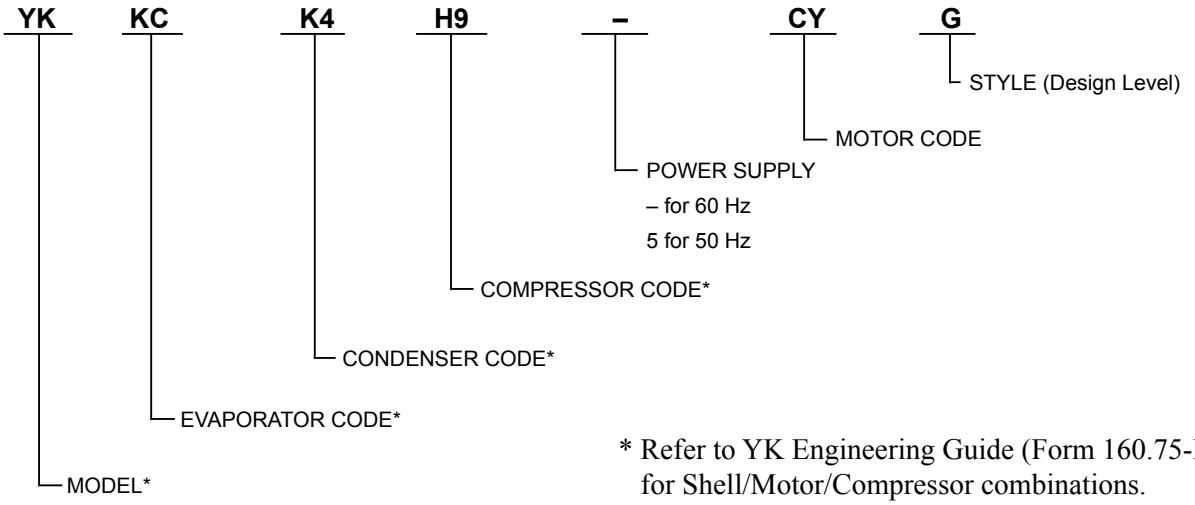
CHANGE BARS

Revisions made to this document are indicated with a line along the left or right hand column in the area the revision was made. These revisions are to technical information and any other changes in spelling, grammar or formatting are not included.

ASSOCIATED LITERATURE

MANUAL DESCRIPTION	FORM NUMBER
Solid State Starter (Mod "B") – Operation and Maintenance	160.00-O2
Variable Speed Drive – Operation	160.00-O1
Installation – Unit	160.54-N1
Operation – OptiView Control Panel	160.54-O1
Renewal Parts – Unit	160.75-RP1
Renewal Parts – OptiView Control Center	160.54-RP1
Wiring Diagram – YK Chiller (Style G) Field Control Modifications	160.75-PW4
Wiring Diagram – YK Chiller (Style G) OptiView Control Center with Remote Low or Medium Voltage EMS	160.75-PW5
Wiring Diagram – YK Chiller (Style G) OptiView Control Center with Unit Mounted Low or Medium Voltage SSS, Unit Mounted Low Voltage VSD with Modbus, or Remote Medium Voltage VSD	160.75-PW6
Wiring Diagram – YK Chiller (Style G) OptiView Control Center with LTC I/O Board with Remote Low or Medium Voltage EMS	160.75-PW7
Wiring Diagram – YK Chiller (Style G) OptiView Control Center with LTC I/O Board with Unit Mounted Low or Medium Voltage SSS, Unit Mounted Low Voltage VSD with Modbus or Remote Medium Voltage VSD	160.75-PW8
Maintenance Requirements Log Sheets	160.54-MR1
Installation and ReAssembly - Unit	160.75-N3
Operation - Unit	160.75-O1

NOMENCLATURE



* Refer to YK Engineering Guide (Form 160.75-EG1) for Shell/Motor/Compressor combinations.

LIST OF FIGURES

LIST OF TABLES

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SECTION 1 - INTRODUCTION

GENERAL

This manual describes the installation of a YORK YK Mod "G" Centrifugal Chiller. This unit can be shipped as a single factory assembled, piped, wired package, requiring a minimum of field labor to make chilled water connections, condenser water connections, refrigerant atmospheric relief connections, and electrical power connections. Refrigerant and oil charges are shipped separately unless optional condenser isolation valves are ordered.

Chillers can also be shipped dismantled when required by rigging conditions, but generally it is more economical to enlarge access openings to accommodate the factory assembled unit. Chillers shipped dismantled MUST be field assembled under the supervision of a Johnson Controls representative, but otherwise installation will be as described in this instruction.

FIELD ASSEMBLED UNITS ONLY

Use *Unit - Installation Instructions (Form 160.75-N3)* in conjunction with this installation instruction. This instruction will be furnished with all units that are to be field assembled.

The services of a Johnson Controls representative will be furnished to check the installation, supervise the initial start-up and operation of all chillers installed within the Continental United States.

The Johnson Controls Warranty may be voided if the following restrictions are not adhered to:

1. No valves or connections should be opened under any circumstances because such action will result in loss of the factory nitrogen charge.
2. Do not dismantle or open the chiller for any reason except under the supervision of a Johnson Controls representative.
3. When units are shipped dismantled, notify the nearest Johnson Controls office in ample time for a Johnson Controls representative to supervise rigging the unit to its operating position and the assembly of components.
4. Do not make final power supply connections to the compressor motor or control center.

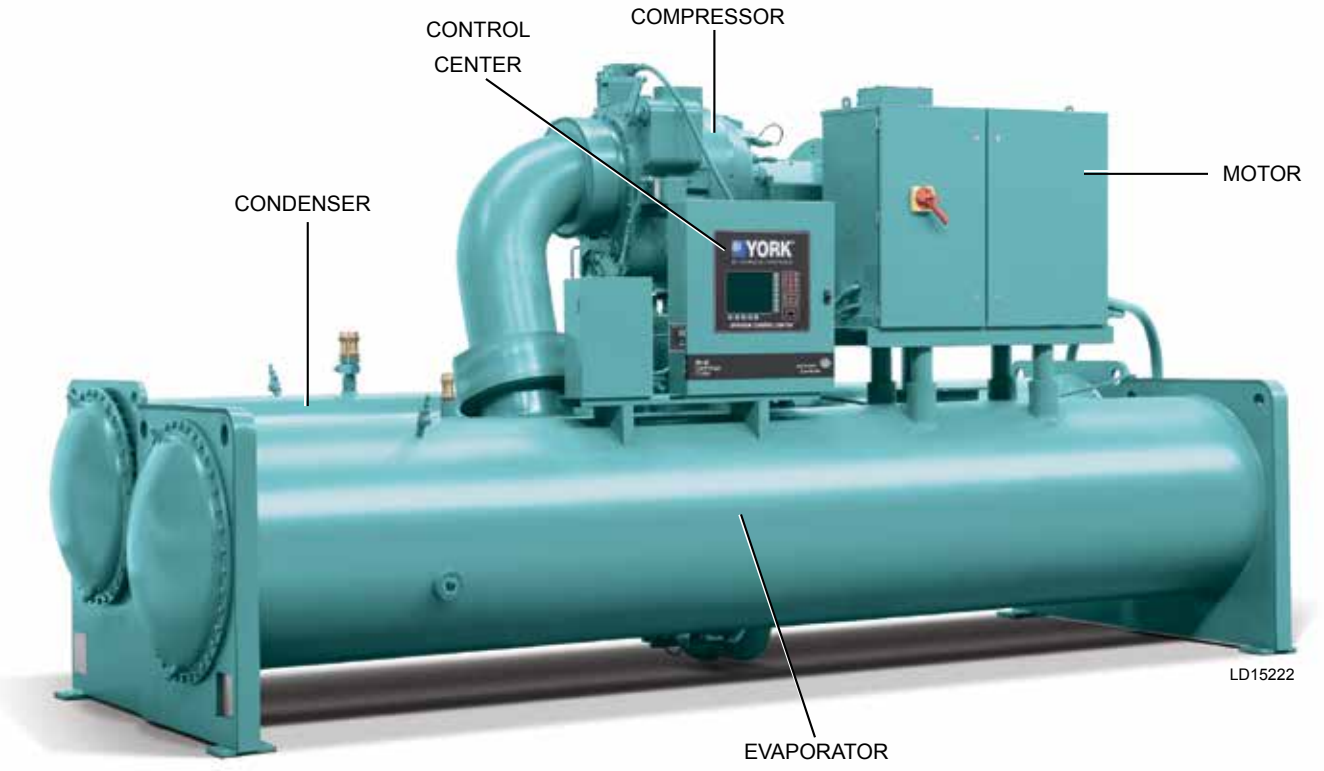


FIGURE 1 - MODEL YK CHILLER

5. Do not charge the compressor with oil.
6. Do not charge the unit with refrigerant.
7. Do not attempt to start the system.
8. Do not run hot water (110°F / 43°C max) or steam through the evaporator or condenser at any time.

SHIPMENT

The chiller may be ordered and shipped in any of the following forms:

Form 1 – Factory Assembled Unit, complete with motor, refrigerant and oil charges.

- The motor/compressor assembly mounted, with all necessary interconnecting piping assembled. OptiView™ Control Center is mounted on the unit. Complete unit factory leak tested, evacuated and charged with R-134A.

  An optional Solid State Starter or Variable Speed Drive can be factory mounted and wired.

- Miscellaneous material – Four (4) vibration isolation pads (or optional spring isolators and brackets). K7 units will be shipped with 8 Vibration Isolation Pads.

Form 2 – Factory Assembled Unit, complete with motor (refrigerant and oil charges shipped separately).

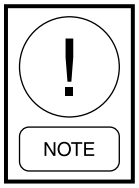
- The motor/compressor assembly mounted, with all necessary interconnecting piping assembled. OptiView™ Control Center is mounted on the unit. Complete unit factory leak tested, evacuated and charged with holding charge of nitrogen.

  An optional Solid State Starter or Variable Speed Drive can be factory mounted and wired.

- Miscellaneous material – Four (4) vibration isolation pads (or optional spring isolators). K7 units will be shipped with 8 Vibration Isolation Pads.

Form 3 – Driveline Separate From Shells – Shipped as two major assemblies. Unit first factory assembled, refrigerant piped, wired and leak tested; then dismantled for shipment.

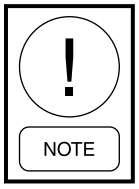
- Compressor/motor assembly removed from shells and skidded. Evaporator/condenser is not skidded.
- All wiring integral with compressor is left on it, and all conduit is left on shell. All openings on compressor, oil separator, and shell are closed and charged with dry nitrogen (2 to 3 PSIG) (115/122 kPa).
- Miscellaneous packaging of control center, tubing, water temperature controls, wiring, oil, isolators, solid state starter (option), etc.; refrigerant charge shipped separately.



Units shipped dismantled MUST be reassembled by, or under the supervision of, a Johnson Controls representative. Refer to Installation - Unit (Form 160.75-N3)

Form 7 – Split Shells – Shipped as three major assemblies. Unit first factory assembled, refrigerant piped, wired and leak tested; then dismantled for shipment.

- Compressor/motor assembly removed from shells and skidded.
- Evaporator and condenser shells are separated at tube sheets and are not skidded. Refrigerant lines between shells are flanged and capped, requiring no welding.
- All wiring integral with compressor is left on it. All wiring harnesses on shells are removed. All openings on compressor and shells are closed and charged with dry nitrogen (2 to 3 psig) (115/122 kPa).
- Miscellaneous packaging of control center, tubing, water temperature controls, wiring, oil isolators, solid state starter (option), etc.; refrigerant charge shipped separately.



Units shipped dismantled MUST be reassembled by, or under the supervision of, a Johnson Controls representative. Refer to Installation - Unit (Form 160.75-N3)

When more than one chiller is involved, the major parts of each unit will be marked to prevent mixing of assemblies. (Piping and Wiring Drawings to be furnished by Johnson Controls)

INSPECTION – DAMAGE – SHORTAGE

The unit shipment should be checked on arrival to see that all major pieces, boxes and crates are received. Each unit should be checked on the trailer or rail car when received, before unloading, for any visible signs of damage. Any damage or signs of possible damage must be reported to the transportation company immediately for their inspection. Johnson Controls will not be responsible for any damage in shipment, at job site, or loss of parts. (Refer to Shipping Damage Claims, Form 50.15-NM.)

When received at the job site all containers should be opened and contents checked against the packing list. Any material shortage should be reported to Johnson Controls immediately. (Refer to Shipping Damage Claims, Form 50.15-NM.)

CHILLER DATA PLATE

A unit data plate is mounted on the control center assembly of each unit, giving unit model number; design working pressure; water passes; refrigerant charge; serial numbers; and motor power characteristics and connection diagrams.

Additional information may be found on the motor data plate. This information should be included when contacting the factory on any problem relating to the motor.

RIGGING

The complete standard chiller is shipped without skids. (When optional skids are used it may be necessary to remove the skids so riggers skates can be used under the unit end sheets to reduce overall height.)

Each unit has four (4) lifting holes (two in each end) in the end sheets which should be used to lift the unit.

Care should be taken at all times during rigging and handling of the chiller to avoid damage to the unit and its external connections. Lift only using holes shown in *Figure 2 on Page 9*.

Do not lift the unit with slings around motor/compressor assembly or by means of eyebolts in the tapped holes of the compressor motor assembly. Do not turn a unit on its side for rigging. Do not rig vertically.

The rigging and operating weights and overall dimensions are given on pages 22 thru 40 as a guide in determining the clearances required for rigging. Add 6" (15 cm) to overall height for optional skidded unit.

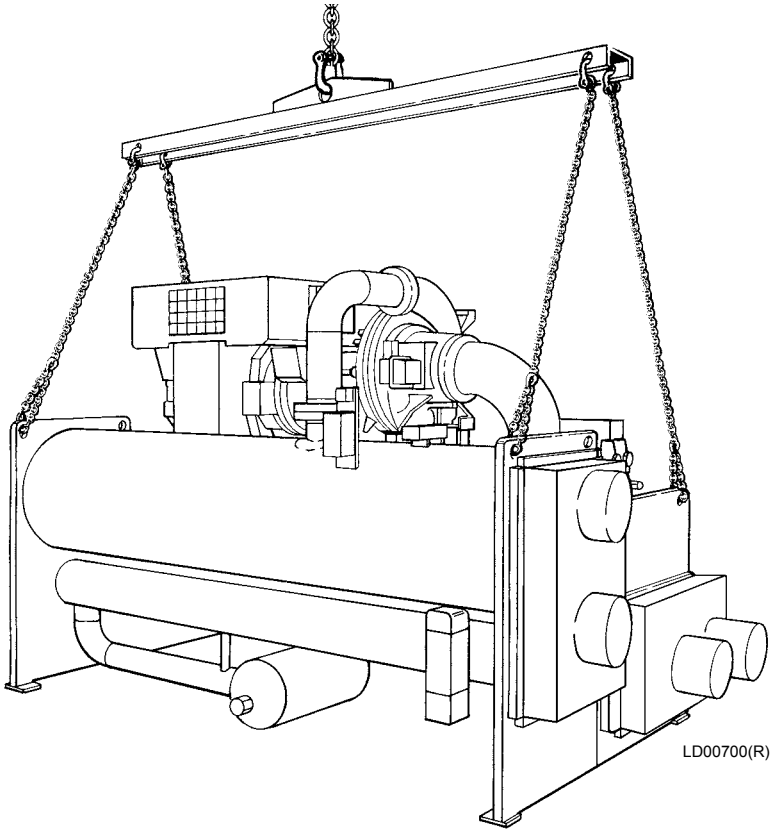


FIGURE 2 - RIGGING

LOCATION

YORK Chillers are furnished with vibration isolator mounts for basement or ground level installations. Units may be located on upper floor levels providing the floor is capable of supporting the total unit operating weight and optional spring isolators are used.

Sufficient clearance to facilitate normal service and maintenance work must be provided all around and above the unit and particularly space provided at either end to permit cleaning or replacement of evaporator and condenser tubes – see Clearance. A doorway or other sufficiently large opening properly located may be used. The chiller should be located in an indoor location where temperatures range from 40°F to 110°F (4.4°C to 43.3°C).

MOTORS

The YK open motor is air cooled. Check state, local and other codes for ventilation requirements.

FOUNDATION

A level floor, mounting pad or foundation must be provided by others, capable of supporting the operating weight of the unit.

CLEARANCE

Clearances should be adhered to as follows:

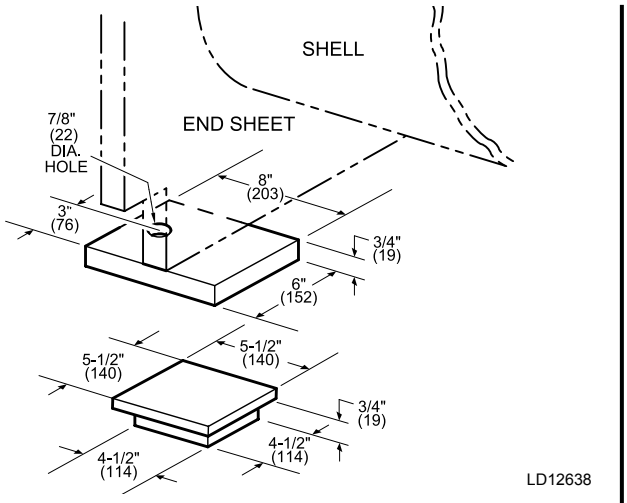
- Rear and above unit – 2 ft (61 cm).
- Front of unit – 3 ft (91 cm).
- Tube Removal – 14 ft.* (4.3 m) (either end)

* 16 ft (4.9 meters) on shell codes Q-Q, N-N, R-R, X-T and X-X.

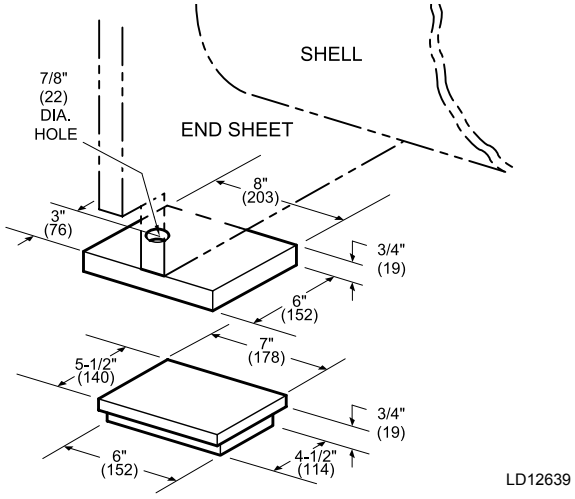
** 18 ft (5.5 meters) on shell code S-S, S-V, Z-Z.

*** 22 ft (6.7 meters) on shell code W-W.

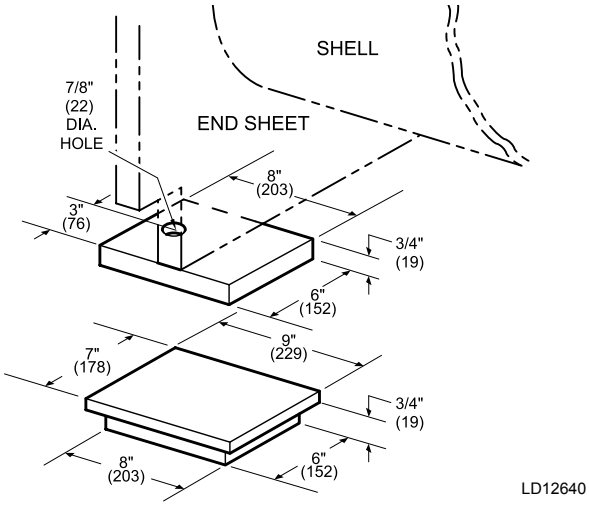
ALL DIMENSIONS ARE IN INCHES (MM)



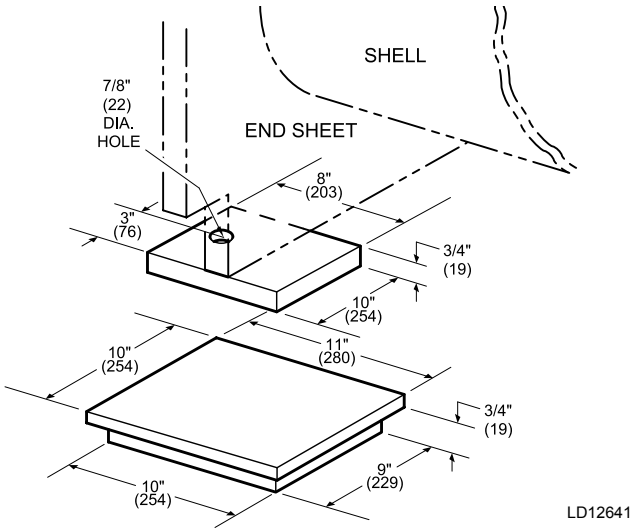
UNIT WEIGHT UP TO 16,365 Lbs (7,423 Kgs)



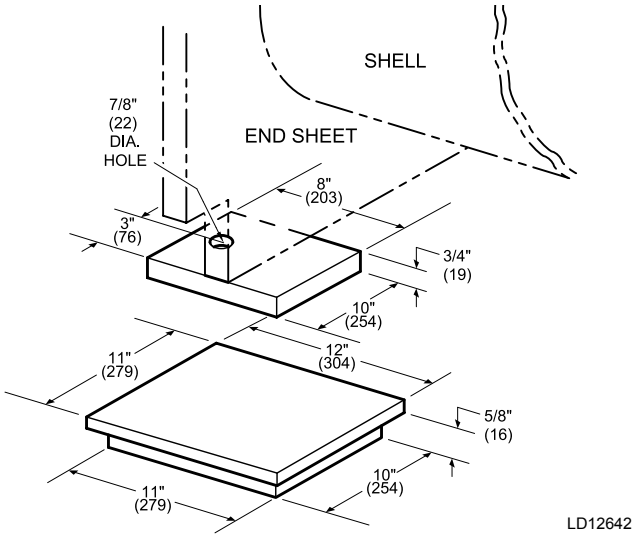
UNIT WEIGHT 16,366 - 28,835 Lbs (7,424 - 13,080 Kgs)



UNIT WEIGHT 28,836 - 53,530 Lbs (13,081 - 24,281 Kgs)



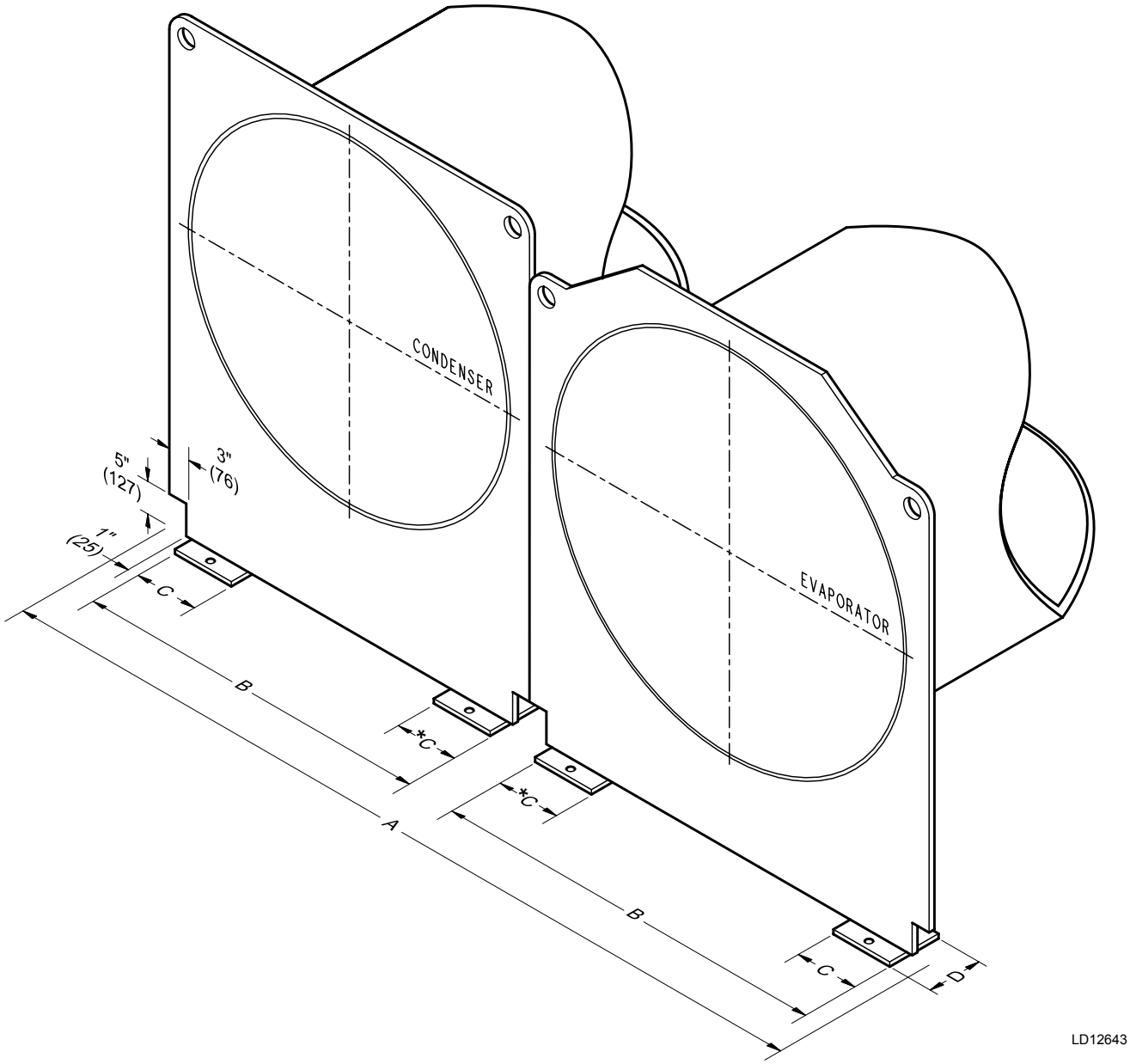
UNIT WEIGHT 53,531 - 100,464 Lbs (45,570 - 58,968 Kgs)



UNIT WEIGHT 100,465 - 130,000 Lbs (45,570 - 58,967 Kgs)

FIGURE 3 - NEOPRENE ISOLATORS

ALL DIMENSIONS ARE IN INCHES (MM)



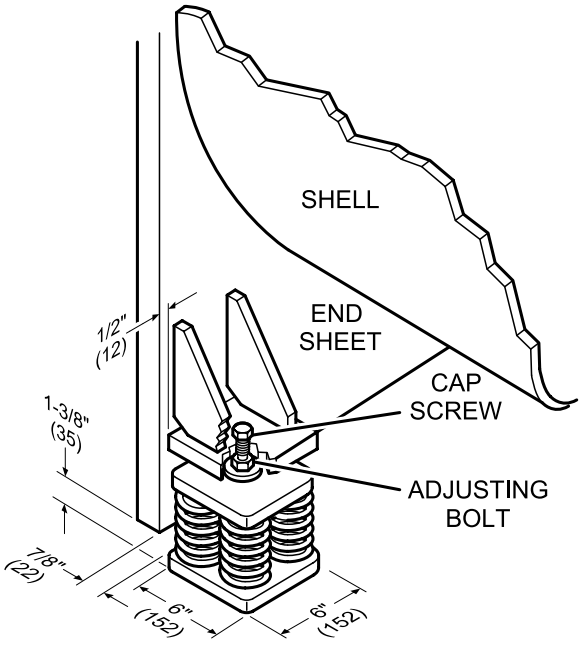
LD12643

COMPRESSOR	UNIT WEIGHT	DIM "A"	DIM "B"	DIM "C"	DIM "D"
Q, P, H & K1 - K4	Up To 16,365 Lbs (7,423 Kgs)	See Figures 11-16	See Figures 11-16	6" (152mm)	8" (203mm)
	16,366 - 28,835 Lbs (7,424 - 13,08 Kgs)	See Figures 11-16	See Figures 11-16	6" (152mm)	8" (203mm)
	28,836 - 53,530 Lbs (13,081 - 24,281 Kgs)	See Figures 11-16	See Figures 11-16	6" (152mm)	8" (203mm)
	53,531 - 100,464 Lbs (24,281 - 45,569 Kgs)	See Figures 11-16	See Figures 11-16	10" (254mm)	8" (203mm)
	100,465 - 130,000 Lbs (45,570 - 58,967 Kgs)	See Figures 11-16	See Figures 11-16	10" (254mm)	8" (203mm)
*K7	–	See Figures 15-16	See Figures 15-16	10" (254mm)	11" (280mm)

* Isolator quantity is 8 when K7 Compressor is supplied.

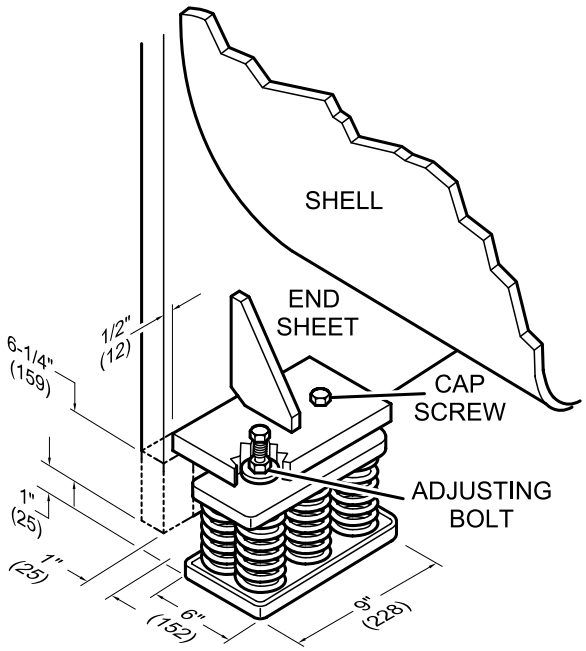
FIGURE 4 - NEOPRENE ISOLATORS

ALL DIMENSIONS ARE IN INCHES (MM)



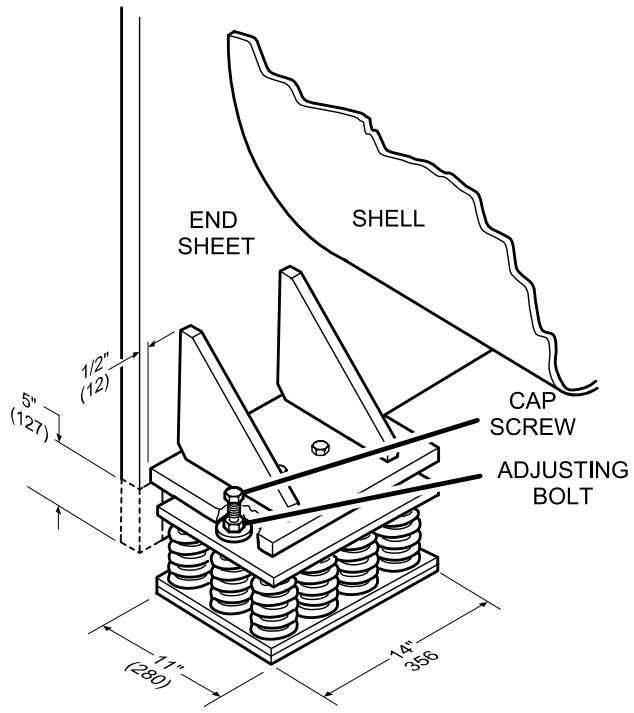
4-SPRING ISOLATORS
UNIT WEIGHT
10,000 Lbs UP TO 35,009 Lbs
(4,536 Kgs UP TO 15,880 Kgs)

LD126544



6-SPRING ISOLATORS
UNIT WEIGHT
35,010 Lbs UP TO 58,349 Lbs
(15,881 Kgs UP TO 26,467 Kgs)

LD12645



12-SPRING ISOLATORS
UNIT WEIGHT
89,341 Lbs UP TO 115,000 Lbs
(40,252 Kgs UP TO 52,164 Kgs)

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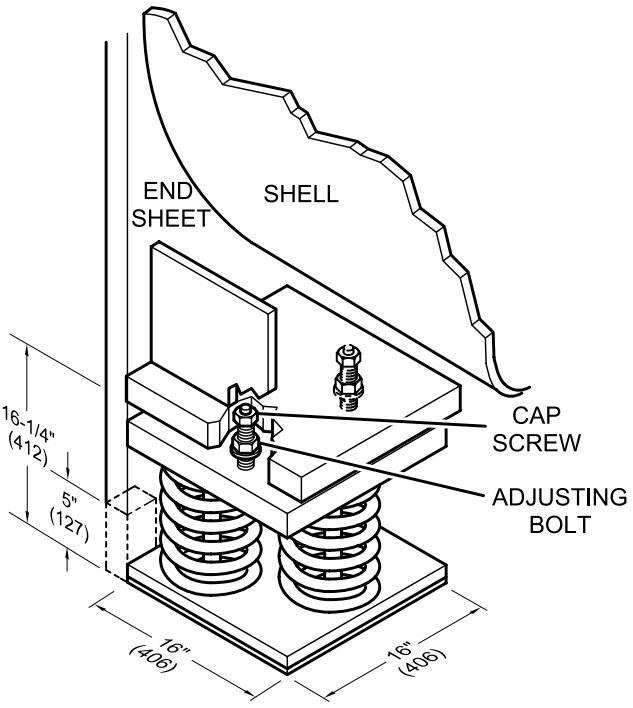
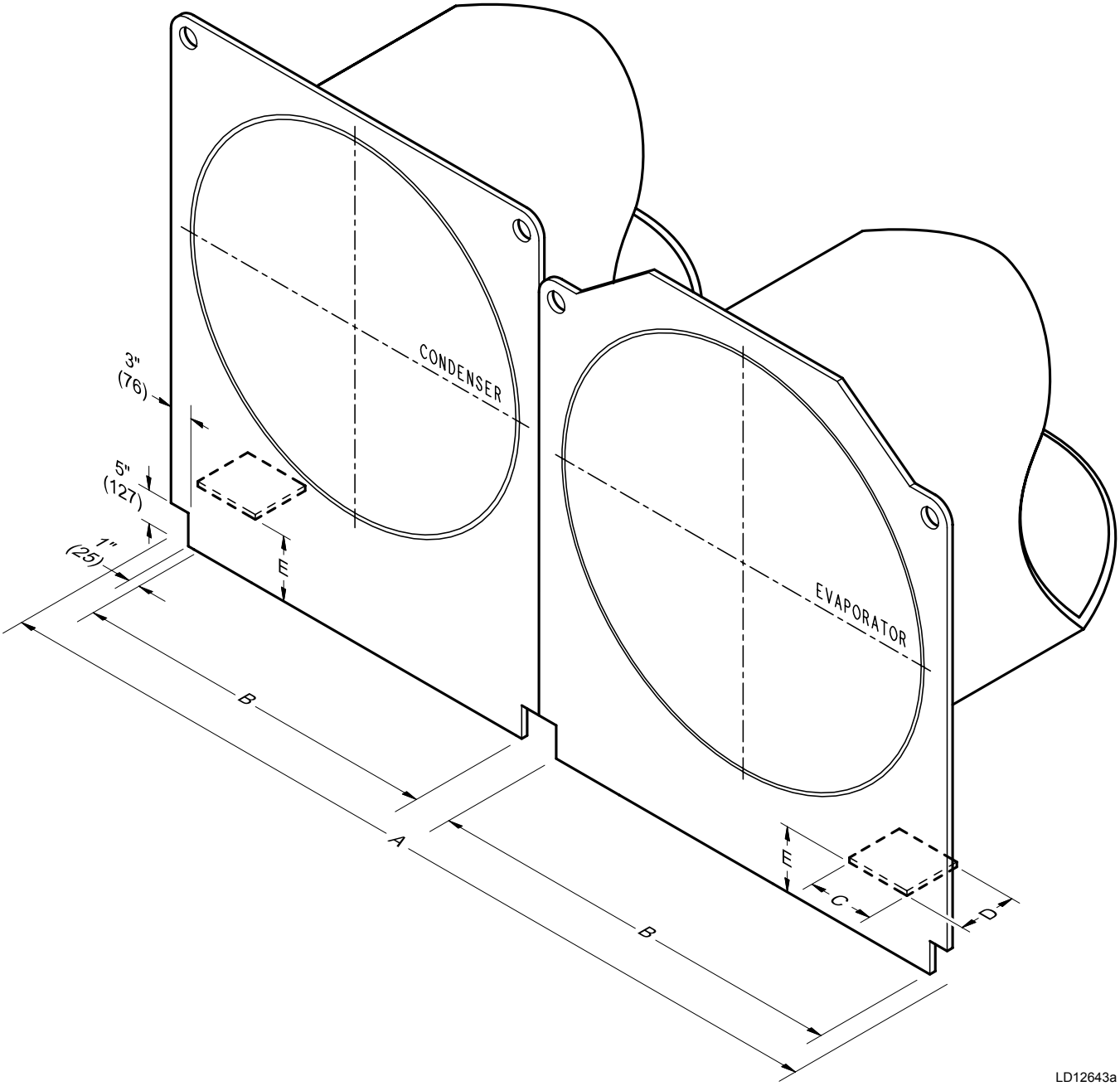


3-SPRING ISOLATORS
UNIT WEIGHT
115,000 Lbs. UP TO 190,000 Lbs
(52,163 Kgs UP TO 86,182 Kgs)

LD12647

FIGURE 5 - SPRING ISOLATORS

ALL DIMENSIONS ARE IN INCHES (MM)



LD12643a

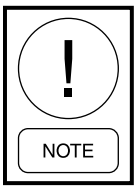
UNIT WEIGHT	DIM "A"	DIM "B"	DIM "C"	DIM "D"	DIM "E"
10,000 - 35,009 Lbs (4,536 - 15,880 Kgs)	See Figures 11-16	See Figures 11-16	6" (152)	6-7/8" (175)	5-1/2" (140)
35,010 - 58,349 Lbs (15,881 - 26,467 Kgs)	See Figures 11-16	See Figures 11-16	9" (229)	7" (178)	6-1/4" (159)
89,341 - 115,000 Lbs (40,252 - 52,164 Kgs)	See Figures 11-16	See Figures 11-16	13-1/2" (343)	8" (203)	5" (127)
115,000 - 190,000 Lbs (52,163 - 86,182 Kgs)	See Figures 11-16	See Figures 11-16	16" (406)	17" (432)	16-1/4" (413)

FIGURE 6 - SPRING ISOLATORS

SECTION 2 - INSTALLATION

RIGGING UNIT TO FINAL LOCATION

Rig the unit to its final location on the floor or mounting pad, lift the unit (or shell assembly) by means of an overhead lift and lower the unit to its mounting position. (If optional shipping skids are used, remove them before lowering the chiller to its mounting position.)



At this point units shipped dismantled should be assembled under the supervision of a Johnson Controls representative.

If evaporator is to be field insulated, the insulation should be applied to the evaporator before the unit is placed in position while the unit is in the lift position. Be sure unit is properly supported. (Refer to *Figure 2 on Page 9*)

LOCATING AND INSTALLING ISOLATOR PADS

The isolator pad mounts are to be located as shown in *Figure 3 on Page 11* (rubber side down).

After the isolator pads have been placed into position on the floor, lower the chiller onto the pads. When the unit is in place, remove the rigging equipment and check that the unit is level. The unit should be level within 1/4" (6 mm) from one end to the other end and from front to the rear. If the chiller is not level within the amount specified, lift it and place shims between the isolation pad and the chiller tube sheets. (Shims furnished by the installer.) Lower unit again and recheck to see that it is level.

CHECKING THE ISOLATION PAD DEFLECTION

All isolation pads should be checked for the proper deflection while checking to see if the unit is level. Each pad should be deflected approximately 0.10 inches (2.5 mm) to 0.20 inches (5 mm). If an isolation pad is under-deflected, shims should be placed between the unit tube sheet and the top of the pad to equally deflect all pads.

LEVELING THE UNIT

The longitudinal alignment of the unit should be checked by placing a level on the top center of the evaporator shell under the compressor/motor assembly. Transverse alignment should be checked by placing a level on top of the shell end sheets.

INSTALLING OPTIONAL SPRING ISOLATORS

When ordered, spring type isolator assemblies will be furnished with the unit. The 4 assemblies are identical and can be placed at any of the 4 corners of the unit.

While the unit is still suspended by the rigging, the isolators should be bolted to the unit by inserting the cap screw(s) through the hole(s) in the mounting bracket into the tapped hole in the top of the isolator leveling bolt(s). Then the unit can be lowered onto the floor.

The leveling bolts should now be rotated one (1) turn at a time, in sequence, until the unit end sheets are clear of the floor by the dimension shown in *Figure 4 on Page 12* or *Figure 6 on Page 14* and the unit is level. Check that the unit is level, both longitudinally and transversely (see Leveling the Unit). If the leveling bolts are not long enough to level unit due to an uneven or sloping floor or foundation, steel shims (grouted, if necessary) must be added beneath the isolator assemblies as necessary.

After the unit is leveled, wedge and shim under each corner to solidly support the unit in this position while piping connections are being made, pipe hangers adjusted and connections checked for alignment. Then the unit is filled with water and checked for leaks. The leveling bolts should now be finally adjusted until the wedges and shims can be removed. The unit should now be in correct level position, clear of the floor or foundation and without any effect from the weight of the piping.

PIPING CONNECTIONS

After the unit is leveled (and wedged in place for optional spring isolators) the piping connections may be made; chilled water, condenser water and refrigerant relief. The piping should be arranged with offsets for flexibility, and adequately supported and braced independently of the unit to avoid strain on the unit and vibration transmission. Hangers must allow for alignment of pipe. Isolators (by others) in the piping and hangers are highly desirable, and may be required by specifications, in order to effectively utilize the vibration isolation characteristics of the vibration isolation mounts of the unit.

Check for piping alignment – Upon completion of piping, a connection in each line as close to the unit as possible should be opened, by removing the flange

bolts or coupling and checked for piping alignment. If any of the bolts are bound in their holes, or if the connection springs are out of alignment, the misalignment must be corrected by properly supporting the piping or by applying heat to anneal the pipe.

NOTE

If the piping is annealed to relieve stress, the inside of the pipe must be cleaned of scale before it is finally bolted in place.

EVAPORATOR AND CONDENSER WATER PIPING

The evaporator and condenser liquid heads of chiller have nozzles which are grooved, suitable for welding 150 psig DWP flanges or the use of flexible couplings. Factory mounted flanges are optional.

The nozzles and water pass arrangements are furnished in accordance with the job requirements (see Product Drawings) furnished with the job. Standard units are designed for 150 psig DWP on the water side. If job requirements are for greater than 150 psig DWP, check the unit data plate before applying pressure to evaporator or condenser to determine if the chiller has provisions for the required DWP.

Inlet and outlet connections are identified by labels placed adjacent to each nozzle.

The coolant temperature inside any JCI-supplied liquid-cooled motor starter must be maintained above the dewpoint temperature in the equipment room to prevent condensing water vapor inside the starter cabinet. Therefore, an additional temperature-controlled throttle valve is needed in the flow path for the starter heat exchanger to regulate cooling above the equipment room dewpoint for applications using cooling sources other than evaporative air-exchange methods, such as wells, bodies of water, and chilled water. The temperature control valve should be the type to open on increasing drive coolant temperature, fail-closed, and set for a temperature above dewpoint. It can be requested as factory-supplied on a chiller order by special quotation.

Chilled Water

Foreign objects which could lodge in, or block flow through, the evaporator and condenser tubes must be kept out of the water circuit. All water piping must be cleaned or flushed before being connected to the chiller pumps, or other equipment.

Permanent strainers (supplied by others) are required in both the evaporator and condenser water circuits to protect the chiller as well as the pumps, tower spray nozzles, chilled water coils and controls, etc. The strainer must be installed in the entering chilled water line, directly upstream of the chiller.

Water piping circuits should be arranged so that the pumps discharge through the chiller, and should be controlled as necessary to maintain essentially constant chilled and condenser water flows through the unit at all load conditions.

If pumps discharge through the chiller, the strainer may be located upstream from pumps to protect both pump and chiller. (Piping between strainer, pump and chiller must be very carefully cleaned before start-up.) If pumps are remotely installed from chiller, strainers should be located directly upstream of the chiller.

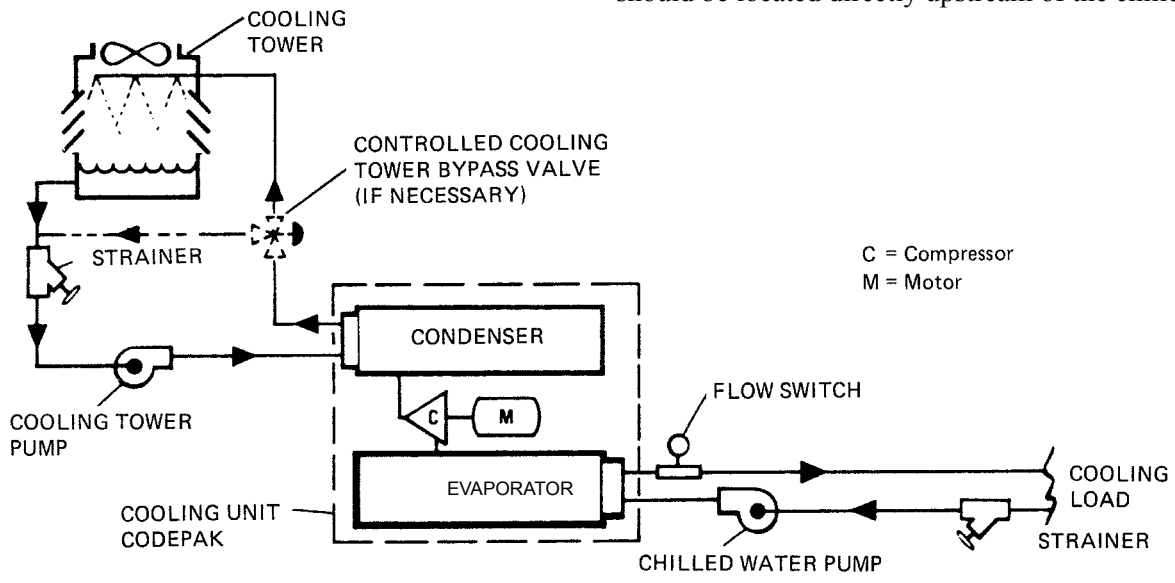


FIGURE 7 - SCHEMATIC OF A TYPICAL PIPING ARRANGEMENT

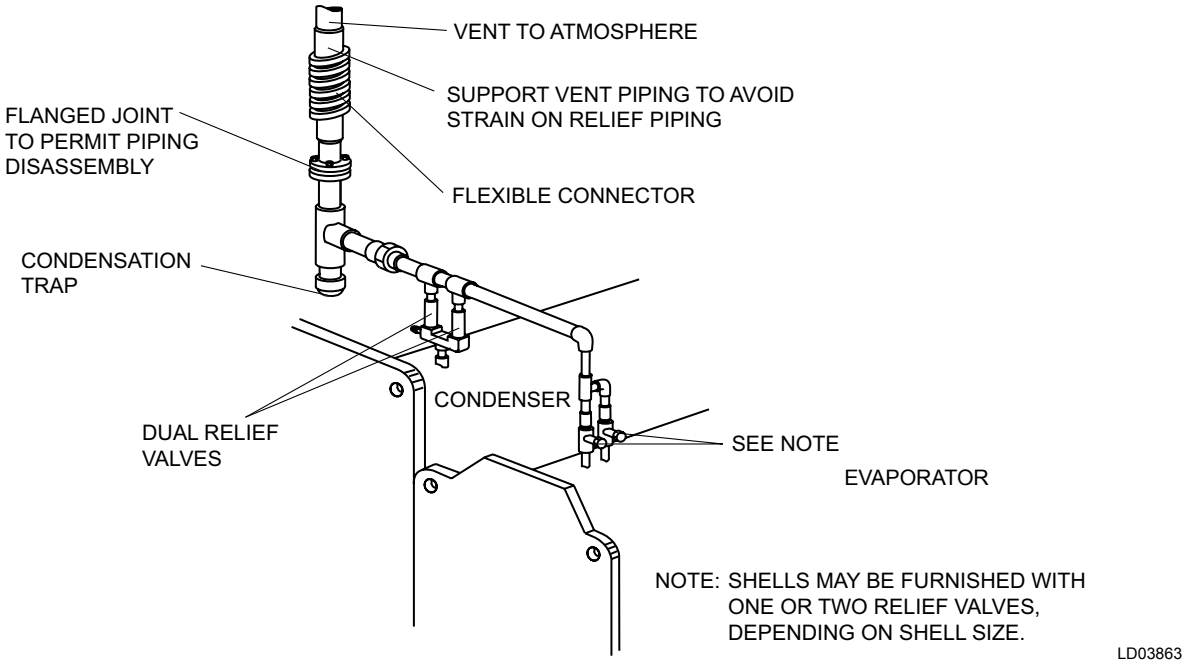


FIGURE 8 - TYPICAL REFRIGERANT VENT PIPING

Condenser Water Circuit

For proper operation of the unit, condenser refrigerant pressure must be maintained above evaporator pressure. If operating conditions will fulfill this requirement, no attempt should be made to control condenser water temperature by means of automatic valves, cycling of the cooling tower fan or other means, since chillers are designed to function satisfactorily and efficiently when condenser water is allowed to seek its own temperature level at reduced loads and off-peak seasons of the year. However, if entering condenser water temperature can go below the required minimum, *Refer to Operation - Unit (Form 160.75-O1)* condenser water temperature must be maintained equal to or slightly higher than the required minimum. Refer to *Figure 7 on Page 16* for typical water piping schematic.

Stop Valves

Stop valves may be provided (by others) in the evaporator and condenser water piping adjacent to the unit to facilitate maintenance. Thermometer wells and pressure taps should be provided (by others) in the piping as close to the unit as possible to facilitate operating check.

Flow Switches

Thermal type water flow switches are factory mounted in the chilled and condensed water nozzles and are factory wired to the OptiView™ control panel. These solid-state flow sensors have a small internal heating element and use the cooling effect of the flowing fluid to sense when an adequate flow rate has been established.

Waterbox Drain and Vent Valves

Drain and vent valves (by others) should be installed in the connections provided in the evaporator and condenser liquid heads. These connections may be piped to drain if desired.

Checking Piping Circuits and Venting Air

After the water piping is completed, but before any waterbox insulation is applied. Tighten and torque to maintain between 30 and 60 ft. lbs. (41 and 81 N·m) the nuts on the liquid head flanges. Gasket shrinkage and handling during transit cause nuts to loosen. If water pressure is applied before tightening is done, the gaskets may be damaged and have to be replaced. Fill the chilled and condenser water circuits, operate the pumps manually and carefully check the evaporator and condenser water heads and piping for leaks. Repair leaks as necessary.

Before initial operation of the unit both water circuits should be thoroughly vented of all air at the high points.

REFRIGERANT RELIEF PIPING

Each unit is equipped with pressure relief valves located on the condenser and on the evaporator for the purpose of quickly relieving excess pressure of the refrigerant charge to the atmosphere as a safety precaution in case of an emergency, such as fire.

Refrigerant relief vent piping (by others), from the relief valves to the outside of the building, is required by code in most areas and should be installed on all chillers. The vent line should be sized in accordance with the ANSI/ASHRAE-15, or local code. The vent line must include a dirt trap in the vertical leg to intercept and permit clean out and to trap any vent stack condensation. The piping MUST be arranged to avoid strain on the relief valves, using a flexible connection, if necessary.

UNIT PIPING

Compressor lubricant piping and system external piping are factory installed on all units shipped assembled. On units shipped dismantled, the following piping should be completed under the supervision of the Johnson Controls representative: (1) the lubricant piping to oil sump and oil evaporator and system oil return connections using material furnished. Refer to *Installation - Unit (Form 160.75-N3)*.

CONTROL PANEL POSITIONING

On large YK chillers equipped with H9 and K1-K7 compressors, the control panel height can be adjusted. **Chillers equipped with P and Q compressors the control panel height is NOT adjustable.** The OptiView™ Control Center is placed in a position above the evaporator for shipping. To move the control center into position for operation, proceed as follows:

1. While supporting the control center, remove the hardware between the support arms and the evaporator.
2. Swing the control center into a vertical position.
3. Slide the control center down the guide rails to the proper position. Tighten securely.
4. Discard unused hardware.

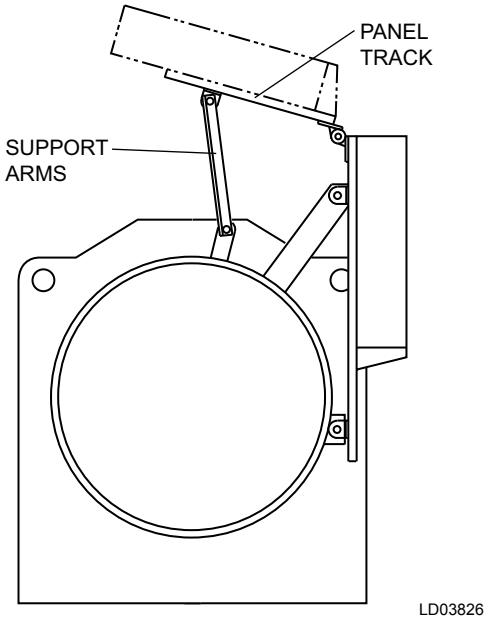
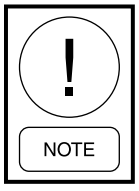


FIGURE 9 - CONTROL PANEL POSITIONING (H9, K1-K7)

CONTROL WIRING

On units shipped disassembled, after installation of the control center, control wiring must be completed between unit components and control center, solid state starter, or variable speed drive, when used, using wiring harnesses furnished. Refer to *Installation - Unit (Form 160.75-N3)*.

Field wiring connections for commonly encountered control modifications (by others) if required, are shown on *Wiring Diagram – Unit (Style G) Field Control Modifications (Form 160.75-PW4)*.



No deviations in unit wiring from that shown on drawings furnished shall be made without prior approval of the Johnson Controls representative.

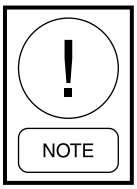
POWER WIRING

Chiller with Electro-Mechanical Starter

A 115 volt – single phase – 60 or 50 Hertz power supply of 20 amperes must be furnished to the control center, from the control transformer (2 KVA required) included with the compressor motor starter. Do NOT make final power connections to control center until approved by YORK representative.

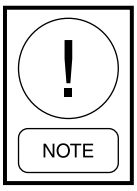
OIL PUMP – 3 PHASE STARTER

Separate wiring or a fused disconnect switch should be supplied by the installer.



Remote Electro-Mechanical starters for the chiller must be furnished in accordance with YORK Starter Specifications Product Drawing Form 160.73-PA1 to provide the features necessary for the starter to function properly with the YORK control system.

Each chiller unit is furnished for a specific electrical power supply as stamped on the Unit Data Plate, which also details the motor connection diagrams.



To insure proper motor rotation the starter power input and starter to motor connections must be checked with a phase sequence indicator in the presence of the Johnson Controls representative.

DO NOT cut wires to final length or make final connections to motor terminals or starter power input terminals until approved by the Johnson Controls representative.

YK Motors (Electro-Mechanical Starter)

Motor leads are furnished with a crimp type connection having a clearance hole for a 3/8" bolt, motor terminal lugs are not furnished. Refer to Wiring Labels in motor terminal box for hook-up to suit motor voltage and amperage for power wiring connections.

Chiller with Solid State Starter or Variable Speed Drive

A chiller equipped with a factory mounted Solid State Starter or Variable Speed Drive does not require wiring to the compressor motor. The motor power wiring is factory connected to the Solid State Starter or Variable Speed Drive (or an optional factory installed disconnect switch). See Field Wiring Diagram. All wiring to the control panel and the oil pump starter is completed by the factory. A control transformer is furnished with the Solid State Starter or Variable Speed Drive.

INSULATION

DO NOT field insulate until the unit has been leak tested under the supervision of the Johnson Controls representative.

Insulation of the type specified for the job, or minimum thickness to prevent sweating of 30°F (-1°C) surfaces should be furnished (by others) and applied to the evaporator shell, end sheets, liquid feed line to flow chamber, compressor suction connection, and evaporator liquid heads and connections. The liquid head flange insulation must be removable, to allow head removal for the tube maintenance. Details of areas to be insulated are given on the Product Drawing.

Units are furnished factory anti-sweat insulated on order at additional cost. This includes all low temperature surfaces except the two (2) cooler liquid heads.

INSTALLATION CHECK – REQUEST FOR START-UP SERVICE

The services of a Johnson Controls representative will be furnished to check the installation and supervise the initial start-up and operation on all chillers installed within the Continental United States.

After the unit is installed, piped and wired as described in this Instruction, but before any attempt is made to start the unit, the Johnson Controls District Office should be advised so that the start-up service, included in the contract price, can be scheduled. Use the Installation Checklist and Request for startup, (Form 160.75-CL1).

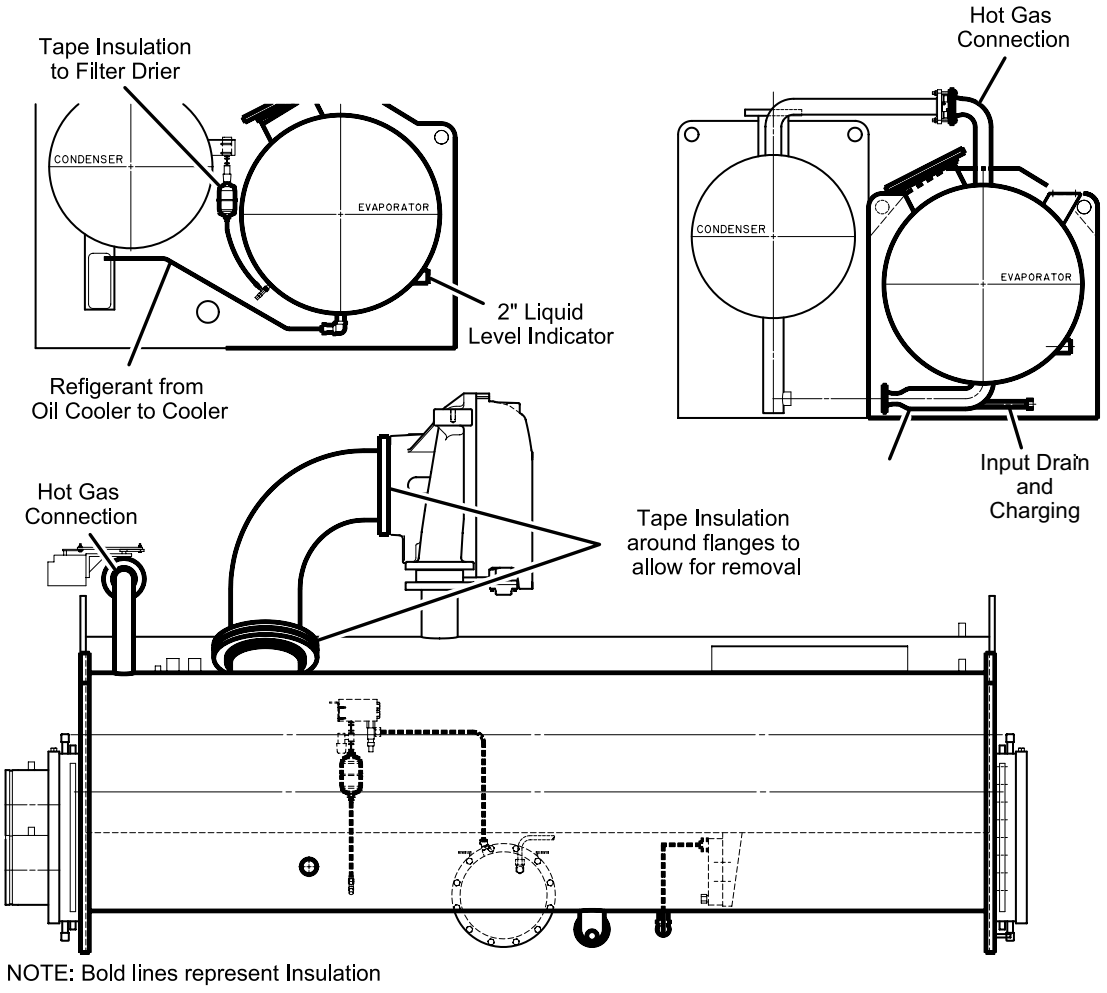


FIGURE 10 - UNIT INSULATION

TABLE 1 - ALLOWABLE COMPRESSOR / EVAPORATOR / CONDENSER / MOTOR COMBINATIONS

YK MOD G COMBINATIONS				
COMPRESSOR CODES	**EVAPORATOR CODES**	**CONDENSER CODES**	**MOTOR CODES**	
			60 HZ	**50 HZ**
Q3	AP to AS	AP to AS	CF-CT EF-ET	5CC-5CO 5EC-5EO
Q3, Q4	CP to CS	CP to CS		
	DP to DS	DP to DS		
Q4	EP to ET	EP to ET		
Q5	CP to CS	CP to CS	CH-CT EH-ET	5CE-5CO 5EE-5EO
	DP to DS	DP to DS		
Q5, Q6, Q7	EP to ET	EP to ET		
	FQ to FT	FQ to FT		
P7	EP to ET	EP to ET	CU-CY EU-EV	5CP-5CU
	FQ to FT	FQ to FT		
P8	GQ to GS	EV to EX	CH-CZ EH-EV	5CE-5CU 5EE-5EO
P8, P9	HQ to HS	FV to FX		
	JP to JS	JP to JS		
	LQ to LS	LQ to LS		
H9	KP to KS, K2 to K4	KP to KS, K2 to K4	CN-CA EN-EV	5CK-5CW 5EK-5EO
	MQ to MS, M2 to M4	MP to MS, M2 to M4		
K1	KT to KX, K5 to K7	KP to KS, K2 to K4	CS-DC ES-EV	5CN-5DC 5EN-5EO
K1, K2	MQ to MS, M2 to M4	MP to MS, M2 to M4		
	NQ to NS, N2 to N4	NP to NS, N2 to N4		
	PQ to PS, P2 to P4	PQ to PS, P2 to P4		
	QQ to QS, Q2 to Q4	QQ to QS, Q2 to Q4		
K3	NQ to NS, N2 to N4	NP to NS, N2 to N4	DA-DJ	5DA-5DH
	QQ to QV, Q2 to Q4	QQ to QS, Q2 to Q4		
	RQ, RS, RV, R3, R5, R7	RQ to RS, R2 to R4		
K4	RP, RR, RT, R2, R4, R6	RQ to RS, R2 to R4	DA-DJ	5DA-5DJ
	SQ, SS, SV, S3, S5, S7	SQ to SS, S2 to S4		
		VP to VS, V2 to V5		
	XQ to XS, X2 to X4	TP to TS, T2 to T5		
		XQ to XS, X2 to X4		
K7	WP-WT, W1, W2, W4, W6	WQ to WS, W1 to W4	DD-DL	5DD-5DL
	ZQ to ZS, Z1 to Z4	ZQ to ZS, Z1 to Z4		

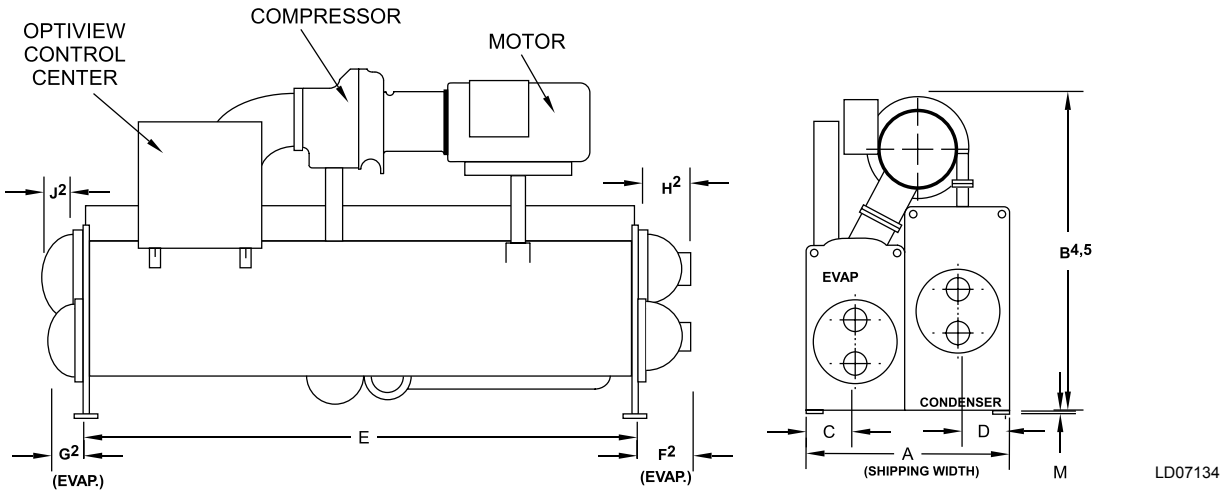
YK MOD G HEAT RECOVERY COMBINATIONS				
COMPRESSOR CODES	**EVAPORATOR CODES**	**CONDENSER CODES**	**MOTOR CODES**	
			60 HZ	**50 HZ**
Q4	CP to CS	BW, BX	CF-CT EF-ET	5CC-5CO 5EC-5EO
Q7	EP to ET	IW, IX		
H9	KP to KS, K2 to K4	OW, OX, O8, O9	CN-CA EN-EV	5CK-5CW 5EK-5EO
K2	MQ to MS, M2 to M4	UW, UX, U8, U9	CS-DC ES-EV	5CN-5DC 5EN-5EO
K7	ZQ to ZS, Z1 to Z4	YW, YX, Y8, Y9	DD-DL	5DD-5DL

TABLE 1 - ALLOWABLE COMPRESSOR/EVAPORATOR/CONDENSER/MOTOR COMBINATIONS (CONT'D)

YK MOD G HYBRID FALLING FILM COMBINATIONS				
COMPRESSOR CODES	**HYBRID FALLING FILM EVAPORATOR CODES**	**CONDENSER CODES**	**MOTOR CODES**	
			60 HZ	**50 HZ**
Q3	AC, AD, A3, A4	AP to AS	CF-CT EF-ET	5CC-5CO 5EC-5EO
	CC to CE, C3 to C5	CP to CS		
Q4	CC to CE, C3 to C5	CP to CS		
	DC to DE, D3 to D5	DP to DS		
Q5	CC to CE, C3 to C5	CP to CS	CH-CT EH-ET	5CE-5CO 5EE-5EO
	DC to DE, D3 to D5	DP to DS		
Q5, Q6, Q7	EC to EE, E3 to E5	EP to ET		
	FC to FE, F3 to F5	FQ to FT		
P7	EC to EE, E3 to E5	EP to ET	CU-CY EU-EV	5CP-5CU
	FC to FE, F3 to F5	FQ to FT		
P8, P9	GC to GE, G3 to G5	EV to EX, E3 to E4	CH-CZ EH-EV	5CE-5CU 5EE-5EO
	HC to HE, H3 to H5	FV to FX, F3 to F4		
H9	KC, KD, K8, K9, K0	KP, KQ, KR, KS, K2, K3, K4	CN-CA EN-EV	5CK-5CW 5EK-5EO
	IB, ID, IF, IH, I2, I4, I6, I8	KP, KQ, KR, KS, K2, K3, K4		
	MB, MD, MF, M5, M7, M8	MP, MQ, MR, MS, M2, M3, M4		
K1	IB, ID, IF, IH, I2, I4, I6, I8	KP, KQ, KR, KS, K2, K3, K4	CS-DC ES-EV	5CN-5DC 5EN-5EO
K1, K2	MB, MD, MF, M5, M7, M8, M9	MP, MQ, MR, MS, M2, M3, M4		
	NB, ND, NF, N5, N7, N8, N9	NP, NQ, NR, NS, N2, N3, N4		
	PB, PD, PF, P5, P7, P8	PQ, PR, PS, P2, P3, P4		
	QB, QD, QF, Q5, Q7, Q8	QQ, QR, QS, Q2, Q3, Q4		
K3	NB, ND, NF, N5, N7, N8, N9	NP, NQ, NR, NS, N2, N3, N4	DA-DJ	5DA-5DH
	QD, QF, QH, Q5, Q7, Q8, Q9	QQ, QR, QS, Q2, Q3, Q4		

2

P AND Q COMPRESSOR UNITS (STANDARD)



ADDITIONAL OPERATING HEIGHT CLEARANCE TO FLOOR	
Type Of Chiller Mounting	**M**
Neoprene Pad Isolators	1-3/4"
Spring Isolators 1" Deflection	1"
Direct Mount	3/4"

P7, Q7 COMPRESSOR EVAPORATOR – CONDENSER SHELL CODES			
	E–E	**E–I**	**F–F**
A	6'-2"	7'-1 3/4"	6'-2"
B	8'-0 5/8"	8'-8"	7'-6 1/2"
C	1'-7 1/2"	1'-7 1/2"	1'-7 1/2"
D	1'-5 1/2"	1'-11 3/8"	1'-5 1/2"
E	12'-0"	12'-0"	16'-0"

P8 COMPRESSOR EVAPORATOR – CONDENSER SHELL CODES				
	G–E	**H–F**	**J–J**	**L–L**
A	6'-11"	6'-11"	7'-6 1/2"	7'-6 1/2"
B	10'-6"	10'-6"	10'-11"	10'-11"
C	2'-0"	2'-0"	2'-1 1/4"	2'-1 1/4"
D	1'-5 1/2"	1'-5 1/2"	1'-8"	1'-8"
E	12'-0"	16'-0"	12'-0"	16'-0"

P9 COMPRESSOR EVAPORATOR – CONDENSER SHELL CODES			
	H–F	**J–J**	**L–L**
A	6'-11"	7'-6 1/2"	7'-6 1/2"
B	10'-3"	10'-8 1/2"	10'-8 1/2"
C	2'-0"	2'-1 1/4"	2'-1 1/4"
D	1'-5 1/2"	1'-8"	1'-8"
E	16'-0"	12'-0"	16'-0"

Q3 COMPRESSOR EVAPORATOR – CONDENSER SHELL CODES			
	A–A	**C–C**	**D–D**
A	5'-1"	5'-6"	5'-6"
B	7'-0"	7'-3 3/4"	7'-3 3/4"
C	1'-3 1/2"	1'-5 1/2"	1'-5 1/2"
D	1'-3"	1'-3 1/2"	1'-3 1/2"
E	12'-0"	12'-0"	16'-0"

Q4 COMPRESSOR EVAPORATOR – CONDENSER SHELL CODES				
	C–B	**C–C**	**D–D**	**E–E**
A	6'-4 3/4"	5'-6"	5'-6"	7'-0"
B	7'-11 3/8"	7'-2 1/2"	7'-2 1/2"	7'-8 1/2"
C	1'-5 1/2"	1'-5 1/2"	1'-5 1/2"	1'-7 1/2"
D	1'-8 7/8"	1'-3 1/2"	1'-3 1/2"	1'-5 1/2"
E	12'-0"	12'-0"	16'-0"	12'-0"

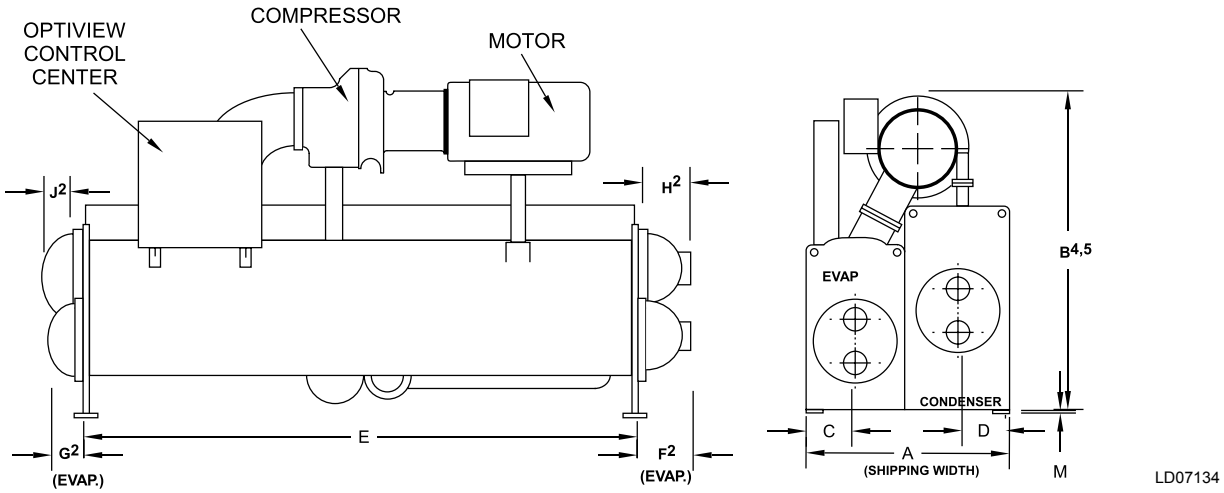
Q5 COMPRESSOR EVAPORATOR – CONDENSER SHELL CODES				
	C–C	**D–D**	**E–E**	**F–F**
A	5'-6"	5'-6"	7'-0"	7'-0"
B	7'-10 5/8"	7'-10 5/8"	8'-5 1/2"	8'-5 1/2"
C	1'-5 1/2"	1'-5 1/2"	1'-7 1/2"	1'-7 1/2"
D	1'-3 1/2"	1'-3 1/2"	1'-5 1/2"	1'-5 1/2"
E	12'-0"	16'-0"	12'-0"	16'-0"

Q6 COMPRESSOR EVAPORATOR – CONDENSER SHELL CODES		
	E–E	**F–F**
A	7'-0"	7'-0"
B	8'-3"	8'-3"
C	1'-7 1/2"	1'-7 1/2"
D	1'-5 1/2"	1'-5 1/2"
E	12'-0"	16'-0"

NOTES:
1. All dimensions are approximate.
2. For compact waterboxes (shown above), determine overall unit length by adding waterbox depth to tube sheet length.
3. Water nozzles can be located on either end of unit. Add 1/2" (13 mm) to nozzle length for flanges connections.
4. To determine overall height, add 7/8" (22 mm) for isolators.
5. Use of motors with motor hoods may increase overall unit dimensions.

FIGURE 11 - DIMENSIONS – P AND Q COMPRESSOR UNITS (FT–IN)

P AND Q COMPRESSOR UNITS (METRIC)



ADDITIONAL OPERATING HEIGHT CLEARANCE	
Type of Chiller Mounting	**M**
Neoprene Pad Isolators	45
Spring Isolators 25mm Deflection	25
Direct Mount	19

P7, Q7 COMPRESSOR EVAPORATOR – CONDENSER SHELL CODES			
	E–E	**E–I**	**F–F**
A	1,880	2,178	1,880
B	2,299	2,642	2,299
C	495	495	495
D	445	594	445
E	3,658	3,658	4,877

P8 COMPRESSOR EVAPORATOR – CONDENSER SHELL CODES				
	E–E	**F–F**	**G–G**	**H–H**
A	2,108	2,108	2,299	2,299
B	3,200	3,200	3,327	3,327
C	610	610	641	641
D	445	445	508	508
E	3,658	4,877	3,658	4,877

P9 COMPRESSOR EVAPORATOR – CONDENSER SHELL CODES			
	H–F	**J–J**	**L–L**
A	2,108	2,299	2,299
B	3,124	3,264	3,264
C	610	641	641
D	445	508	508
E	4,877	3,658	4,877

Q3 COMPRESSOR EVAPORATOR – CONDENSER SHELL CODES			
	A–A	**C–C**	**D–D**
A	1,549	1,676	1,676
B	2,134	2,229	2,229
C	394	445	445
D	381	394	394
E	3,658	3,658	4,877

Q4 COMPRESSOR EVAPORATOR – CONDENSER SHELL CODE				
	C–C	**C–B**	**D–D**	**E–E**
A	1,676	1,949	1,676	2,134
B	2,197	2,423	2,197	2,350
C	445	445	445	495
D	394	530	394	445
E	3,658	3,658	4,877	3,658

Q5 COMPRESSOR EVAPORATOR – CONDENSER SHELL CODES				
	C–C	**D–D**	**E–E**	**F–F**
A	1,676	1,676	2,134	2,134
B	2,403	2,403	2,578	2,578
C	445	445	495	495
D	394	394	445	445
E	3,658	4,877	3,658	4,877

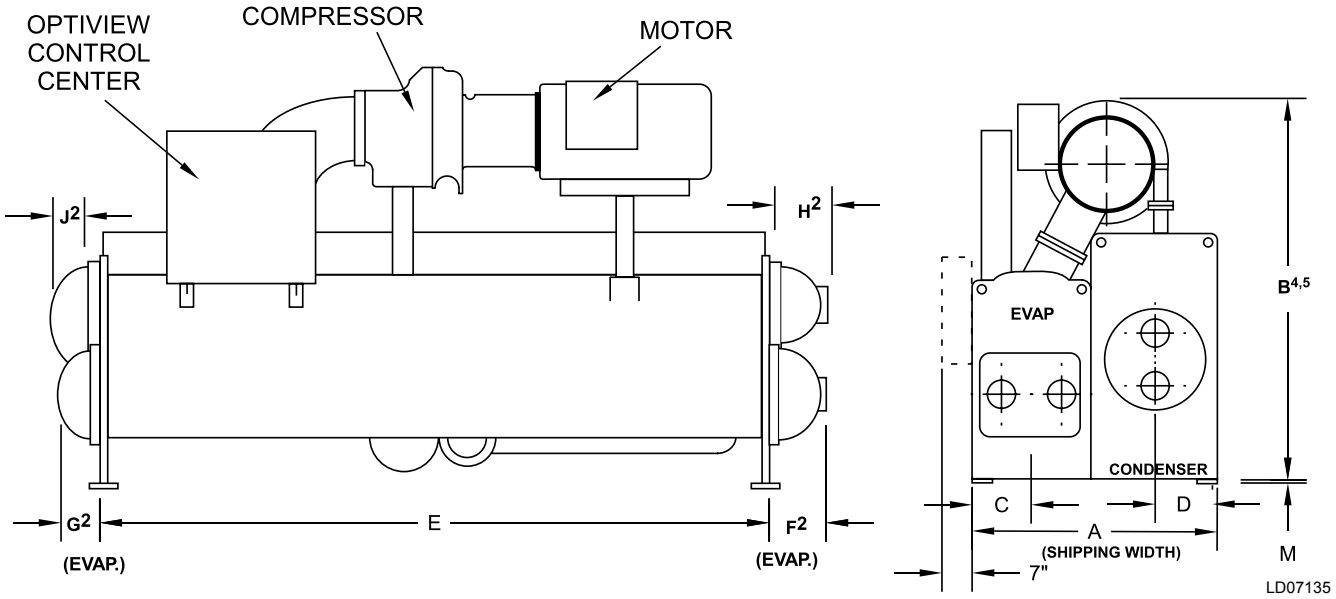
Q6 COMPRESSOR EVAPORATOR – CONDENSER SHELL CODES		
	E–E	**F–F**
A	2,134	2,134
B	2,515	2,515
C	495	495
D	445	445
E	3,658	4,877

NOTES:

1. All dimensions are approximate.
2. For compact waterboxes (shown above), determine overall unit length by adding waterbox depth to tube sheet length.
3. Water nozzles can be located on either end of unit. Add 13 mm (1/2 inch) to nozzle length for flanges connections.
4. To determine overall height, add 22 mm (7/8 inch) for isolators.
5. Use of motors with motor hoods may increase overall unit dimensions.

FIGURE 12 - DIMENSIONS – P AND Q COMPRESSOR UNITS (MM)

H COMPRESSOR UNITS (STANDARD)



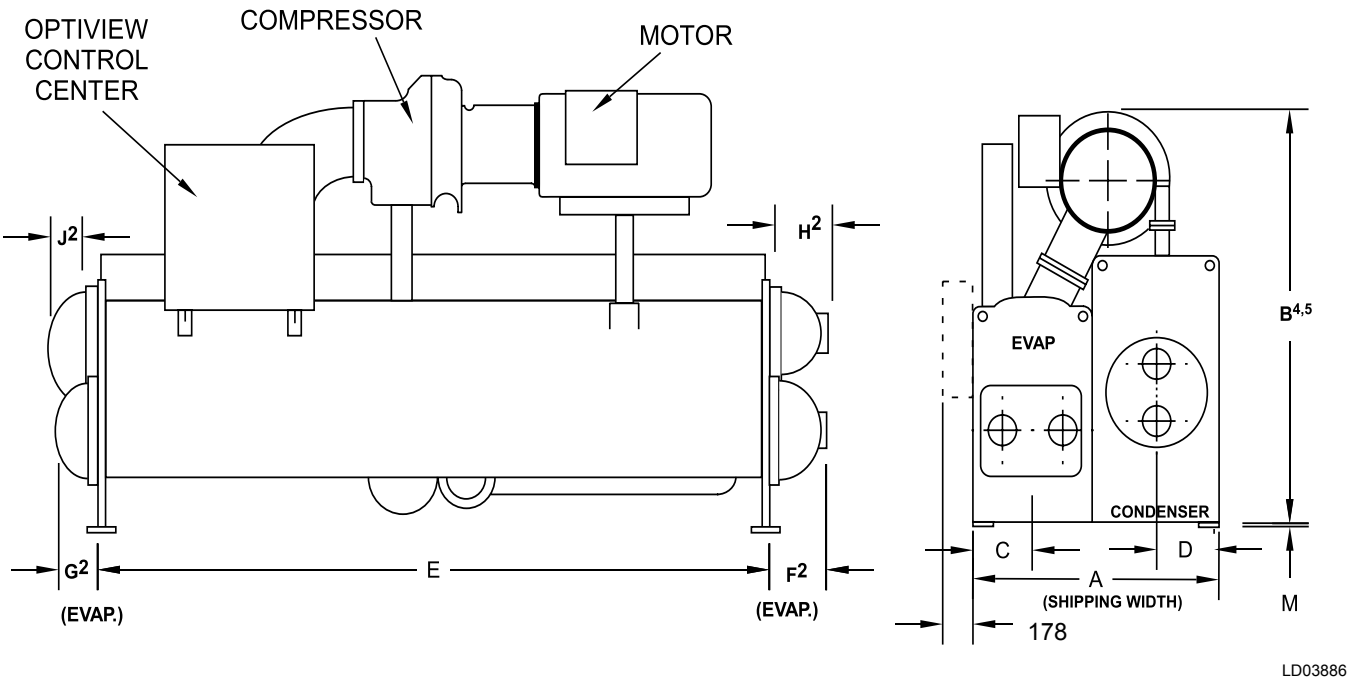
ADDITIONAL OPERATING HEIGHT CLEARANCE TO FLOOR	
Type of Chiller Mounting	**M**
Neoprene Pad Isolators	1 3/4"
Spring Isolators 1" Deflection	1"
Direct Mount	3/4"

H9 COMPRESSORS EVAPORATOR – CONDENSER SHELL CODES			
	I-K & K–K	**K–O**	**M–M**
A	7'-6 1/2"	8'-9 1/4"	8'-7"
B	10'-4"	10'-7 5/8"	10'-10 1/2"
C	2'-1 1/4"	2'-1 1/4"	2'-4 1/2"
D	1'-8"	2'-3 3/8"	1'-11"
E	14'-0"	14'-0"	14'-0"

NOTES:
1. All dimensions are approximate.
2. For compact waterboxes (shown above), determine overall unit length by adding waterbox depth to tube sheet length.
3. Water nozzles can be located on either end of unit. Add 1/2" (13 mm) to nozzle length for flanges connections.
4. To determine overall height, add 7/8" (22 mm) for isolators.
5. Use of motors with motor hoods may increase overall unit dimensions.

FIGURE 13 - DIMENSIONS – H COMPRESSOR UNITS (FT–IN)

H COMPRESSOR UNITS (METRIC)



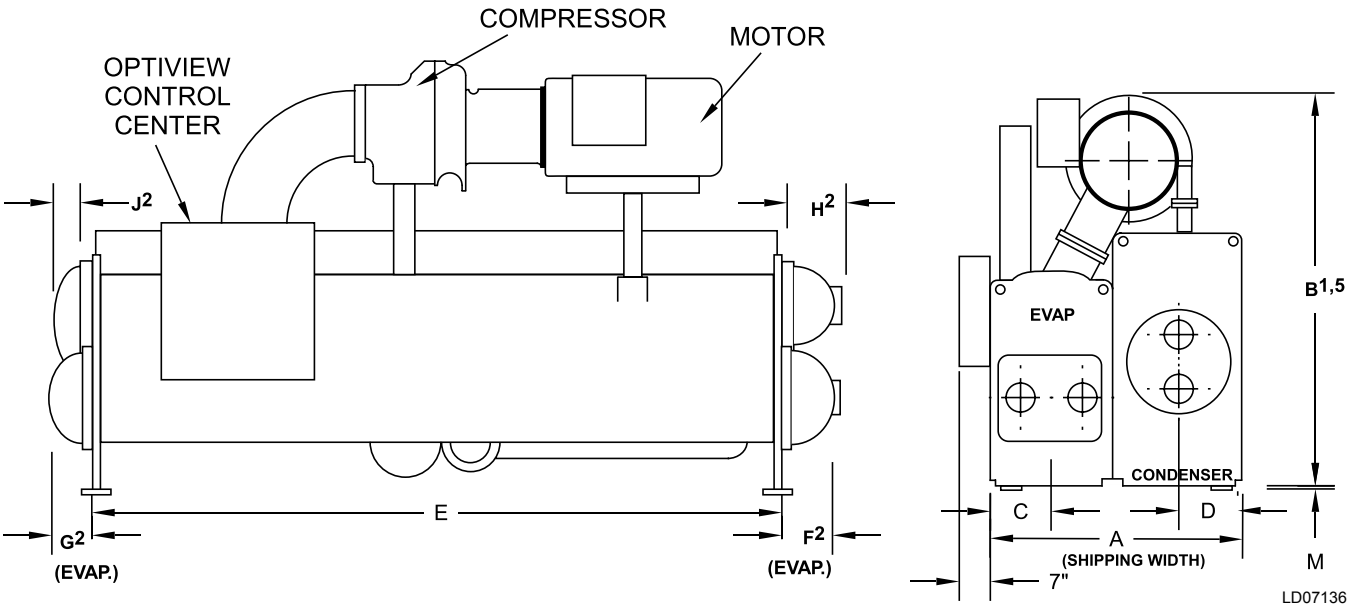
ADDITIONAL OPERATING HEIGHT CLEARANCE	
Type of Chiller Mounting	**M**
Neoprene Pad Isolators	44
Spring Isolators 25mm Deflection	25
Direct Mount	19

H9 COMPRESSORS EVAPORATOR – COND. SHELL CODES			
	I-K & K–K	**K–O**	**M–M**
A	2,299	2,673	2,616
B	3,150	3,242	3,315
C	641	641	724
D	508	695	584
E	4,267	4,267	4,267

NOTES:
1. All dimensions are approximate.
2. For compact waterboxes (shown above), determine overall unit length by adding waterbox depth to tube sheet length.
3. Water nozzles can be located on either end of unit. Add 13 mm (1/2 inch) to nozzle length for flanges connections.
4. To determine overall height, add 22 mm (7/8 inch) for isolators.
5. Use of motors with motor hoods may increase overall unit dimensions.

FIGURE 14 - DIMENSIONS – H COMPRESSOR UNITS (MM)

K COMPRESSOR UNITS (STANDARD)



K1 COMPRESSOR, EVAPORATOR – CONDENSER SHELL CODES					
	I-K & K–K	M–M	N–N	P–P	Q–Q
A	7'-6 1/2"	8'-7"	8'-7"	9'-1 1/2"	9'-1 1/2"
B	9'-7"	11'-4"	11'-4"	11'-5 1/2"	11'-5 1/2"
C	2'-1 1/4"	2'-4 1/2"	2'-4 1/2"	2'-5 1/2"	2'-5 1/2"
D	1'-8"	1'-11"	1'-11"	2'-1 1/4"	2'-1 1/4"
E	14'-0"	14'-0"	16'-0"	14'-0"	16'-0"

K2 COMPRESSOR, EVAPORATOR – CONDENSER SHELL CODES					
	M–M	M–U	N–N	P–P	Q–Q
A	8'-7"	9'-6"	8'-7"	9'-1 1/2"	9'-1 1/2"
B	11'-4"	11'-10"	11'-4"	11'-5"	11'-5"
C	2'-4 1/2"	2'-4 1/2"	2'-4 1/2"	2'-5 1/2"	2'-5 1/2"
D	1'-11"	2'-4 1/2"	1'-11"	2'-1 1/4"	2'-1 1/4"
E	14'-0"	14'-0"	16'-0"	14'-0"	16'-0"

K4 COMPRESSOR, EVAPORATOR – CONDENSER SHELL CODES					
	R–R	S–S	S–V	X–T	X–X
A	9'-9"	9'-9"	10'-3"	10'-10"	11'-3"
B	11'-11"	11'-11"	12'-4"	12'-4"	12'-4"
C	2'-8"	2'-8"	2'-8"	2'-11 1/2"	2'-11 1/2"
D	2'-3 1/2"	2'-3 1/2"	2'-5 1/2"	2'-5 1/2"	2'-8"
E	16'-0"	18'-0"	18'-0"	16'-0"	16'-0"

ADDITIONAL OPERATING HEIGHT CLEARANCE	
Type of Chiller Mounting	M
Neoprene Pad Isolators	1 3/4"
Spring Isolators 1" Deflection	1"
Direct Mount	3/4"

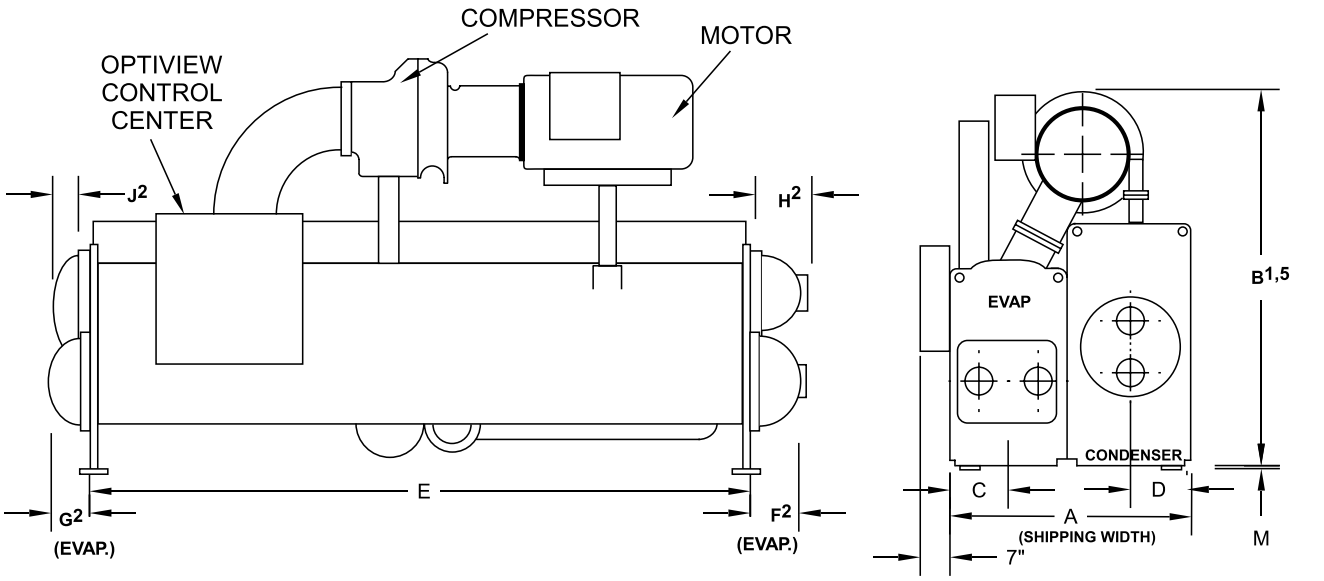
K3 COMPRESSOR, EVAPORATOR – CONDENSER SHELL CODES			
	N–N	Q–Q	R–R
A	8'-7"	9'-1 1/2"	9'-9"
B	10'-8"	11'-6"	11'-10"
C	2'-4 1/2"	2'-5 1/2"	2'-8"
D	1'-11"	2'-1 1/4"	2'-3 1/2"
E	16'-0"	16'-0"	16'-0"

K7 COMPRESSOR, EVAPORATOR – CONDENSER SHELL CODES			
	W–W	Z–Y	Z–Z
A	10'-3"	12'-7"	11'-3"
B	12'-2"	14'-1 5/8"	12'-10"
C	2'-8"	2'-11 1/2"	2'-11 1/2"
D	2'-5 1/2"	3'-4"	2'-8"
E	22'-0"	18'-0"	18'-0"

NOTES:
1. All dimensions are approximate.
2. For compact waterboxes (shown above), determine overall unit length by adding waterbox depth to tube sheet length.
3. Water nozzles can be located on either end of unit. Add 1/2" (13 mm) to nozzle length for flanges connections.
4. To determine overall height, add 7/8" (22 mm) for isolators.
5. Use of motors with motor hoods may increase overall unit dimensions.

FIGURE 15 - DIMENSIONS – K COMPRESSOR UNITS (FT–IN)

K COMPRESSOR UNITS (METRIC)



K1 COMPRESSOR, EVAPORATOR – CONDENSER SHELL CODES					
	I-K & K–K	M–M	N–N	P–P	Q–Q
A	2,299	2,616	2,616	2,781	2,781
B	2,921	3,454	3,454	3,493	3,493
C	641	724	724	749	749
D	508	584	584	641	641
E	4,267	4,267	4,877	4,267	4,877

K2 COMPRESSOR, EVAPORATOR – CONDENSER SHELL CODES					
	M–M	M–U	N–N	P–P	Q–Q
A	2,616	2,896	2,616	2,781	2,781
B	3,454	2,921	3,454	3,480	3,480
C	724	724	724	749	749
D	584	724	584	641	641
E	4,267	4,267	4,877	4,267	4,877

K4 COMPRESSOR, EVAPORATOR – CONDENSER SHELL CODES					
	R–R	S–S	S–V	X–T	X–X
A	2,972	2,972	3,124	3,302	3,429
B	3,632	3,632	3,759	3,759	3,759
C	813	813	813	902	902
D	699	699	749	749	813
E	4,877	5,486	5,486	4,877	4,877

ADDITIONAL OPERATING HEIGHT CLEARANCE	
Type of Chiller Mounting	M
Neoprene Pad Isolators	44
Spring Isolators 1" Deflection	25
Direct Mount	19

K3 COMPRESSOR, EVAPORATOR – CONDENSER SHELL CODES			
	N–N	Q–Q	R–R
A	2,616	2,781	2,972
B	3,251	3,505	3,607
C	724	749	813
D	584	641	699
E	4,877	4,877	4,877

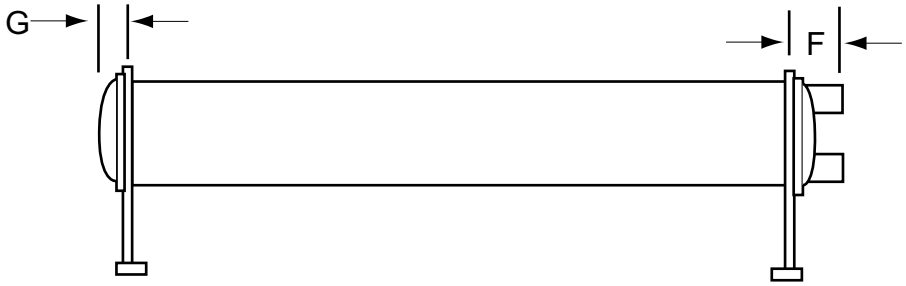
K7 COMPRESSOR, EVAPORATOR – CONDENSER SHELL CODES			
	W–W	Z–Y	Z–Z
A	3,124	3,835	3,429
B	3,708	4,308	3,912
C	813	902	902
D	749	1,016	813
E	6,706	5,486	5,486

NOTES:
1. All dimensions are approximate.
2. For compact waterboxes (shown above), determine overall unit length by adding waterbox depth to tube sheet length.
3. Water nozzles can be located on either end of unit. Add 13 mm (1/2 inch) to nozzle length for flanges connections.
4. To determine overall height, add 22 mm (7/8 inch) for isolators.
5. Use of motors with motor hoods may increase overall unit dimensions.

FIGURE 16 - DIMENSIONS – K COMPRESSOR UNITS (MM)

EVAPORATOR COMPACT WATERBOXES - FT - IN (MM)

ONE PASS EVAPORATORS, CODES									
DIMENSIONS	**A**	**C,D**	**E,F**	**G,H**	**I,J,K,L**	**M,N**	**P,Q**	**R,S,W**	**X,Z**
F	1'-2 1/4" (362)	1'-3" (381)	1'-3 1/2" (394)	1'-3 3/4" (400)	1'-5 1/2" (445)	1'-11 5/8" (600)	1'-11 5/8" (600)	2'-0 5/8" (625)	2'-1 3/4" (654)



TWO PASS EVAPORATORS, CODES									
DIMENSIONS	**A**	**C,D**	**E,F**	**G,H**	**I,J,K,L**	**M,N**	**P,Q**	**R,S,W**	**X,Z**
F	1'-2 1/4" (362)	1'-3" (381)	1'-3 1/2" (394)	1'-3 3/4" (400)	1'-5 1/2" (445)	1'-11 5/8" (600)	1'-11 5/8" (600)	2'-0 5/8" (625)	2'-1 3/4" (654)
G	0'-6 1/2" (165)	0'-7" (178)	0'-7 1/2" (191)	0'-7 3/4" (197)	0'-9 1/2" (241)	1'-3 5/8" (397)	1'-3 5/8" (397)	1'-4 3/4" (425)	1'-5 3/4" (451)

LD07619

THREE PASS EVAPORATORS, CODES									
DIMENSIONS	**A**	**C,D**	**E,F**	**G,H**	**I,J,K,L**	**M,N**	**P,Q**	**R,S,W**	**X,Z**
F	1'-2 1/4" (362)	1'-3" (381)	1'-3 1/2" (394)	1'-3 3/4" (400)	1'-5 1/2" (445)	1'-11 5/8" (600)	1'-11 5/8" (600)	2'-0 5/8" (625)	2'-1 3/4" (654)

See Notes on page 14.

FIGURE 17 - DIMENSIONS – EVAPORATOR COMPACT WATERBOXES

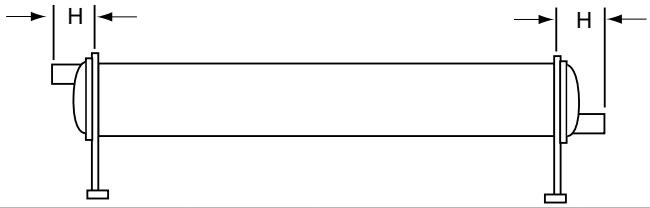
CONDENSER COMPACT WATERBOXES - FT - IN (MM)

ONE PASS CONDENSERS, CODES									
DIMENSIONS	A	C,D	E,F	J,K,L	M,N	P,Q	R,S	T,V,W	X,Z
H	1'-1 7/8" (352)	1'-1 7/8" (352)	1'-3" (381)	1'-4" (406)	1'-2 7/8" (378)	1'-4 7/8" (429)	1'-7 3/8" (492)	1'-7 1/2" (495)	1'-9 3/4" (552)

DOUBLE BUNDLE HEAT RECOVERY CONDENSERS, CODES										
	B		I		O		U		Y	
DIMENSIONS	TOWER	HEATING	TOWER	HEATING	TOWER	HEATING	TOWER	HEATING	TOWER	HEATING
H	1'-6 1/2" (470)	1'-5" (432)	1'-7 1/2" (495)	1'-4 3/4" (425)	1'-9 1/2" (546)	1'-6" (457)	1'-10 1/4" (565)	1'-8" (508)	2'-4 3/4" (730)	1'-10 1/2" (572)

TWO PASS CONDENSERS, CODES									
DIMENSIONS	A	C,D	E,F	J,K,L	M,N	P,Q	R,S	T,V,W	X,Z
H	1'-1 7/8" (352)	1'-1 7/8" (352)	1'-3" (381)	1'-4" (406)	1'-2 7/8" (378)	1'-4 7/8" (429)	1'-7 3/8" (492)	1'-7 1/2" (495)	1'-9 3/4" (552)
J	0'-5 7/8" (149)	0'-6 1/2" (165)	0'-7" (178)	0'-7 1/2" (191)	0'-7 3/4" (197)	0'-9 1/2" (241)	0'-11 3/4" (298)	0'-11" (279)	1'-1 7/8" (352)

DOUBLE BUNDLE HEAT RECOVERY CONDENSERS, CODES										
	B		I		O		U		Y	
DIMENSIONS	TOWER	HEATING	TOWER	HEATING	TOWER	HEATING	TOWER	HEATING	TOWER	HEATING
H	1'-6 1/2" (470)	1'-5" (432)	1'-7 1/2" (495)	1'-4 3/4" (425)	1'-9 1/2" (546)	1'-6" (457)	1'-10 1/4" (565)	1'-8" (508)	2'-4 3/4" (730)	1'-10 1/2" (572)
J	0'-10 1/2" (267)	0'-9" (229)	0'-11 1/2" (292)	0'-8 3/4" (222)	1'-1 1/2" (343)	0'-10" (254)	1'-2 1/4" (362)	1'-0" (305)	1'-8 3/4" (527)	1'-2 1/2" (368)



LD07619a

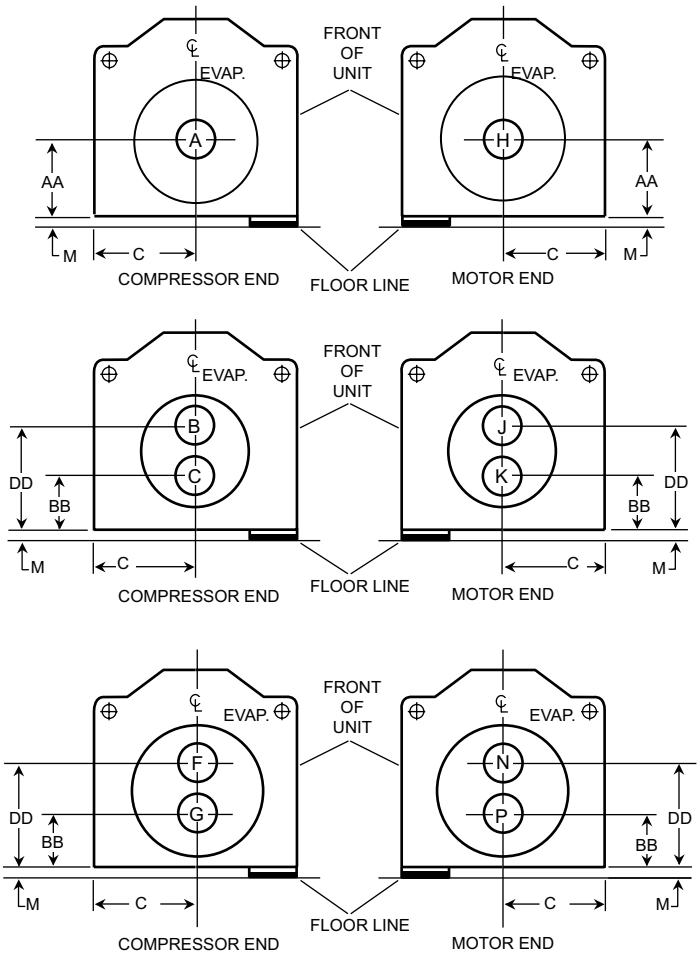
THREE PASS CONDENSERS, CODES									
DIMENSIONS	A	C,D	E,F	J,K,L	M,N	P,Q	R,S	T,V,W	X,Z
H	1'-1 7/8" (352)	1'-1 7/8" (352)	1'-3" (381)	1'-3 1/2" (394)	1'-3 3/8" (197)	1'-5 1/2" (241)	1'-7 3/8" (298)	1'-7 1/2" (279)	1'-7 3/8" (492)

DOUBLE BUNDLE HEAT RECOVERY CONDENSERS, CODES										
	B		I		O		U		Y	
DIMENSIONS	TOWER	HEATING	TOWER	HEATING	TOWER	HEATING	TOWER	HEATING	TOWER	HEATING
H	1'-6 1/2" (470)	1'-5" (432)	1'-7 1/2" (495)	1'-4 3/4" (425)	1'-9 1/2" (546)	1'-6" (457)	1'-10 1/4" (565)	1'-8" (508)	2'-4 3/4" (730)	1'-10 1/2" (572)

See Notes on page 14.

FIGURE 18 - DIMENSIONS – CONDENSER COMPACT WATERBOXES

EVAPORATORS – COMPACT WATERBOXES – A THRU L EVAPORATORS - FT - IN (MM)



NOZZLE ARRANGEMENTS		
NUMBER OF PASSES	EVAPORATOR	
	IN	OUT
1	A	H
	H	A

NOZZLE ARRANGEMENTS		
NUMBER OF PASSES	EVAPORATOR	
	IN	OUT
2	C	B
	K	J

NOZZLE ARRANGEMENTS		
NUMBER OF PASSES	EVAPORATOR	
	IN	OUT
3	G	N
	P	F

LD07598a

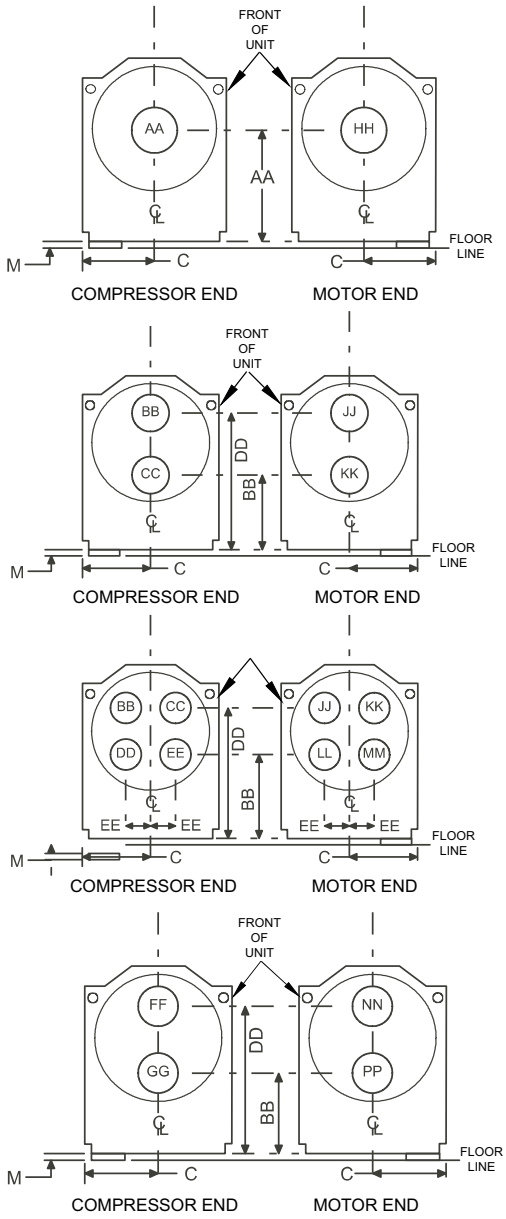
COMPACT WATERBOXES – 150 PSI ROUND									
CONDENSER SHELL CODE	NOZZLE PIPE SIZE IN (MM)			EVAPORATOR NOZZLE DIMENSIONS FT-IN (MM)					
	NUMBER OF PASSES			1-PASS		2-PASS		3-PASS	
	1	2	3	C	AA[5]	BB[5]	DD[5]	BB[5]	DD[5]
A	8" (203)	6" (152)	4" (101)	1'-3 1/2" (394)	1'-10" (559)	1'-2" (356)	2'-6" (762)	1'-2" (356)	2'-6" (762)
C,D	10" (254)	8" (203)	6" (152)	1'-5 1/2" (445)	2'-0" (610)	1'-3" (381)	2'-9" (838)	1'-3" (381)	2'-9" (838)
E,F	14" (355)	10" (254)	8" (203)	1'-7" (483)	2'-2" (660)	1'-4" (406)	3'-0" (914)	1'-4" (406)	3'-0" (914)
G,H	14" (355)	10" (254)	8" (203)	2'-0" (610)	2'-3 1/2" (699)	1'-3 1/2" (394)	3'-3 1/2" (1,003)	1'-3 1/2" (394)	3'-3 1/2" (1,003)
I,J,K,L	16" (406)	12" (305)	10" (254)	2'-1 1/4" (641)	2'-6" (762)	1'-5" (432)	3'-7" (1092)	1'-5" (432)	3'-7" (432)

NOTES:

1. Standard water nozzles are furnished as welding stub-outs with grooves, allowing the option of welding, flanges, or use of Victaulic couplings. Factory-installed, class 150 (ANSI B16.5, round slip-on, forged carbon steel with 1/16" raised face), water flanged nozzles are optional (add 1/2" to nozzle length). Companion flanges, nuts, bolts, and gaskets are not furnished.
2. One-, two- and three-pass nozzle arrangements are available only in pairs shown and for all shell codes. Any pair of evaporator nozzles may be used in combination with any pair of condenser nozzles.
3. Evaporator and condenser water must enter the waterbox through the bottom connection to achieve rated performance.
4. Connected piping should allow for removal of compact waterboxes for tube access and cleaning.
5. Add dimension "M" as shown on the unit dimensions page for the appropriate isolator type.
6. Standard 150 PSI design pressure boxes shown.

FIGURE 19 - DIMENSIONS – EVAPORATOR COMPACT WATERBOXES A THRU L EVAPORATORS

EVAPORATORS – COMPACT WATERBOXES – M THRU Z EVAPORATORS - FT - IN (MM)



SHELL CODES	1 PASS	
	IN	OUT
M–Z	AA	HH
	HH	AA

SHELL CODES	2 PASS	
	IN	OUT
M,N,P,Q	CC	BB
	KK	JJ

SHELL CODES	2 PASS	
	IN	OUT
R,S,W, X and Z	DD	CC
	EE	BB
	LL	KK
	MM	JJ

SHELL CODES	3 PASS	
	IN	OUT
M–Z	GG	NN
	PP	FF

LD07173a

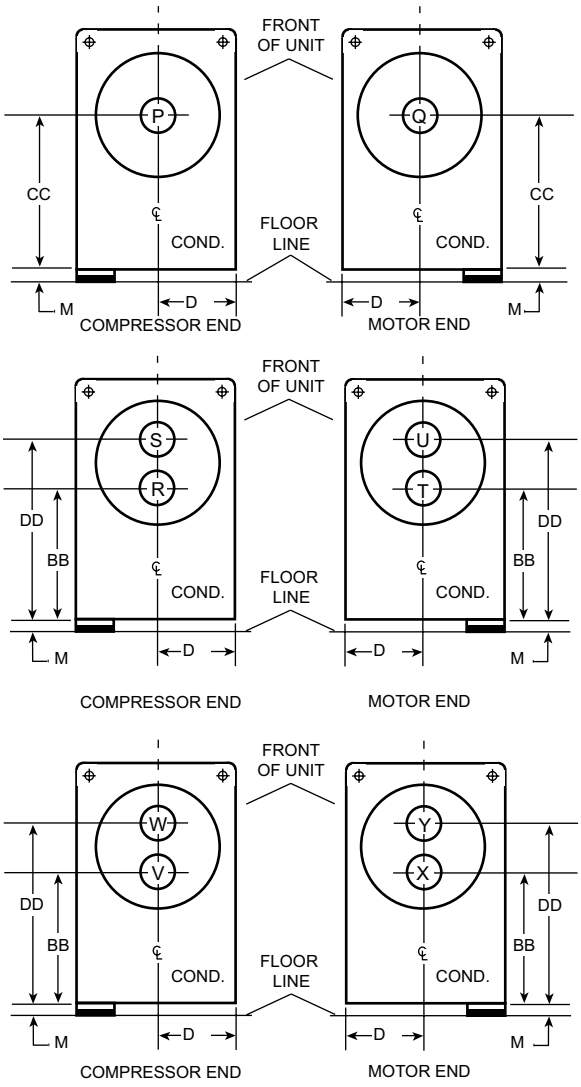
COMPACT WATERBOXES – 150 PSI RECTANGULAR										
EVAPORATOR SHELL CODE	NOZZLE PIPE SIZE IN (MM)			EVAPORATOR NOZZLE DIMENSIONS FT-IN (MM)						
	NUMBER OF PASSES			1-PASS		2-PASS			3-PASS	
	1	2	3	C	AA[5]	BB[5]	DD[5]	EE	BB[5]	DD[5]
M,N	18" (457)	14" (356)	12" (304)	2'-4 1/2" (724)	3'-0" (914)	1'-8 1/2" (521)	4'-3 1/2" (1308)	-	1'-8 1/2" (521)	4'-3 1/2" (1308)
P,Q	18" (457)	14" (356)	12" (304)	2'-5 1/2" (749)	3'-1 1/2" (953)	1'-10" (559)	4'-5" (1346)	-	1'-10" (559)	4'-5" (1346)
QV, QT	20" (508)	16" (406)	12" (305)	2'-5 1/2" (749)	3'-1 1/2" (953)	1'-11 1/2" (597)	4'-3 1/2" (1308)	-	1'-11 1/2" (597)	4'-3 1/2" (1308)
R,S,W	20" (508)	18" (457)	14" (356)	2'-8" (813)	3'-5 1/4" (1048)	2'-4 1/2" (724)	4'-6 1/2" (1384)	0'-10 1/2" (267)	2'-1" (635)	4'-10" (1473)
X,Z	20" (508)	18" (457)	14" (356)	2'-11 1/2" (902)	3'-9 3/4" (1162)	2'-8 3/4" (832)	4'-10 3/4" (1492)	0'-11" (279)	2'-2 7/8" (683)	5'-4 5/8" (1641)

See Notes on page 30.

FIGURE 20 - DIMENSIONS – EVAPORATOR COMPACT WATERBOXES M THRU Z EVAPORATORS

2

CONDENSER – COMPACT WATERBOXES – STANDARD - FT - IN (MM)



NOZZLE ARRANGEMENTS		
NUMBER OF PASSES	CONDENSER	
	IN	OUT
1	P	Q
	Q	P

NOZZLE ARRANGEMENTS		
NUMBER OF PASSES	CONDENSER	
	IN	OUT
2	R	S
	T	U

NOZZLE ARRANGEMENTS		
NUMBER OF PASSES	CONDENSER	
	IN	OUT
3	V	Y
	X	W

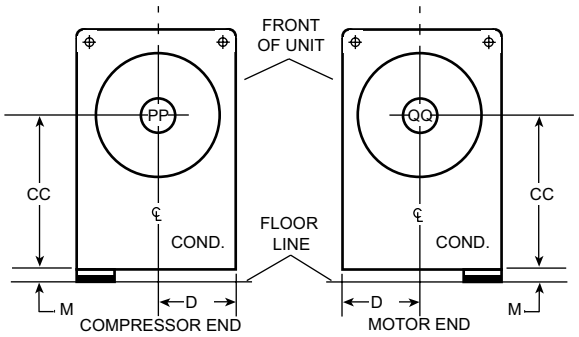
LD07131a

COMPACT WATERBOXES – 150 PSI ROUND									
CONDENSER SHELL CODE	NOZZLE PIPE SIZE IN (MM)			CONDENSER NOZZLE DIMENSIONS FT-IN (MM)					
	NUMBER OF PASSES			1-PASS		2-PASS		3-PASS	
	1	2	3	D	CC[5]	BB[5]	DD[5]	BB[5]	DD[5]
A	10" (254)	6" (152)	6" (152)	1'-3" (381)	2'-4" (711)	1'-9 1/2" (546)	2'-10 1/2" (876)	1'-9 1/2" (546)	2'-10 1/2" (876)
C,D	12" (305)	8" (203)	6" (152)	1'-3 1/2" (394)	2'-6" (762)	1'-10 3/8" (568)	3'-1 5/8" (956)	1'-10 3/8" (568)	3'-1 5/8" (956)
E,F	14" (356)	10" (254)	8" (203)	1'-5 1/2" (445)	2'-8" (813)	1'-11 3/4" (603)	3'-4 1/4" (1022)	1'-11 3/4" (603)	3'-4 1/4" (1022)
J,K,L	16" (406)	10" (254)	10" (254)	1'-8" (508)	3'-0" (914)	2'-3" (686)	3'-9" (1,143)	2'-3" (686)	3'-9" (1,143)
M,N	20" (508)	14" (356)	10" (254)	1'-11" (584)	3'-6" (1067)	2'-6 3/8" (772)	4'-5 5/8" (1,362)	2'-6 3/8" (772)	4'-5 5/8" (1,362)
P,Q	20" (508)	16" (406)	14" (356)	2'-1 1/4" (641)	3'-8" (1118)	2'-7" (787)	4'-9" (1,448)	2'-7" (787)	4'-9" (1,448)

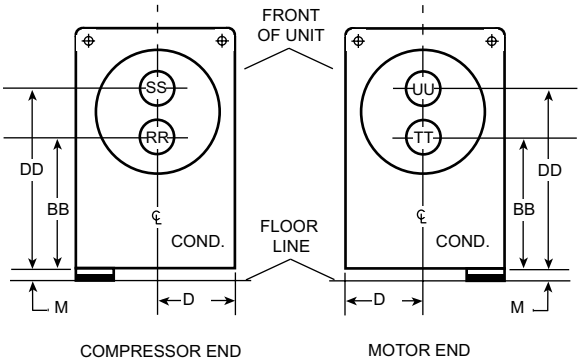
See Notes on page 30.

FIGURE 21 - DIMENSIONS – CONDENSER COMPACT WATERBOXES - STANDARD (MM)

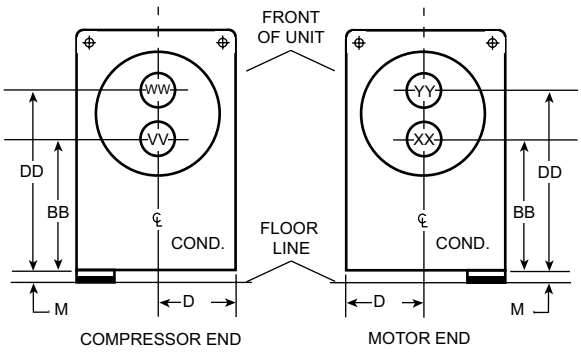
CONDENSER – COMPACT WATERBOXES – STANDARD - FT - IN (MM)



NOZZLE ARRANGEMENTS		
NUMBER OF PASSES	CONDENSER	
	IN	OUT
1	PP	QG
	QQ	PP



NOZZLE ARRANGEMENTS		
NUMBER OF PASSES	CONDENSER	
	IN	OUT
2	RR	SS
	TT	UU



NOZZLE ARRANGEMENTS		
NUMBER OF PASSES	CONDENSER	
	IN	OUT
3	VV	YY
	XX	WW

LD07131b

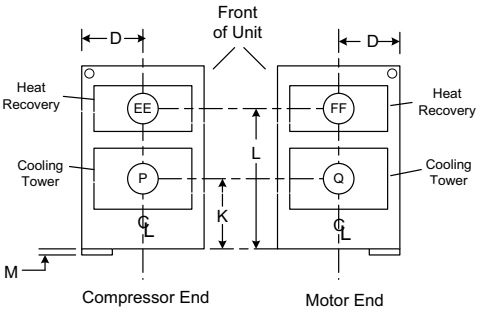
COMPACT WATERBOXES – 150 PSI ROUND									
CONDENSER SHELL CODE	NOZZLE PIPE SIZE IN (MM)			CONDENSER NOZZLE DIMENSIONS FT-IN (MM)					
	NUMBER OF PASSES			1-PASS		2-PASS		3-PASS	
	1	2	3	D	CC[5]	BB[5]	DD[5]	BB[5]	DD[5]
R,S	20" (508)	18" (457)	14" (356)	2'-3 1/2" (699)	3'-10 1/2" (1181)	2'-9 1/2" (851)	4'-11 1/2" (1,511)	2'-9 1/2" (851)	4'-11 1/2" (1,511)
T,V,W	24" (610)	18" (457)	16" (406)	2'-5 1/2" (749)	3'-11 1/2" (1207)	2'-9" (838)	5'-2" (1,575)	2'-9" (838)	5'-2" (1,575)
X,Z	24" (610)	20" (508)	16" (406)	2'-8" (813)	4'-1 1/4" (1251)	2'-9 1/4" (845)	5'-5 1/4" (1,657)	2'-9 1/4" (845)	5'-5 1/4" (1,657)

See Notes on page 30.

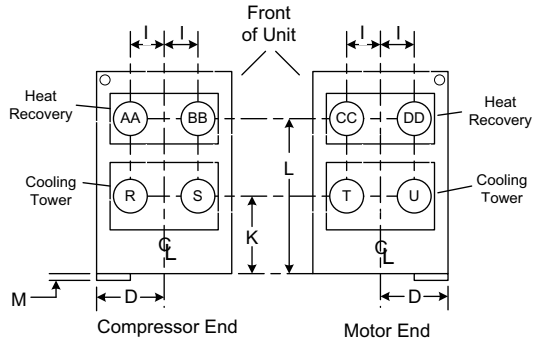
FIGURE 22 - DIMENSIONS – CONDENSER COMPACT WATERBOXES - STANDARD (MM)

2

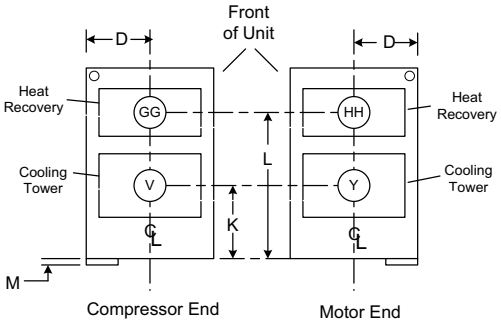
CONDENSER – HEAT RECOVERY COMPACT WATERBOXES – STANDARD - FT - IN (MM)



	1 PASS NOZZLE ARRANGEMENTS	
	IN	OUT
HEAT RECOVERY	EE FF	FF EE
COOLING TOWER	P Q	Q P



	2 PASS NOZZLE ARRANGEMENTS	
	IN	OUT
HEAT RECOVERY	AA BB CC DD	BB AA DD CC
COOLING TOWER	R S T U	S R U T



	2 PASS NOZZLE ARRANGEMENTS	
	IN	OUT
HEAT RECOVERY	GG HH	HH GG
COOLING TOWER	V Y	Y V

LD07131c

HEAT RECOVERY COMPACT WATERBOXES – 150 PSI RECTANGULAR							
CONDENSER SHELL CODE	NOZZLE PIPE SIZE IN (MM)			CONDENSER NOZZLE DIMENSIONS FT-IN (MM)			
	NUMBER OF PASSES			1, 2 OR 3 PASS			2 PASS
	1	2	3	D	K	L	I
B	10" (254)	8" (203)	6" (152)	1'-8 7/8" (530)	1'-9 1/4" (540)	3'-6 1/2" (1,018)	0'-9 1/16" (230)
I	14" (355)	10" (254)	8" (203)	1'-11 3/8" (594)	1'-10 1/4" (565)	3'-8 1/8" (1,121)	0'-10 1/8" (257)
O	16" (406)	12" (304)	10" (254)	2'-3 3/8" (695)	2'-0 3/8" (619)	4'-1 1/8" (1,248)	0'-11 13/16" (300)
U	18" (457)	14" (355)	10" (254)	2'-4 1/2" (724)	2'-11 3/16" (894)	5'-2 13/16" (1,595)	1'-0 3/8" (314)
Y	24" (609)	20" (508)	16" (406)	3'-4" (1,016)	3'-3 15/16" (1,014)	6'-3 7/8" (1,927)	1'-5 7/8" (454)

See Notes on page 30.

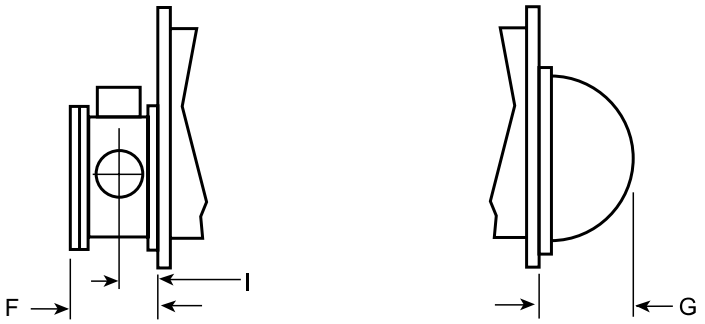
FIGURE 23 - DIMENSIONS – CONDENSER HEAT RECOVERY COMPACT WATERBOXES - STANDARD (MM)

EVAPORATOR – NOZZLE ARRANGEMENTS – STANDARD - FT - IN (MM)

EVAPORATOR 1-PASS	
IN	OUT
1	6
6	1

EVAPORATOR 2-PASS	
IN	OUT
2	3
7	8

EVAPORATOR 3-PASS	
IN	OUT
5	10
9	4



(2-PASS RETURN HEAD)

LD01342c

EVAPORATOR SHELL CODE	EVAPORATOR NOZZLE DIMENSIONS FT-IN (MM)						
	1-PASS		2-PASS			3-PASS	
	F	I	F	G	I	F	I
A	1'-7" (483)	0'-8 3/4" (222)	1'-5" (432)	0'-6 1/2" (165)	0'-7 3/4" (197)	1'-5" (432)	0'-7 3/4" (197)
C,D	1'-10 3/4' (578)	0'-10 5/8" (270)	1'-8 5/8" (524)	0'-7" (178)	0'-9 1/2" (241)	1'-8 5/8" (524)	0'-9 1/2" (241)
E,F	2'-1 3/4" (654)	1'-0 1/8" (308)	1'-10" (559)	0'-7 1/2" (191)	0'-10 1/4" (260)	1'-10" (559)	0'-10 1/4" (260)
G,H	2'-5 5/8" (752)	1'-1 7/8" (352)	2'-5 5/8" (752)	1'-9 7/8" (556)	1'-1 7/8" (352)	2'-5 5/8" (752)	1'-1 7/8" (352)
I,J,K,L	2'-9 5/16" (846)	1'-3 1/2" (394)	2'-9 5/16" (846)	2'-0 5/8" (625)	1'-3 1/2" (394)	2'-9 5/16" (846)	1'-3 1/2" (394)
M,N	2'-11" (889)	1'-4" (406)	2'-6" (762)	1'-0 1/4" (311)	1'-1 1/2" (343)	2'-4" (711)	1'-0 1/4" (311)
P,Q	3'-5" (1041)	1'-7" (483)	3'-0" (914)	0'-11" (279)	1'-4 1/2" (419)	2'-10" (864)	1'-3 1/4" (387)
QT, QV	2'-8" (813)	1'-2 1/2" (368)	2'-4" (711)	1'-1 1/2" (343)	1'-0 1/2" (318)	2'-4" (711)	1'-0 1/2" (318)
R,S,W	2'-8" (813)	1'-2 5/8" (371)	2'-6" (762)	1'-2 1/2" (368)	1'-1 5/8" (346)	2'-6" (762)	1'-1 5/8" (346)
X,Z	3'-1" (940)	1'-4 1/4" (413)	2'-8 1/2" (826)	1'-2" (356)	1'-1 5/8" (346)	2'-6 1/2" (775)	1'-1" (330)

NOTES:

1. All dimensions are approximate.
2. Standard water nozzles are Schedule 40 pipe size, furnished as welding stub-outs with grooves, allowing the option of welding, flanges, or use of Victaulic couplings. Factory-installed, class 150 (ANSI B16.5, round slip-on, forged carbon steel with 1/16" raised face), water flanged nozzles are optional (add 1/2" to nozzle length). Companion flanges, nuts, bolts, and gaskets are not furnished.
3. One-, two-, and three-pass nozzle arrangements are available only in pairs shown and for all shell codes. Any pair of evaporator nozzles may be used in combination with any pair of condenser nozzles. Compact waterboxes on one heat exchanger may be used with Marine Waterboxes on the other heat exchanger.
4. Condenser water must enter the waterbox through the bottom connection for proper operation of the sub-cooler to achieve rated performance.
5. Add dimension "M" as shown on pages per unit dimensions page for the appropriate isolator type.

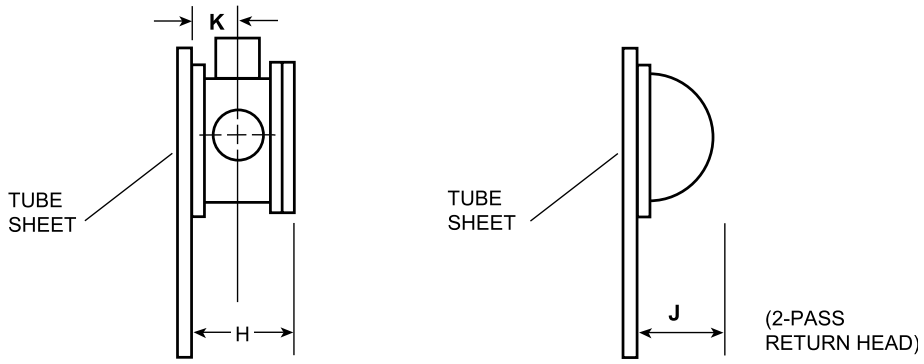
FIGURE 24 - DIMENSIONS – EVAPORATOR NOZZLE ARRANGEMENTS - STANDARD (MM)

CONDENSER – NOZZLE ARRANGEMENTS – STANDARD - FT - IN (MM)

CONDENSER 1-PASS	
IN	OUT
11	16
16	11

CONDENSER 2-PASS	
IN	OUT
12	13
17	18

CONDENSER 3-PASS	
IN	OUT
15	20
19	14

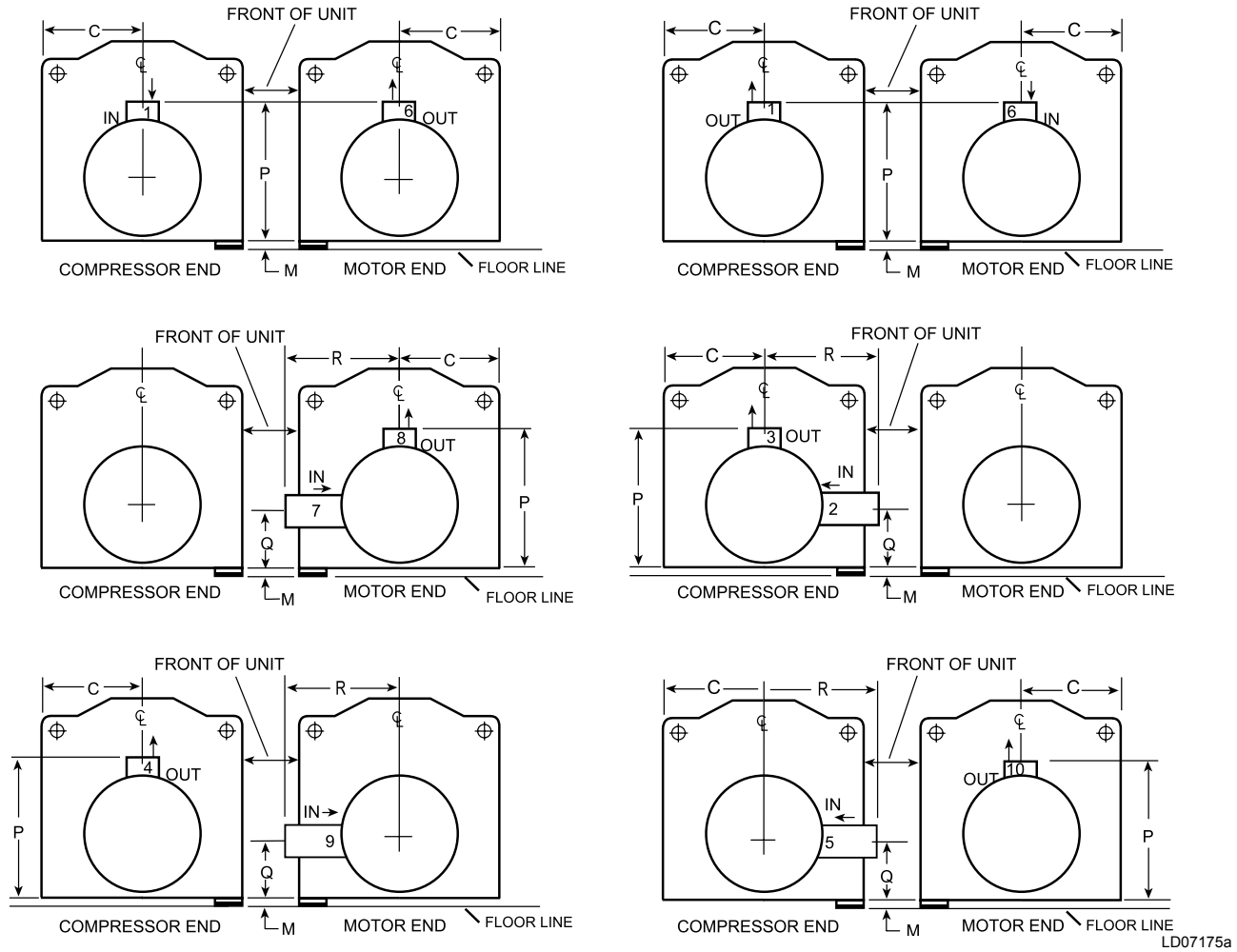


CONDENSER SHELL CODE	CONDENSER NOZZLE DIMENSIONS FT-IN (MM)						
	1-PASS		2-PASS			3-PASS	
	H	K	H	J	K	H	K
A	1'-9" (533)	0'-9 7/8" (251)	1'-4 3/4" (425)	0'-6" (152)	0'-7 3/4" (197)	1'-4 3/4" (425)	0'-7 3/4" (197)
B[6]	1'-10 1/2" (572)	0'-10 1/2" (267)	1'-8" (508)	0'-10 1/2" (267)	0'-9 1/4" (235)	1'-8" (508)	0'-9 1/4" (235)
C,D	2'-0" (610)	0'-11 1/8" (283)	1'-7 1/2" (495)	0'-6 3/8" (162)	0'-9" (229)	1'-7 1/2" (495)	0'-9" (229)
E,F	2'-0 1/2" (622)	0'-11 1/2" (292)	1'-10 1/4" (565)	0'-7" (178)	0'-9 7/8" (251)	1'-10 1/4" (565)	0'-9 7/8" (251)
I[6]	2'-3" (686)	1'-0 3/4" (324)	1'-10 1/2" (572)	0'-11 1/2" (292)	0'-10 1/2" (267)	1'-10 1/2" (572)	0'-10 1/2" (267)
J,K,L	2'-8 3/8" (822)	1'-3 3/8" (391)	2'-8 3/8" (822)	0'-7 1/2" (191)	1'-3 3/8" (391)	2'-8 3/8" (822)	1'-3 3/8" (391)
M,N	2'-11" (889)	1'-4" (406)	2'-11" (889)	1'-0" (305)	1'-4" (406)	2'-11" (889)	1'-4" (406)
O[6]	2'-6 1/4" (768)	1'-2 1/4" (362)	2'-1 3/4" (654)	1'-1 1/2" (343)	1'-0" (305)	2'-1 3/4" (654)	1'-0" (305)
P,Q	2'-8" (813)	1'-2 1/2" (368)	2'-4" (711)	0'-9 1/2" (241)	1'-0 1/2" (318)	2'-4" (711)	1'-0 1/2" (318)
R,S	2'-8" (813)	1'-2 1/2" (368)	2'-6" (762)	1'-0" (305)	1'-1 1/2" (343)	2'-6" (762)	1'-1 1/2" (343)
T,V,W	3'-0" (914)	1'-4 1/2" (419)	2'-6" (762)	0'-11" (279)	1'-1 1/2" (343)	2'-6" (762)	1'-1 1/2" (343)
U[6]	2'-8" (813)	1'-3" (381)	2'-4" (711)	1'-2 1/4" (362)	1'-1" (330)	2'-4" (711)	1'-1" (330)
X,Z	3'-5 1/2" (1,054)	1'-6 1/2" (470)	3'-0 1/2" (927)	1'-2" (356)	1'-4 1/4" (413)	2'-9 1/2" (851)	1'-2" (356)
Y[6]	3'-4 3/4" (1,035)	1'-7 1/4" (489	3'-0 1/4" (921)	1'-8 3/4" (527)	1'-5" (432)	3'-0 1/4" (921)	1'-5" (432)

NOTES:
1. All dimensions are approximate.
2. Standard water nozzles are Schedule 40 pipe size, furnished as welding stub-outs with grooves, allowing the option of welding, flanges, or use of Victaulic couplings. Factory-installed, class 150 (ANSI B16.5, round slip-on, forged carbon steel with 1/16" raised face), water flanged nozzles are optional (add 1/2" to nozzle length). Companion flanges, nuts, bolts, and gaskets are not furnished.
3. One-, two-, and three-pass nozzle arrangements are available only in pairs shown and for all shell codes. Any pair of evaporator nozzles may be used in combination with any pair of condenser nozzles. Compact waterboxes on one heat exchanger may be used with Marine Waterboxes on the other heat exchanger.
4. Condenser water must enter the waterbox through the bottom connection for proper operation of the sub-cooler to achieve rated performance.
5. Add dimension "M" as shown on pages per unit dimensions page for the appropriate isolator type.
6. Heat recovery units offer marine waterbox option for tower (lower) bundle only.

FIGURE 25 - DIMENSIONS – CONDENSER NOZZLE ARRANGEMENTS - STANDARD (MM)

EVAPORATOR MARINE WATERBOX NOZZLE ARRANGEMENTS - FT. - IN. (MM)

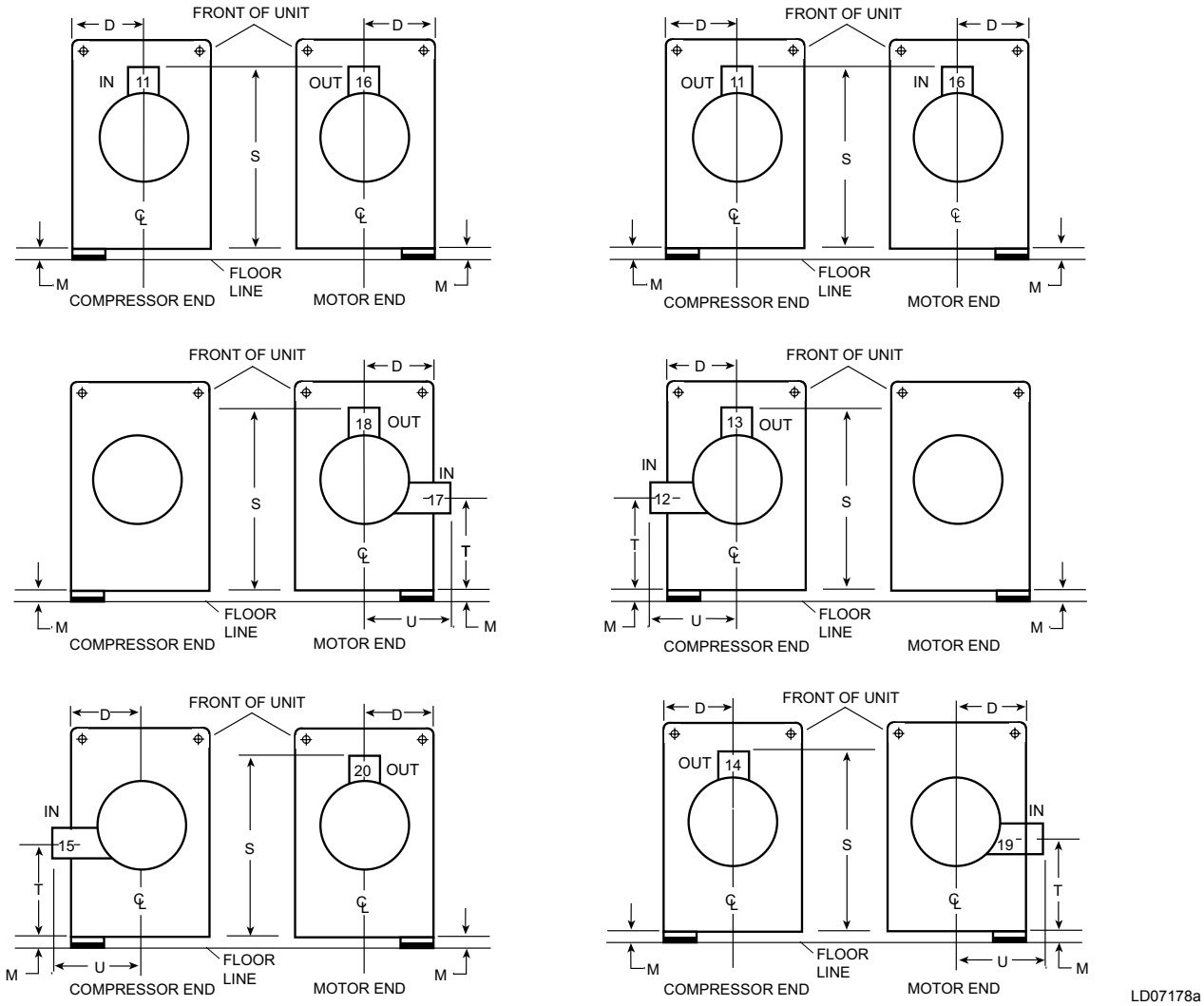


MARINE WATERBOXES – 150 PSI ROUND											
EVAP SHELL CODE	NOZZLE PIPE SIZE IN (MM) NUMBER OF PASSES			1-PASS		2-PASS			3-PASS		
	1	2	3	C	P[5]	P[5]	Q[5]	R	P[5]	Q[5]	R
A	8" (203)	6" (152)	4" (101)	1'-3 1/2" (394)	3'-7" (1092)	3'-7" (1092)	0-11" (279)	1'-3 1/4" (387)	3'-7" (1092)	0'-11" (279)	1'-3 1/4" (387)
C,D	10" (254)	8" (203)	6" (152)	1'-5 1/2" (445)	3'-11" (1194)	3'-11" (1194)	0'-10" (254)	1'-6 1/2" (470)	3'-11" (1194)	0'-10" (254)	1'-6 1/2" (470)
E,F	14" (356)	10" (254)	8" (203)	1'-7 1/2" (495)	4'-3" (1295)	4'-3" (1295)	0'-11" (279)	1'-9 1/2" (546)	4'-3" (1295)	0'-11" (279)	1'-9 1/2" (546)
G,H	14" (356)	10" (254)	8" (203)	2'-0" (610)	4'-5 1/2" (1359)	4'-5 1/2" (1359)	1'-0 1/2" (318)	1'-11 1/2" (597)	4'-5 1/2" (1359)	0'-11" (279)	1'-9 7/8" (556)
I,J,K,L	16" (406)	12" (305)	10" (254)	2'-1 1/4" (641)	5'-0 3/8" (1,534)	5'-0 3/8" (1,534)	0'-10 1/2" (267)	2'-2 1/2" (673)	5'-0 3/8" (1,534)	0'-10 1/2" (267)	2'-2 1/2" (673)
M,N	18" (457)	14" (356)	12" (305)	2'-4 1/2" (724)	5'-8 1/2" (1,740)	5'-8 1/2" (1,740)	1'-2" (356)	2'-2 1/2" (673)	5'-8 1/2" (1,740)	1'-2" (356)	2'-4 3/4" (730)
P,Q	18" (457)	14" (356)	12" (305)	2'-5 1/2" (749)	6'-0 1/8" (1,832)	6'-0 1/8" (1,832)	1'-3" (381)	2'-6 1/2" (775)	6'-0 1/8" (1,832)	1'-3" (381)	2'-6 1/2" (775)
QT, QV	20" (508)	16" (406)	12" (305)	2'-5 1/2" (749)	6'-0 1/8" (1,832)	6'-0 1/8" (1,832)	1'-4 1/2" (419)	2'-6 1/2" (775)	6'-0 1/8" (1,832)	1'-4 1/2" (419)	2'-6 1/2" (775)
R,S	20" (508)	18" (457)	14" (356)	2'-8" (813)	6'-5 7/8" (1,978)	6'-5 7/8" (1,978)	1'-3 3/4" (400)	3'-0 1/8" (918)	6'-5 7/8" (1,978)	1'-3 3/4" (400)	3'-0 1/8" (918)
W	20" (508)	18" (457)	14" (356)	2'-8" (813)	6'-5 7/8" (1,978)	6'-5 7/8" (1,978)	1'-3 3/4" (400)	3'-0 1/8" (918)	6'-5 7/8" (1,978)	1'-3 3/4" (400)	3'-0 1/8" (918)
X,Z	20" (508)	18" (457)	14" (356)	2'-11 1/2" (902)	6'-11 1/2" (2121)	6'-11 1/2" (2121)	2'-1 3/4" (654)	3'-2 1/8" (968)	6'-11 1/2" (2121)	1'-8 1/4" (514)	3'-2 1/8" (968)

FIGURE 26 - DIMENSIONS – EVAPORATOR MARINE WATERBOXES

2

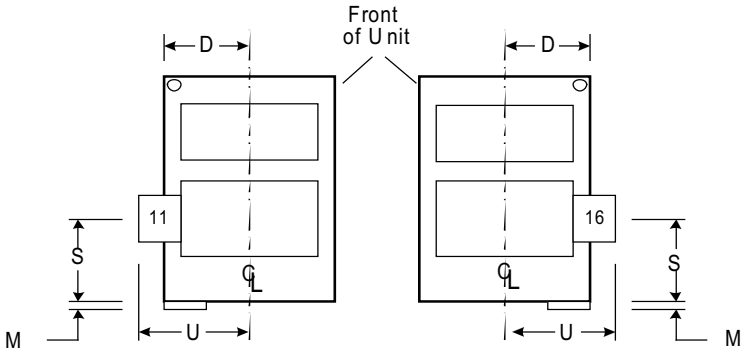
CONDENSER MARINE WATERBOX NOZZLE ARRANGEMENTS - FT. - IN. (MM)



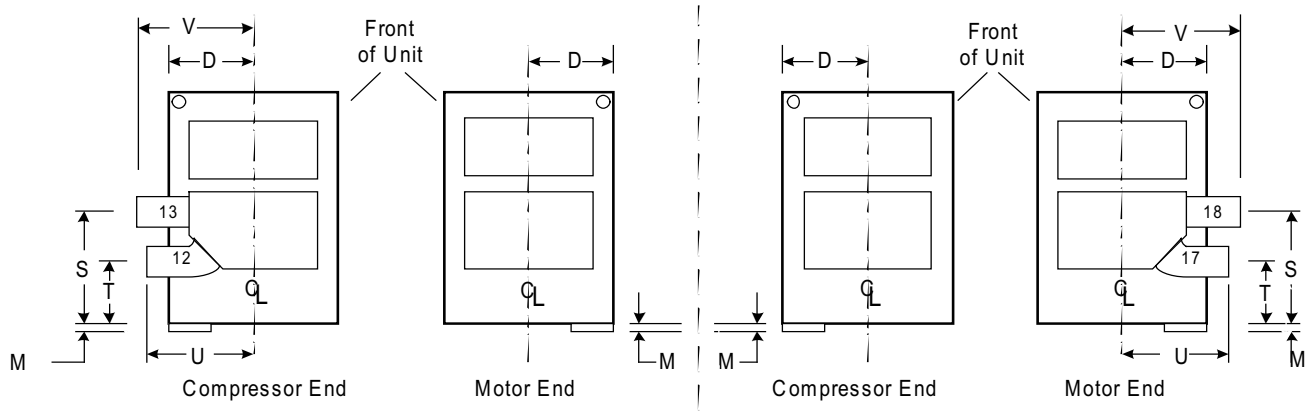
MARINE WATER BOXES – 150 PSI ROUND											
CONDENSER SHELL CODE	NOZZLE PIPE SIZE IN (MM) NUMBER OF PASSES			1-PASS		2-PASS			3-PASS		
	1	2	3	D	S[5]	S[5]	T[5]	U	S[5]	T[5]	U
A	10" (254)	6" (152)	6" (152)	1'-3" (381)	3'-11" (1,194)	3'-11" (1,194)	1'-8" (508)	1'-3 3/8" (391)	3'-11" (1,194)	1'-8" (508)	1'-3 3/8" (391)
C,D	12" (305)	8" (203)	6" (152)	1'-3 1/2" (394)	4'-3" (1,295)	4'-3" (1,295)	1'-8" (508)	1'-6 1/2" (470)	4'-3" (1295)	1'-8" (508)	1'-6 1/2" (470)
E,F	14" (356)	10" (254)	8" (203)	1'-5 1/2" (445)	4'-7" (1,397)	4'-7" (1,397)	1'-10" (559)	1'-9" (533)	4'-7" (1,397)	1'-10" (559)	1'-9" (533)
J,K,L	16" (406)	10" (254)	10" (254)	1'-8" (508)	5'-1" (1,549)	5'-1" (1,549)	1'-9" (533)	1'-9 1/2" (546)	5'-1" (1,549)	1'-9" (533)	1'-9 1/2" (546)
M,N	20" (508)	14" (356)	10" (254)	1'-11" (584)	5'-9 7/8" (1,775)	5'-9 7/8" (1,775)	2'-4" (711)	2'-1 1/2" (648)	5'-9 7/8" (1,775)	2'-4" (711)	2'-1 1/2" (648)
P,Q	20" (508)	16" (406)	14" (356)	2'-1 1/4" (641)	6'-2 3/8" (1,889)	6'-2 3/8" (1,889_	2'-4 1/2" (724)	2'-5 1/2" (749)	6'-2 3/8" (1,889)	2'-4 1/2" (724)	2'-5 1/2" (749)
R,S	20" (508)	18" (457)	14" (356)	2'-3 1/2" (699)	6'-7" (2007)	6'-7" (2007)	2'-6 1/2" (775)	2'-8 1/2" (825)	6'-7" (2007)	2'-6 1/2" (775)	2'-8 1/2" (826)
T,V,W	24" (610)	18" (457)	16" (406)	2'-5 1/2" (749)	6'-10 1/4" (2,089)	6'-10 1/4" (2,089)	2'-6" (762)	2'-10" (864)	6'-10 1/4" (2,089)	2'-6" (762)	2'-10" (864)
X,Z	24" (610)	20" (508)	16" (406)	2'-8" (813)	7'-2" (2184)	7'-2" (2184)	2'-7 3/4" (806)	2'-11 1/2" (902)	7'-2" (2184)	2'-7 3/4" (806)	2'-11 1/2" (902)

FIGURE 27 - DIMENSIONS – CONDENSER MARINE WATERBOXES

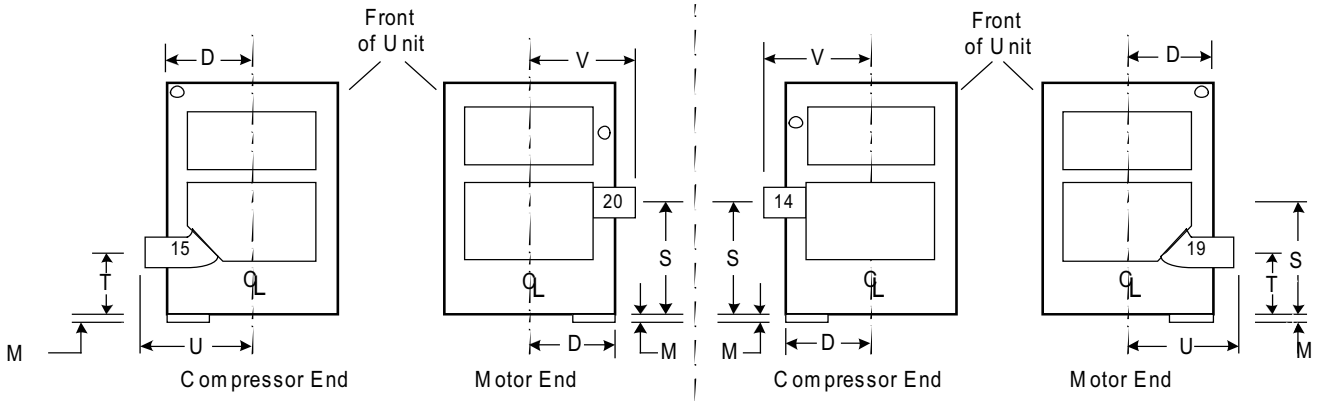
CONDENSERS MARINE WATERBOXES HEAT RECOVERY UNITS - MAIN (TOWER) CIRCUIT ONLY



CONDENSER NOZZLE OPTIONS	COOLING WATER	
	IN	OUT
1 PASS	11	16
	16	11



CONDENSER NOZZLE OPTIONS	COOLING WATER	
	IN	OUT
2 PASS	12	13
	17	18



CONDENSER NOZZLE OPTIONS	COOLING WATER	
	IN	OUT
3 PASS	15	20
	19	14

CONDENSERS MARINE WATERBOXES HEAT RECOVERY UNITS - MAIN (TOWER) CIRCUIT ONLY

MARINE WATER BOXES - 150 PSI (RECTANGULAR)								
CONDENSER SHELL CODE	NOZZLE PIPE SIZE IN (MM) NUMBER OF PASSES				1 PASS			
	1	2	3	D	S		U	
B	10" (254)	8" (203)	6" (152)	1'-8 7/8" (530)	1'-9 1/4" (539)		2'-6 3/4" (780)	
I	14" (355)	10" (254)	8" (203)	1'-11 3/8" (593)	1'-10 1/4" (559)		2'-9 3/8" (838)	
O	16" (406)	12" (305)	10" (254)	2'-3 3/8" (695)	2'-0 3/8" (610)		3'-2 3/8" (975)	
U	18" (457)	14" (355)	10" (254)	2'-4 1/2" (723)	2'-11 3/16" (893)		3'-5 9/16" (1056)	
Y	24" (610)	20" (508)	16" (406)	3'-4" (1016)	3'-3 15/16" (1014)		4'-7 9/16" (1411)	
2 PASS								
	1	2	3	D	S	T	U	V
B	10" (254)	8" (203)	6" (152)	1'-8 7/8" (530)	2'-3 7/16" (697)	1'-1 15/16" (338)	2'-4 3/4" (730)	2'-7 1/8" (790)
I	14" (355)	10" (254)	8" (203)	1'-11 3/8" (593)	2'-4 1/2" (723)	1'-1" (330)	2'-5 1/8" (740)	2'-10 5/8" (879)
O	16" (406)	12" (305)	10" (254)	2'-3 3/8" (695)	2'-7 1/8" (790)	1'-1 3/8" (339)	2'-10 1/4" (870)	3'-4 1/2" (1029)
U	18" (457)	14" (355)	10" (254)	2'-4 1/2" (723)	3'-6 9/16" (1081)	1'-11 3/16" (589)	3'-1 7/8" (962)	3'-7 1/2" (1105)
Y	24" (610)	20" (508)	16" (406)	3'-4" (1016)	4'-2 5/16" (1278)	1'-10 5/16" (582)	4'-4 3/4" (1340)	4'-11 11/16" (1516)
3 PASS								
	1	2	3	D	S	T	U	V
B	10" (254)	8" (203)	6" (152)	1'-8 7/8" (530)	2'-4 1/2" (723)	1'-5 1/2" (444)	2'-6 3/4" (780)	2'-6 3/4" (780)
I	14" (355)	10" (254)	8" (203)	1'-11 3/8" (593)	2'-5 1/2" (749)	1'-6 3/8" (466)	2'-9 1/8" (841)	2'-9 1/8" (841)
O	16" (406)	12" (305)	10" (254)	2'-3 3/8" (695)	2'-8 3/8" (822)	1'-7 5/8" (498)	3'-1 7/8" (962)	3'-1 7/8" (962)
U	18" (457)	14" (355)	10" (254)	2'-4 1/2" (723)	3'-8 3/16" (1122)	2'-5 15/16" (760)	3'-0 11/16" (932)	3'-3" (991)
Y	24" (610)	20" (508)	16" (406)	3'-4" (1016)	4'-4 5/16" (1328)	2'-7 7/16" (798)	4'-2 1/16" (1271)	4'-6 13/16" (1392)

NOTE: Add dimension "M" as shown on pages 27 or 28.

TABLE 2 - APPROXIMATE UNIT WEIGHT INCLUDING MOTOR FOR FLOODED EVAPORATOR UNITS - LBS (KGS)

SHELLS	COMPRESSOR	SHIPPING WEIGHT LBS (KGS)	OPERATING WEIGHT LBS (KGS)	ESTIMATE REFRIGERANT CHARGE LBS (KGS)
A-A	Q3	13,100 (5,942)	15,000 (6,804)	810 (367)
C-B	Q4	18,023 (8,175)	22,323 (10,126)	1,525 (692)
C-C	Q3, Q4	14,920 (6,768)	17,940 (8,138)	1,240 (562)
C-C	Q5	15,330 (6,954)	18,350 (8,324)	1,240 (562)
D-D	Q3, Q4	17,215 (7,809)	21,100 (9,571)	1,680 (762)
D-D	Q5	17,625 (7,995)	21,510 (9,757)	1,680 (762)
E-E	Q3, Q4	17,950 (8,142)	22,160 (10,052)	1,710 (776)
E-E	Q5,Q6,Q7,P7	18,360 (8,328)	22,570 (10,238)	1,710 (776)
E-I	Q7	23,567 (10,690)	29,384 (13,328)	1,805 (819)
F-F	Q5,Q6,Q7,P7	18,720 (8,491)	23,880 (10,832)	2,175 (987)
G-E	P8	20,300 (9,208)	24,200 (10,977)	1,990 (903)
H-F	P8,P9	23,100 (10,478)	28,000 (12,701)	2,610 (1,184)
J-J	P8,P9	24,000 (10,886)	29,100 (13,200)	2,550 (1,157)
L-L	P8,P9	27,400 (12,429)	33,900 (15,377)	3,165 (1,436)
K-K	H9	28,530 (12,941)	36,000 (16,329)	2,925 (1,327)
K-K	K1	31,100 (14,107)	36,200 (16,420)	3,248 (1,473)
K-O	H9	34,483 (15,641)	44,776 (20,310)	3,260 (1,479)
M-M	H9	34,200(15,513)	43,600 (19,777)	3,665 (1,662)
M-M	K1,K2	38,300 (17,373)	47,100 (21,364)	3,665 (1,662)
M-U	K2	45,178 (20,493)	58,017 (26,316)	3,540 (1,606)
N-N	K1,K2	28,530 (18,549)	50,800 (23,043)	4,225 (1,916)
N-N	K3	48,000 (21,773)	54,100 (24,540)	4,225 (1,916)
P-P	K1,K2	41,500 (18,824)	51,900 (23,542)	3,855 (1,749)
Q-Q	K1,K2	45,300 (20,548)	56,800 (25,764)	4,255 (1,930)
Q-Q	K3	46,000 (20,865)	60,200 (27,307)	4,255 (1,930)
R-R	K3	52,800 (23,950)	70,300 (31,888)	4,660 (2,114)
R-R	K4	53,000 (24,041)	70,600 (32,034)	4,785 (2,170)
S-S	K4	59,000 (26,672)	76,300 (34,609)	4,940 (2,241)
S-V	K4	60,100 (27,261)	81,300 (36,877)	5,500 (2,495)
X-T	K4	59,200 (26,853)	80,000 (36,288)	5,125 (2,325)
X-X	K4	66,000 (29,937)	87,000 (39,463)	5,625 (2,551)
W-W	K7	79,500 (36,061)	104,000 (47,174)	6,900 (3,130)
Z-Y	K7	95,300 (43,196)	123,015 (55,799)	6,555 (2,973)
Z-Z	K7	80,500 (36,515)	105,000 (47,628)	6,275 (2,846)

NOTE: Refrigerant charge quantity and weights will vary based on tube count, configuration, and chiller performance. Use for reference only. Refer to YORKworks Performance Page or chiller nameplate for actual charge requirement.

TABLE 3 - APPROXIMATE UNIT WEIGHT INCLUDING MOTOR FOR HYBRID FALLING FILM EVAPORATOR UNITS - LBS (KGS)

SHELLS	COMPRESSOR	SHIPPING WEIGHT LBS. (KGS)	OPERATING WEIGHT LBS. (KGS)	EST. REFRIGERANT CHARGE LBS. (KGS)
A-A	Q3	12,850 (5584)	14,419 (6266)	695 (302)
C-C	Q3, Q4	14,570 (6331)	16,848 (7321)	875 (380)
C-C	Q5	15,000 (6518)	17,278 (7508)	875 (380)
D-D	Q4	17,000 (7387)	20,051 (8713)	1,180 (513)
D-D	Q5	17,410 (7565)	20,461 (8891)	1,180 (513)
E-E	Q5, Q6, Q7, P7	18,700 (8126)	21,700 (9429)	1,120 (487)
F-F	Q5, Q6, Q7, P7	19,220 (8352)	23,142 (10056)	1,415 (615)
G-E	P8, P9	20,640 (8969)	24,036 (10445)	1,320 (574)
H-F	P8, P9	23,540 (10229)	28,083 (12203)	1,775 (771)
I-K	H9	28,849 (12536)	34,078 (14808)	1,820 (791)
K-K	H9	28,850 (12536)	34,079 (14809)	1,820 (791)
I-K	K1	31,350 (13623)	35,145 (15272)	1,820 (791)
M-M	K1, K2	34,520 (15000)	46,055 (20013)	2,300 (999)
N-N	K1, K2	41,273 (17935)	49,605 (21555)	2,650 (1152)
N-N	K3	48,380 (21023)	52,905 (22989)	2,650 (1152)
P-P	K1, K2	41,950 (18229)	51,595 (22420)	3,100 (1347)
Q-Q	K1, K2	45,800 (19902)	56,545 (24571)	3,500 (1521)
Q-Q	K3	46,500 (20206)	59,945 (26048)	3,500 (1521)

NOTE: Refrigerant charge quantity and weights will vary based on tube count, configuration, and chiller performance. Use for reference only. Refer to YORKworks Performance Page or chiller nameplate for actual charge requirement.

TABLE 4 - EVAPORATOR MARINE WATERBOX WEIGHTS - LBS (KGS)
(TO BE ADDED TO STANDARD UNIT WEIGHTS SHOWN IN TABLES 2 AND 3)

EVAPORATOR CODE	SHIPPING WEIGHT INCREASE - LBS (KGS)			OPERATING WEIGHT INCREASE - LBS (KGS)		
	1-PASS	2-PASS	3-PASS	1-PASS	2-PASS	3-PASS
A	924 (419)	744 (337)	978 (444)	1,468 (666)	1,288 (584)	1,522 (690)
C,D	1,352 (613)	1,114 (505)	1,480 (671)	2,224 (1,009)	1,986 (901)	2,352 (1,067)
E,F	1,878 (852)	1,260 (572)	2,080 (943)	3,378 (1,532)	2,760 (1,252)	3,580 (1,624)
G,H	1,213 550	1,296 (588)	1,293 (587)	2,655 (1,204)	2,738 (1,242)	2,735 (1,241)
I,J,K,L	1,751 (794)	1,843 (836)	1,856 (842)	3,864 (1,753)	3,956 (1,794)	3,969 (1,800)
M,N	4,290 (1,946)	2,036 (924)	4,140 (1,878)	7,535 (3,418)	3,264 (1,481)	6,300 (2,858)
P,Q	5,982 (2,713)	3,281 (1,488)	5,724 (2,596)	10,854 (4,923)	5,277 (2,394)	9,442 (4,283)
R,S,W	4,804 (2,179)	2,700 (1,225)	4,912 (2,228)	8,522 (3,866)	4,516 (2,048)	8,187 (3,714)
X,Z	7,088 (3,215)	3,660 (1,660)	7,244 (3,286)	11,552 (5,240)	5,507 (2,498)	11,243 (5,100)

TABLE 5 - CONDENSER MARINE WATERBOX WEIGHTS - LBS (KGS)
(TO BE ADDED TO STANDARD UNIT WEIGHTS SHOWN IN TABLES 2 AND 3)

CONDENSER CODE	SHIPPING WEIGHT INCREASE - LBS (KGS)			OPERATING WEIGHT INCREASE - LBS (KGS)		
	1-PASS	2-PASS	3-PASS	1-PASS	2-PASS	3-PASS
A	762 (346)	566 (257)	810 (367)	1,274 (578)	1,078 (489)	1,322 (600)
B	1,569 (712)	874 (396)	1,677 (761)	2,113 (958)	1,094 (496)	2,071 (939)
C,D	946 (429)	778 (353)	1,046 (474)	1,692 (767)	1,524 (691)	1,792 (813)
E,F	726 (329)	811 (368)	791 (359)	1,337 (606)	1,722 (781)	1,702 (772)
I	2,066 (937)	1,070 (485)	2,032 (922)	3,017 (1,396)	1,416 (642)	2,738 (1,242)
J,K,L	1,029 (467)	1,167 (529)	1,151 (522)	2,309 (1,047)	2,448 (1,110)	2,431 (1,103)
M,N	2,466 (1,119)	1,330 (603)	2,324 (1,054)	4,863 (2,206)	2,448 (1,110)	4,582 (2,078)
O	2,985 (1,354)	1,443 (655)	2,987 (1,355)	4,435 (2,012)	2,172 (985)	3,979 (1,805)
P,Q	3,700 (1,678)	1,858 (843)	3,752 (1,702)	6,561 (2,976)	3,132 (1,421)	5,991 (2,717)
R,S	3,806 (1,726)	1,946 (883)	3,960 (1,796)	6,657 (3,020)	3,195 (1,449)	6,352 (2,881)
V,T,W	5,196 (2,357)	2,565 (1,163)	5,204 (2,361)	9,161 (4,155)	4,012 (1,820)	8,219 (3,728)
U	3,641 (1,652)	1,893 (859)	3,609 (1,637)	5,350 (2,427)	2,556 (1,159)	4,770 (2,164)
X,Z	5,840 (2,649)	2,953 (1,339)	5,380 (2,440)	9,900 (4,491)	4,649 (2,109)	8,100 (3,674)
Y	9,094 (4,125)	4,762 (2,160)	9,058 (4,109)	13,326 (6,045)	6,524 (2,959)	12,409 (5,465)

The following factors can be used to convert from English to the most common SI Metric values.

TABLE 6 - SI METRIC CONVERSION

MEASUREMENT	MULTIPLY ENGLISH UNIT	BY FACTOR	TO OBTAIN METRIC UNIT
Capacity	Tons Refrigerant Effect (ton)	3.516	Kilowatts (kW)
Power	Horsepower	0.7457	Kilowatts (kW)
Flow Rate	Gallons / Minute (gpm)	0.0631	Liters / Second (l/s)
Length	Feet (ft)	0.3048	Meters (m)
	Inches (in)	25.4	Millimeters (mm)
Weight	Pounds (lbs)	0.4538	Kilograms (kg)
Velocity	Feet / Second (fps)	0.3048	Meters / Second (m/s)
Pressure Drop	Feet of Water (ft)	2.989	Kilopascals (kPa)
	Pounds / Square Inch (psi)	6.895	Kilopascals (kPa)

TEMPERATURE

To convert degrees Fahrenheit (°F) to degrees Celsius (°C), subtract 32° and multiply by 5/9 or 0.5556.

Example: (45.0°F - 32°) x 0.5556 = 27.2°C

To convert a temperature range (i.e., a range of 10°F) from Fahrenheit to Celsius, multiply by 5/9 or 0.5556.

Example: 10.0°F range x 0.5556 = 5.6 °C range

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