| YORK | CENTRIFUGAL LIQUID CHILLERS | |
|---|---|---|
| **INSTALLATION AND REASSEMBLY** | Supersedes: 160.84-N1 (416) | Form 160.84-N1 (1116) |

# YMC² MODEL B
# WITH OPTIVIEW™ CONTROL CENTER


LD17194

Issue Date:
November 22, 2016

# IMPORTANT!

## READ BEFORE PROCEEDING!

### GENERAL SAFETY GUIDELINES

This equipment is a relatively complicated apparatus. During rigging, installation, operation, maintenance, or service, individuals may be exposed to certain components or conditions including, but not limited to: heavy objects, 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 rigging, installation, and 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 rigging, installation, and 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 the on-product labels, this document and any referenced materials. This individual shall also be familiar with and comply with all applicable industry and governmental standards and regulations pertaining to the task in question.

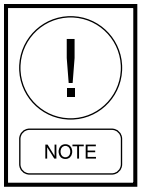
### SAFETY SYMBOLS

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 cabinet. 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 could 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 or product 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.

It is the responsibility of rigging, lifting, and operating/service personnel to verify the applicability of these documents to the equipment. If there is any question regarding the applicability of these documents, rigging, lifting, and operating/service personnel 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 |
|---|---|
| Chiller Operations & Maintenance | 160.84-OM1 |
| Unit Installation Checklist and Request for Startup | 160.84-CL1 |
| Unit Startup Checklist | 160.84-CL2 |
| Field Connections Diagram | 160.84-PW1 |
| Field Control, Wiring and MBC Diagrams | 160.84-PW2 |
| Replacement Parts | 160.84-RP1 |
| Replacement Parts Variable Speed Drive | 160.84-RP3 |
| Liquid Chiller Log Sheet | 160.84-MR1 |
| Centrifugal Chiller Long Term Storage | 50.20-NM5 |
| All Products - Replacement Parts Electrical Connectors | 50.20-RP1 |
| All Products - Replacement Parts Fittings | 50.20-RP2 |

## SYSTEM NOMENCLATURE

**Y M C 2 - S 0756 A B**

- YORK
- Magnetic Bearing
- Centrifugal Chiller
- S = Single Stage
  T = Two Stage
- Capacity in KW
- A = Refrigerant R-134a
  B = Refrigerant R-513a
- Mod Level

## COMPRESSOR NOMENCLATURE

**M2 B - 197 F A C D**

- Motor
- Motor Design Level
- Impeller Tip Diameter (mm)
- Rotation
  F = Forward
  R = Reverse
- Impeller Design Revision Level
- Gas Path Revision Level
- Down Discharge

## VESSEL NOMENCLATURE

**E A 25 14 271 B R 1 1 F C R**

- Vessel
  E = Evaporator
  C = Condenser
- Heat Exchanger Mod Level
- Nominal Inside Diameter (Inches)
- Nominal Length (Feet)
- Marketing Tube Number
- Tube Code
  B = 3/4" Code 1
  C = 3/4" Code 2
  D = 3/4" Code 3
  E = 3/4" Code 4
  2 = 1" Code 1
  3 = 1" Code 2
  4 = 1" Code 3
  5 = 1" Code 4
- Vessel Refrigerant Pressure Code
  R = Code 180
  S = Code 235
  T = Code 300
  U = Code 350
  V = Code 400
- Water Side Pressure Code
  1 = 150 psi
  3 = 300 psi
- Number of Passes
- Water Connection Type
  F = Flanges
  G = Grooved Standard
  A = Victaulic AGS
- Waterbox Type
  C = Compact
  M = Marine
- Inlet from Front View
  R = Right
  L = Left

## VARIABLE SPEED DRIVE NOMENCLATURE

**HYP 0774 X H C 15 D - 40 A**

- Hyp
- Amps
  0490, 0612, 0774, 1278
- X = Factory Mount
  R = Retrofit Model
- H = YMC$^2$ Chiller
- C = Condenser Cooled
  E = Evaporator Cooled
- Liquid DWP
  15 = 150 psi
  30 = 300 psi
- D = Disconnect Switch
  B = Circuit Breaker
- 40 = 380V 60Hz
  50 = 400V 50Hz
  46 = 460V 60Hz
  68 = 415V 50Hz
- Mod Level

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# SECTION 1 - OVERVIEW



## GENERAL

This manual provides instructions for rigging and installing a YMC² Liquid Chilling Unit.

Chillers 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 charges shipped separately unless optional condenser isolation valves are ordered.)

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

## COMPONENT COMBINATIONS

*Figure 1* identifies the major components of the YMC² Chiller. The chiller is customized based on the selected combination of Motor, Compressor, Evaporator, and Condenser. *Section 5 - Dimensions, Nozzle Arrangements And Weights* lists all of the allowable YMC² Chiller combinations.

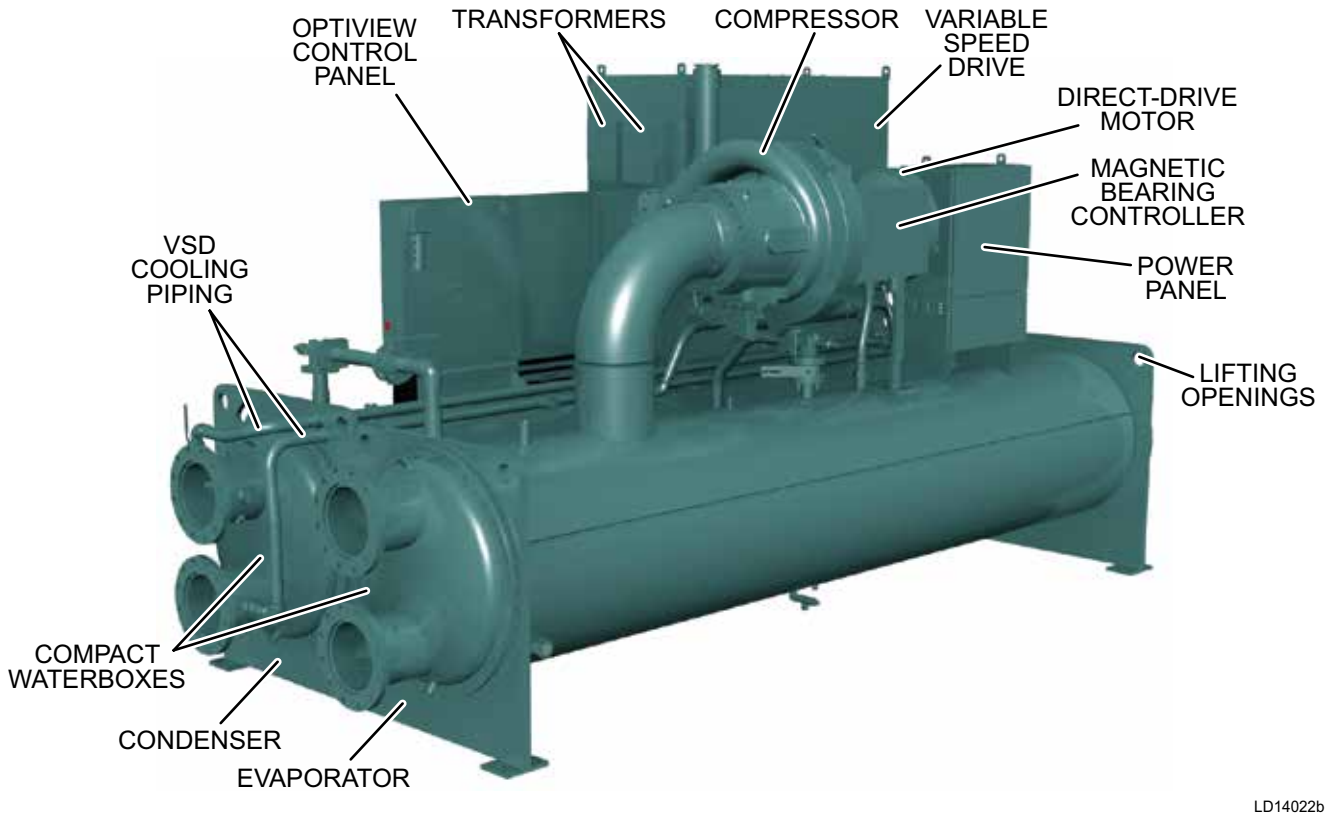



**FIGURE 1 -** YMC² CHILLER COMPONENTS

## 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 OR AT JOB SITE OR LOSS OF PARTS. (*Refer to Shipping Damage Claims Form (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 (Form 50.15-NM*).

YMC$^2$ Chillers are not intended to be stored outdoors, exposed to rain and moisture. The shipping wrap is for shipping, not for extended outdoor storage. The chiller should be tarped during any delays to get indoors and moisture desiccant, available for purchase for inside electrical panels should be used for damp areas.

If the chiller was not shipped complete (as shown in Form 1 or 2) use the *Section 4 - Reassembly* in conjunction with this installation manual.

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 refrigerant (Form 1) or nitrogen charge (Form 2).
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 drive or control center.
5. Do not charge the unit with refrigerant.
6. Do not attempt to start the system.
7. Do not run hot water (>110°F / 43°C max) or steam through the evaporator or condenser at any time.

## CHILLER DATA PLATE

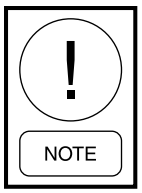
A unit data plate is mounted on the control center assembly of each unit, giving unit model number; design working pressure; water passes; refrigerant charge; serial numbers; and motor power characteristics and connection diagrams.

Additional information may be found on the compressor and motor data plates. This information should be included when contacting the factory on any problem.

## YMC$^2$ SHIPMENT FORMS

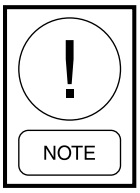
The chiller may be ordered and shipped in any of the following forms:

- Form 1 (shipped complete with refrigerant charge)
- Form 2 (shipped complete with refrigerant charge shipped separately)
- Form 3 (shipped in three assemblies)
- Form 7 (shipped in four assemblies)
- Form 9 (shipped in two assemblies with refrigerant charge shipped separately)
- Form 10 (shipped in two assemblies with refrigerant charge)
- Form 11 (shipped as split shells with refrigerant charge)




***Units that are shipped dismantled MUST be reassembled by, or under the supervision of a Johnson Controls representative.***

***Refer to Section 4 - Reassembly for detailed reassembly instructions.***




***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.***

### Form 1

The chiller is shipped complete with miscellaneous loose items shipped together and refrigerant charges are included.

#### *Chiller Unit*

The unit is completely assembled at the factory.

- The driveline (compressor/motor assembly) is mounted and all the necessary interconnecting piping is assembled.
- The complete unit is factory leak-tested, evacuated, and shipped charged with refrigerant.
- The OptiView™ Control Center is mounted on the unit.
- The Variable Speed Drive (VSD) and Power Panel are mounted, wired, and shipped with glycol.

#### *Miscellaneous Items*

The following items are shipped together:

- Four (4) vibration isolation pads (or optional spring isolators and brackets).
- VSD operating coolant (inhibited water)
- Other shipped loose items, including piping, water temperature controls, wiring, etc.

### Form 2

The chiller is shipped complete with refrigerant charges shipped separately and miscellaneous loose items shipped together.

Arrangements with the local service office must be made to ensure refrigerant is on-site when the unit is ready to be charged.

#### *Chiller Unit*

The unit is completely assembled at the factory.

- The driveline (compressor/motor assembly) is mounted and all the necessary interconnecting piping is assembled.
- The complete unit is factory leak-tested, evacuated, and shipped charged with a 3 to 7 PSIG (20 to 50 kPa) holding charge of dry nitrogen.
- The OptiView™ Control Center is mounted on the unit.
- The Variable Speed Drive (VSD) and Power Panel are mounted, wired, and shipped with Glycol.

#### *Miscellaneous Items*

The following items are shipped together:

- Four (4) vibration isolation pads (or optional spring isolators and brackets).
- Other shipped loose items, including piping, water temperature controls, wiring, etc.
- VSD operating coolant (inhibited water)

### Form 3

Prior to shipping, the unit is completely assembled at the factory. Interconnecting piping is assembled and the complete unit is wired and leak-tested.

The unit is dismantled and shipped as follows:

1. The driveline (compressor/motor assembly).
2. The evaporator/condenser shell assembly.
3. The Variable Speed Drive (VSD).
4. Miscellaneous shipped loose items.
5. Refrigerant charges shipped separately.

Arrangements with the local service office must be made to ensure refrigerant is on-site when the unit is ready to be charged.

#### *Driveline*

The driveline (compressor/motor assembly) is removed from the shells and skidded.

- All integral wiring is left on the compressor.
- All openings on the compressor are closed and shipped charged with a 3 to 7 PSIG (20 to 50 kPa) holding charge of dry nitrogen.

### *Shells*

The evaporator and condenser are assembled prepared for shipping but not skidded.

- All conduit is left on the shells.
- All openings the shells are closed and charged with a 3 to 7 PSIG (20 to 50 kPa) holding charge of dry nitrogen.

### *Variable Speed Drive (VSD)*

The VSD is skidded and shipped separately from the assembled chiller.

- The VSD is filled with glycol for shipping. The VSD operating coolant (inhibited water) is shipped with the other loose items.

### *Miscellaneous Material*

The following assemblies and items are shipped together:

- OptiView™ Control Center
- Power Panel
- Four (4) vibration isolation pads (or optional spring isolators and brackets).
- Other shipped loose items, including piping, water temperature controls, wiring, etc.
- VSD operating coolant (inhibited water)

## Form 7

Prior to shipping, the unit is completely assembled at the factory. Interconnecting piping is assembled and the complete unit is wired and leak-tested.

The unit is dismantled and shipped as follows:

1. The driveline (compressor/motor assembly).
2. The evaporator.
3. The condenser.
4. The Variable Speed Drive (VSD).
5. Refrigerant charges shipped separately.
6. Miscellaneous shipped loose items.

Arrangements with the local service office must be made to ensure refrigerant is on-site when the unit is ready to be charged.

### *Driveline*

The driveline (compressor/motor assembly) is removed from shells and skidded.

- All integral wiring is left on the compressor.
- All wiring harnesses on shells are removed.
- All openings on the compressor are closed and shipped charged with a 3 to 7 PSIG (20 to 50 kPa) holding charge of dry nitrogen.

### *Shells*

The evaporator and condenser are separated at the tube sheets and prepared for shipping separately but not skidded.

- All conduit is left on the shells.
- Refrigerant lines between shells are flanged and capped, requiring no welding.
- All openings the shells are closed and charged with a 3 to 7 PSIG (20 to 50 kPa) holding charge of dry nitrogen.

### *Variable Speed Drive (VSD)*

The VSD is skidded and shipped separately from the assembled chiller.

- The VSD is filled with glycol for shipping. The VSD operating coolant (inhibited water) is shipped with the other loose items.

### *Miscellaneous Items*

The following assemblies and items are shipped together:

- OptiView™ Control Center
- Power Panel
- Four (4) vibration isolation pads (or optional spring isolators and brackets).
- Operating coolant (inhibited water)
- Other shipped loose items, including piping, water temperature controls, wiring, isolators, etc.

## Form 9

Prior to shipping, the unit is completely assembled at the factory. Interconnecting piping is assembled and the complete unit is wired and leak-tested.

The chiller is shipped in two assemblies as follows:

1. The chiller unit (less the VSD).
2. The VSD.
3. Refrigerant charges shipped separately.
4. Miscellaneous shipped loose items.

Arrangements with the local service office must be made to ensure refrigerant is on-site when the unit is ready to be charged.

### *Chiller Unit*

The unit is first completely assembled at the factory:

- The driveline (compressor/motor assembly) is mounted, with all necessary interconnecting piping assembled.
- Interconnecting piping is assembled and the complete unit is factory leak-tested then evacuated and shipped charged with a 3 to 7 PSIG (20 to 50 kPa) holding charge of dry nitrogen.
- The Motor Terminal Box adapter remains attached to the chiller unit.

### *Variable Speed Drive (VSD)*

The VSD is skidded and shipped separately from the assembled chiller.

- The VSD is filled with glycol for shipping. The VSD operating coolant (inhibited water) shipped with the other loose items.

### *Miscellaneous Material*

The following assemblies and items are shipped together:

- Four (4) vibration isolation pads (or optional spring isolators and brackets).
- Other shipped loose items, including piping, water temperature controls, wiring, etc.
- VSD operating coolant (inhibited water)

## Form 10

Prior to shipping, the unit is completely assembled at the factory. Interconnecting piping is assembled and the complete unit is wired and leak-tested.

The chiller is shipped in two assemblies:

1. The assembled chiller unit.
2. The VSD.
3. Refrigerant charges are included.
4. Miscellaneous shipped loose items.

### *Chiller Unit*

The unit is first completely assembled at the factory:

- The driveline (compressor/motor assembly) is mounted, with all necessary interconnecting piping assembled.
- The complete unit is factory leak-tested, evacuated, and shipped charged with refrigerant.
- The Motor Terminal Box adapter remains attached to the chiller unit.

### *Variable Speed Drive (VSD)*

The VSD is skidded and shipped separately from the assembled chiller.

- The VSD is filled with glycol for shipping. The VSD operating coolant (inhibited water) shipped with the other loose items.

### *Miscellaneous Material*

The following assemblies and items are shipped together:

- Four (4) vibration isolation pads (or optional spring isolators and brackets).
- Other shipped loose items, including piping, water temperature controls, wiring, etc.
- VSD operating coolant (inhibited water)

## Form 11

Prior to shipping, the unit is completely assembled at the factory. Interconnecting piping is assembled and the complete unit is wired and leak-tested.

The chiller is split down the middle and shipped in two assemblies:

1. The condenser-side assembly.
2. The evaporator-side assembly.
3. Refrigerant charges are included.
4. Miscellaneous shipped loose items.

Arrangements with the local service office must be made to ensure refrigerant is on-site when the unit is ready to be charged.

### *Condenser-Side Assembly (Condenser / OptiView™ Control Center / Variable Speed Drive)*

The Condenser-side assembly consists of the Condenser, the OptiView™ Control Center and the Variable Speed Drive.

- All conduit is left on the condenser shell.
- Interconnecting piping between shells are flanged and capped, requiring no welding.
- All openings on the condenser shell are closed and shipped charged with a 3 to 7 PSIG (20 to 50 kPa) holding charge of dry nitrogen.

### *Evaporator-Side Assembly (Evaporator / Driveline / Power Panel)*

The evaporator-side assembly consists of the evaporator, the driveline (compressor/motor assembly), and the Power Panel.

- All conduit is left on the evaporator shell.
- Interconnecting piping between shells are flanged and capped, requiring no welding.
- All integral wiring is left on the compressor.
- All openings on the evaporator shell and driveline are closed and shipped charged with a 3 to 5 PSIG (20 to 50 kPa) holding charge of dry nitrogen.

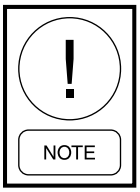
### *Miscellaneous Material*

The following items are shipped together:

- Four (4) vibration isolation pads (or optional spring isolators and brackets)
- Other shipped loose items, including piping, water temperature controls, wiring, etc.
- VSD operating coolant (inhibited water)

# SECTION 2 - RIGGING AND LIFTING


***Improper use of rigging equipment can result in serious injury. Do not operate without proper training and authorization.***




***It is the responsibility of the installer to have a qualified and certified crane operator and rigger for lifting components and relocating to the new site.***

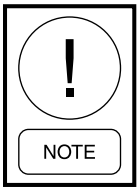
To perform a safe and effective rigging practice the installer is responsible for inspection and operation of the lifting equipment, special site considerations, proper rigging and lifting practices, and any safety considerations.

Particular items the installer must be aware of are:

- Rope with no visible wear, twisted, kinked, or damaged chains.
- Deformed, cracked, or stretched hooks or safety latch on the hook is not damaged.
- Correct drum spooling as the hook is raised.
- Do not operate a damaged or malfunctioning hoist.
- Do not wrap the hoisting rope or chain around the load.
- Do not lift loads over people.

## FORM 1 TOTAL WEIGHT

The heaviest possible YMC² combination of total weight for Form 1 shipment is 33,863 lbs (15,360 kg) or 17 ton. See Weights *on page 73* for YMC² weight breakdown.




***The actual unit total shipping and operating weight is on the submittal drawings.***

## FORM 1 SHIPMENT

The chiller is shipped complete with miscellaneous items shipped together with refrigerant charges are included.

- The unit is completely assembled at the factory.
- The driveline (compressor/motor assembly) is mounted and all the necessary interconnecting piping is assembled.
- The complete unit is factory leak-tested, evacuated and shipped charged with refrigerant.
- The OptiView™ Control Center is mounted on the unit.
- The Power Panel is mounted on the unit.
- The Variable Speed Drive (VSD) is mounted, wired, and ship with glycol.

### Unit Rigging


***One lifting chain is required for each lifting point and each chain having a working load limit 30% of unit total weight.***

***The lifting chains traversing the evaporator/condenser shells should remain 90° +/- 10° from horizontal. A spreader bar may be required to achieve the +/- 10°.***

1. Attach rigging chains to an adequate lifting device.
2. Attach chains to the lifting holes at the corner of each end sheet as shown on *Figure 2 on page 16*.
3. If necessary to avoid contact with chiller components install side spreader bars between the Evaporator and Condenser end sheet lifting chains.
4. The angle of the lifting chains traversing the en sheet should not be less than 65° as shown on *Figure 2 on page 16*.
5. With an adequate lifting device lift the unit slightly off the ground to determine adjustments necessary to keep the unit level. Make adjustments as necessary to level the unit.

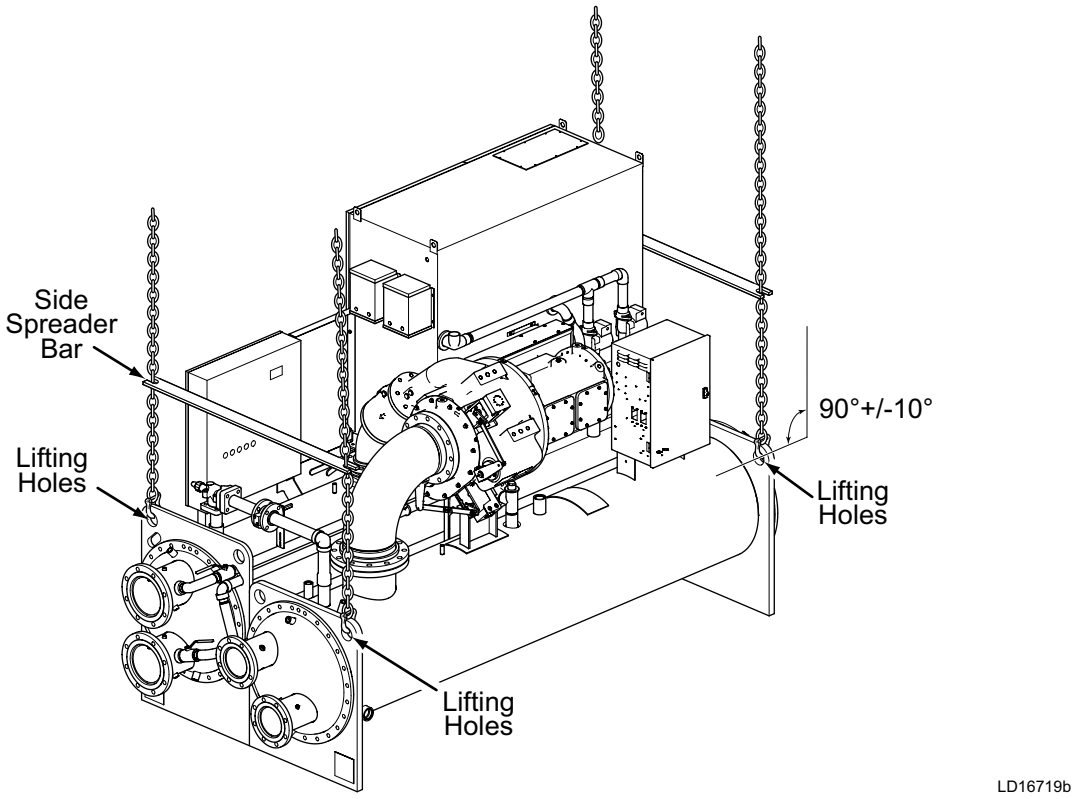



**FIGURE 2 -** FORM 1 AND 2 RIGGING WITH SIDE SPREADER BAR

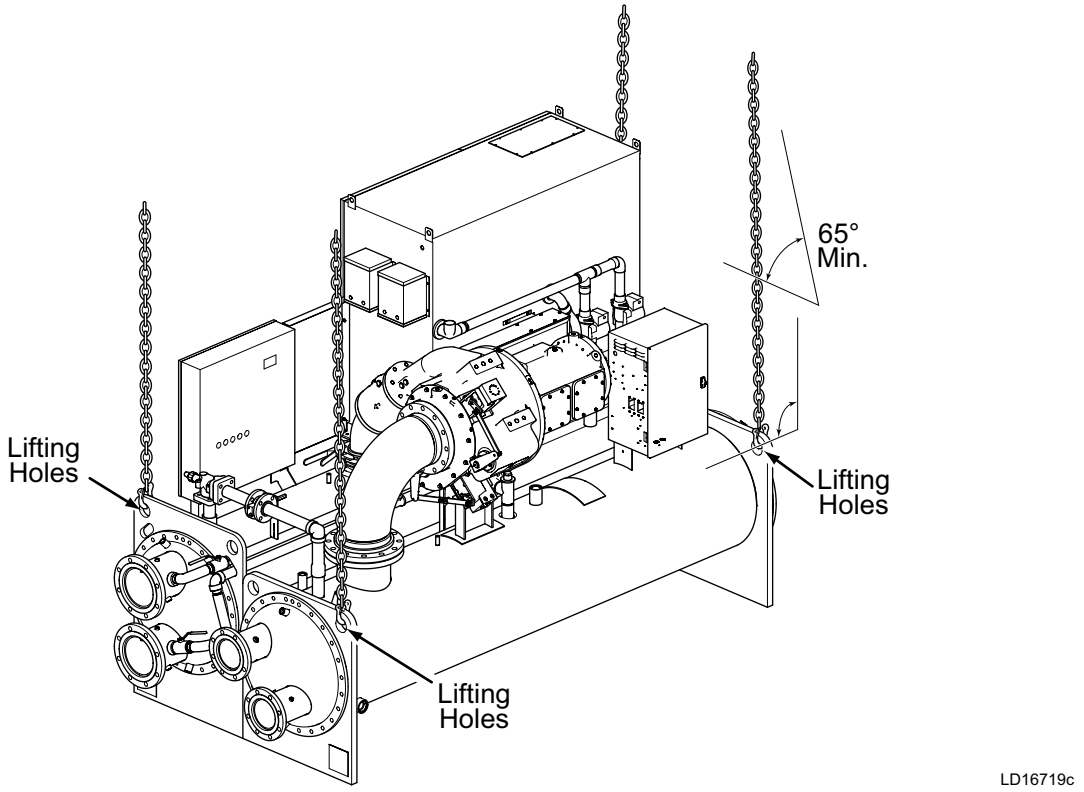
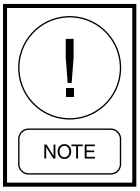



**FIGURE 3 -** FORM 1 AND 2 RIGGING WITHOUT SIDE SPREADER BAR

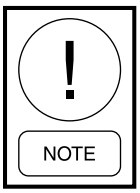
## FORM 2 TOTAL WEIGHT

The heaviest possible YMC² combination of total weight for Form 2 shipment is 21,900 lbs (10,000 kg) or 11 ton. See Weights *on page 73* for YMC² weight breakdown.




***The actual unit total shipping and operating weight is on the submittal drawings.***

## FORM 2 SHIPMENT




***Arrangements with the local service office must be made to ensure refrigerant is on-site when unit is ready to be charged.***

The chiller is shipped complete with miscellaneous items shipped together.

- The driveline (compressor/motor assembly) is mounted and all the necessary interconnecting piping is assembled.
- The complete unit is factory leak-tested, evacuated and shipped charged with a 3 to 7 PSIG (20 to 50 kPa) holding charge of dry nitrogen.
- The OptiView™ Control Center is mounted.
- The Power Panel is mounted on the unit.
- The Variable Speed Drive (VSD) is mounted, wired and shipped with Glycol.
- Refrigerant charges are shipped separately.

## Unit Rigging


***One lifting chain is required for each lifting point and each chain having a working load limit 30% of unit total weight.***

***The lifting chains traversing the evaporator/condenser shells should remain 90° +/- 10° from horizontal. A spreader bar may be required to achieve the +/- 10°.***

1. Attach rigging chains to an adequate lifting device.
2. Attach chains to the lifting holes at the corner of each end sheet as shown on *Figure 2 on page 16*.
3. If necessary to avoid contact with chiller components install side spreader bars between the Evaporator and Condenser end sheet lifting chains.
4. The angle of the lifting chains traversing the en sheet should not be less than 65° as shown on *Figure 2 on page 16*.
5. With an adequate lifting device lift the unit slightly off the ground to determine adjustments necessary to keep the unit level. Make adjustments as necessary to level the unit.

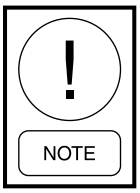
## FORM 3 SHIPMENT

The chiller is shipped in five major assemblies:

- The evaporator/condenser shell assembly.
- The driveline (compressor/motor assembly).
- The Variable Speed Drive (VSD).
- The OptiView™ Control Center assembly.
- The Power Panel assembly.
- Miscellaneous shipped loose items.


***One lifting chain is required for each lifting point and each chain having a working load limit 40% of condenser and evaporator weight or heat exchanger being lifted.***

***The lifting chains traversing the evaporator/condenser shells should remain 90° +/- 10° from horizontal. A spreader bar may be required to achieve the +/- 10°.***




***Refrigerant charges are shipped separately. Arrangements with the local service office must be made to ensure refrigerant is on-site when the unit is ready to be charged.***

***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.***

### Shells

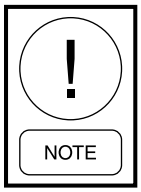
1. Attach rigging chains to an adequate lifting device.
2. Attach chains to the lifting holes at the corner of each end sheet as shown on *Figure 5 on page 19*.
3. If necessary to avoid contact with chiller components install side spreader bars between the Evaporator and Condenser end sheet lifting chains.
4. The angle of the lifting chains traversing the en sheet should not be less than 65° as shown on *Figure 5 on page 19*.
5. With an adequate lifting device lift the unit slightly off the ground to determine adjustments necessary to keep the unit level. Make adjustments as necessary to level the unit.

### Compressor Motor Assembly

**TABLE 1 -** COMPRESSOR MOTOR WEIGHTS

| Compr Code | Pounds | Kilograms |
|---|---|---|
| M2C-197FAC | 2,861 | 1298 |
| M2C-197FACD | 2,861 | 1292 |
| M2C-205FAC | 2,867 | 1300 |
| M2C-205FACD | 2,867 | 1295 |
| M2C-218FAC | 2,987 | 1355 |
| M2C-233FAC | 2,999 | 1,360 |
| M2C-246FAC | 2,989 | 1,356 |
| M6C-295FAC | 4,298 | 1,950 |
| M6C-331FAC | 4,500 | 2,041 |

1. Attach rigging chains to each end of the compressor/motor assembly as shown in *Figure 4 on page 18*.
2. Lift the compressor/motor assembly off the ground to check for center of gravity. Make adjustments as necessary.




***The M2C and M6C Compressor/Motor has metric lifting lugs***


***Use lifting chains with working load limit each 70% of total driveline weight.***

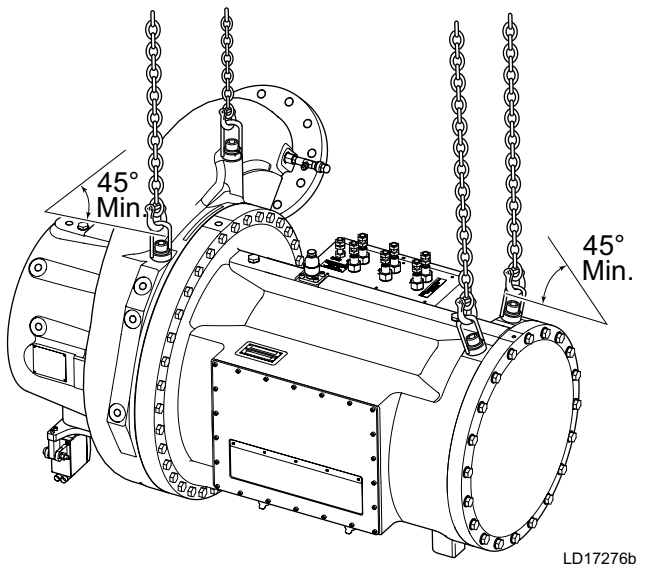



**FIGURE 4 -** DRIVELINE RIGGING

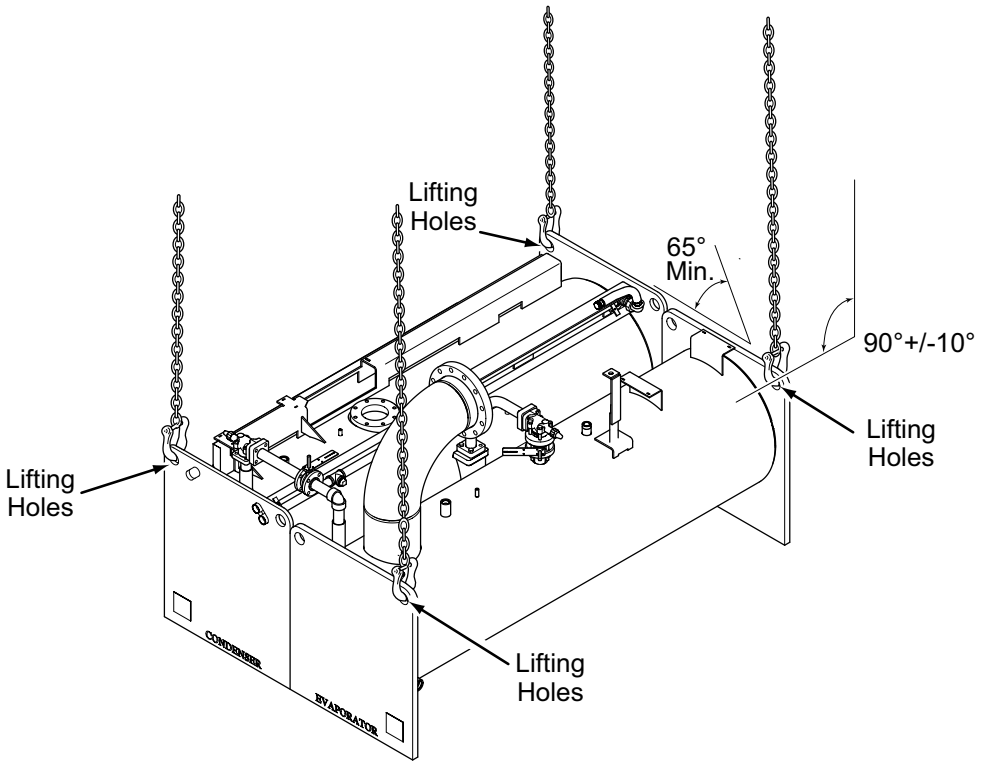



**FIGURE 5 -** FORM 3 RIGGING WITHOUT SIDE SPREADER BARS

## Variable Speed Drive (VSD)

**TABLE 2 -** VARIABLE SPEED DRIVE WEIGHTS

| Model | Pounds | Kilograms |
|---|---|---|
| HYP0490XH | 1,226 | 556 |
| HYP0612XH | 1,954 | 886 |
| HYP0774XH | 2,060 | 934 |
| HYP1278XH | 3,806 | 1727 |

CAUTION

***The VSD is shipped with glycol in the cooling system. The VSD coolant must be changed to the inhibitor provided with the shipped loose items prior to starting the unit or a VSD over temperature fault may occur.***

1. Attach rigging chains from an adequate lifting device to the four lifting holes at the top of the VSD as shown in Figure 6 on page 19, for VSD weight refer to Table 2 on page 19.
2. Lift the VSD slightly off the ground to check for center of gravity. Make adjustments as necessary to level the VSD.
3. Lift the VSD and remove all packing material.
4. Carefully lower the VSD on to the supports on the condenser.
5. Fasten the VSD to the condenser and to the motor terminal box duct. Remove the rigging chains.
6. Make all necessary connections for the VSD cooling loop to be complete.

CAUTION

***Use lifting chains with working load limit each 35% of total VSD weight.***

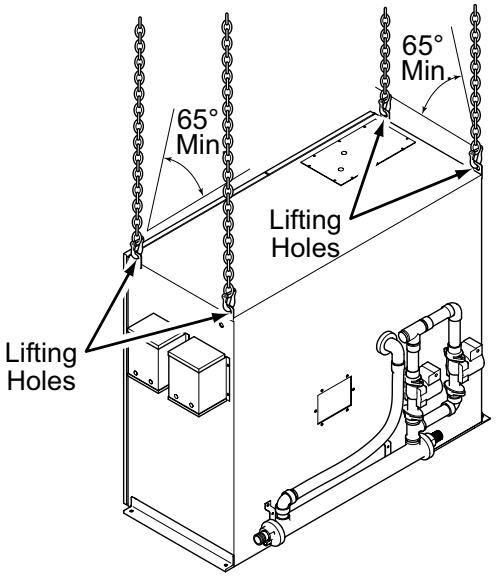



**FIGURE 6 -** VARIABLE SPEED DRIVE RIGGING

## Power Panel

**TABLE 3 -** POWER PANEL

| Description | Pounds | Kilograms |
|---|---|---|
| Power Panel | 300 | 135 |

1. Attach rigging chains to an adequate lifting device.
2. Attach the chains to the lifting holes at the top of the Power Panel as shown in Figure 7 on page 20.
3. Lift the Power Panel slightly off the ground to check for center of gravity. Make adjustments as necessary to level the Power Panel.
4. Lift the Power Panel and remove all packing material.
5. Carefully lower the Power Panel on to the supports on the evaporator.
6. Attach the Power Panel to the evaporator with the proper hardware. Remove the rigging chains.
7. Re-connect all unit wiring and harnesses (refer to YMC² Unit Wiring and Field Control Modifications (Form 160.78-PW2).

CAUTION

***Use lifting chains with working load limit each 70 of the Power Panel weight.***

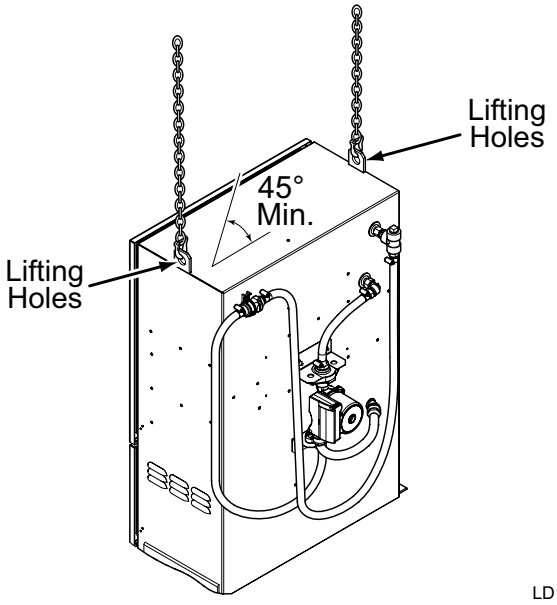



**FIGURE 7 -** POWER PANEL

## OptiView™ Control Center

DANGER

***The OptiView™ Control Center weighs over 50 pounds and a technician and helper are needed for the installation of the panel.***

**TABLE 4 -** CONTROL PANEL WEIGHTS

| Description | Pounds | Kilograms |
|---|---|---|
| OptiView | 75 | 34 |

1. Lift the OptiView™ Control Center and remove all packing material.
2. Carefully lower the OptiView™ Control Center on to the supports on the condenser.
3. Attach the OptiView™ Control Center to the condenser with the proper hardware.
4. Connect all unit wiring and harnesses (refer to YMC² Unit Wiring and Field Control Modifications (Form 160.78-PW2).

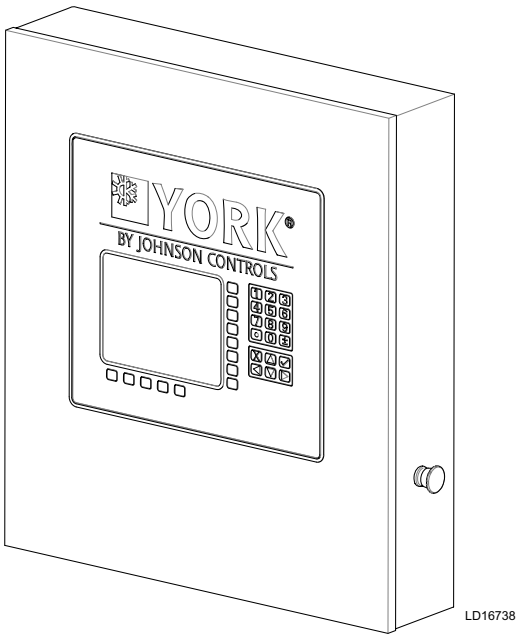



**FIGURE 8 -** OPTIVIEW CONTROL CENTER

## FORM 7 SHIPMENT

The chiller is shipped in six assemblies:

- The driveline (compressor/motor assembly).
- The evaporator.
- The condenser.
- The Variable Speed Drive (VSD).
- The OptiView™ Control Center assembly.
- The Power Panel assembly.
- Miscellaneous shipped loose items.

NOTE

***Refrigerant charges are shipped separately. Arrangements with the local service office must be made to ensure refrigerant is on-site when the unit is ready to be charged.***

***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.***

NOTE

***The lifting chains along the axis of the evaporator/condenser shells should not exceed 90° +/- 10°. A spreader bar may be required to achieve the +/- 10°.***

CAUTION

***One chain is required per each lifting point.***

***Use lifting chains with working load limit each at least 40% of the total shell weight.***

### Condenser

1. Attach rigging chains to an adequate lifting device.
2. Attach chains to the two lifting holes at the corner of each end sheet as shown in *Figure 9 on page 21*.

NOTE

***Angles apply to condenser or evaporator.***

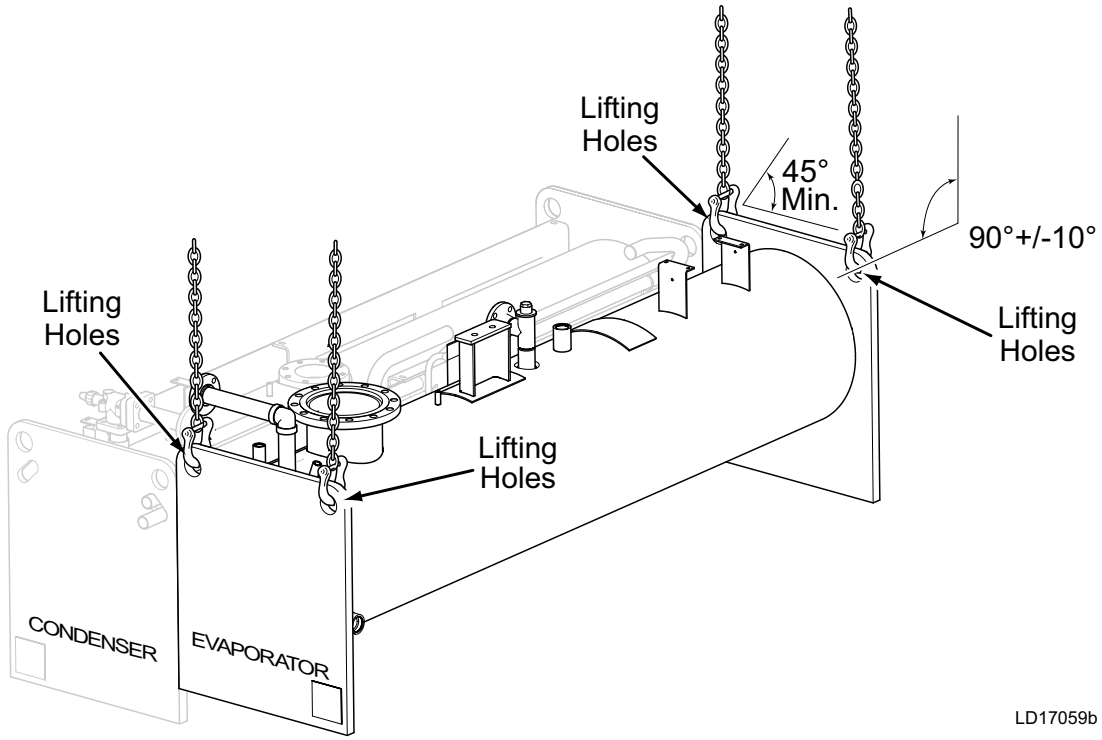



**FIGURE 9 -** FORM 7 RIGGING WITH SIDE SPREADER BARS

3. If necessary to maintain minimum angles install spreader bars between the condenser lifting chains to have the chains as shown in *Figure 9 on page 21*.

CAUTION

***The angle of the lifting chains is critical and damage to the unit may occur if the rigging is not completed as described.***

4. With an adequate lifting device lift the unit slightly off the ground to check for center of gravity. Make adjustments as necessary to level the unit.

### Evaporator

1. Attach rigging chains to an adequate lifting device.
2. Attach chains to the two lifting holes at the corner of the end sheet as shown in *Figure 9 on page 21*.
3. If necessary to maintain minimum angles, install spreader bars between the Evaporator end sheets to have the chains as shown in *Figure 9 on page 21*.

CAUTION

***The angle of the lifting chains is critical and damage to the unit may occur if the rigging is not completed as described.***

4. With an adequate lifting device lift the unit slightly off the ground to check for center of gravity. Make adjustments as necessary to level the unit.

### Compressor Motor Assembly

**TABLE 5 -** COMPRESSOR MOTOR WEIGHTS

| Compr Code | Pounds | Kilograms |
|---|---|---|
| M2C-197FAC | 2,861 | 1298 |
| M2C-197FACD | 2,861 | 1292 |
| M2C-205FAC | 2,867 | 1300 |
| M2C-205FACD | 2,867 | 1295 |
| M2C-218FAC | 2,987 | 1355 |
| M2C-233FAC | 2,999 | 1,360 |
| M2C-246FAC | 2,989 | 1,356 |
| M6C-295FAC | 4,298 | 1,950 |
| M6C-331FAC | 4,500 | 2,041 |

1. Attach rigging chains to each end of the compressor/motor assembly as shown in *Figure 10 on page 22*.
2. Lift the compressor/motor assembly off the ground to check for center of gravity. Make adjustments as necessary.

NOTE

***The M2C and M6C Compressor/Motor has metric lifting lugs***

CAUTION

***Use lifting chains with working load limit each 70% of total driveline weight.***

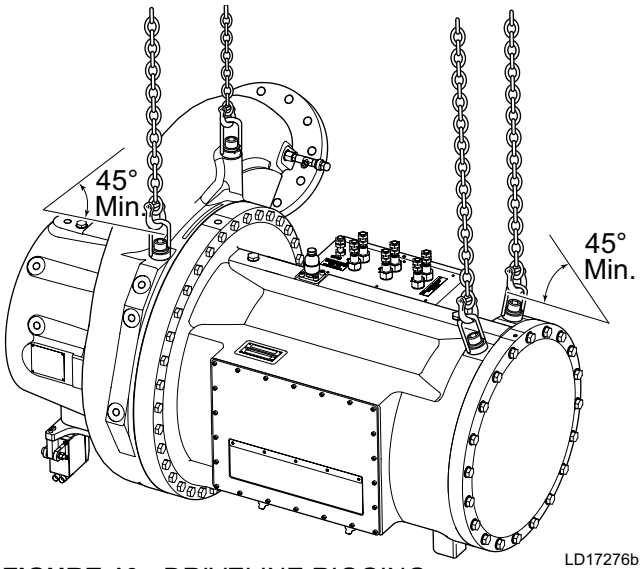



**FIGURE 10 -** DRIVELINE RIGGING

### Variable Speed Drive (VSD)

**TABLE 6 -** VARIABLE SPEED DRIVE WEIGHTS

| Model | Pounds | Kilograms |
|---|---|---|
| HYP0490XH | 1,226 | 556 |
| HYP0612XH | 1,954 | 886 |
| HYP0774XH | 2,060 | 934 |
| HYP1278XH | 3,806 | 1,727 |

CAUTION

***The VSD is shipped with glycol in the cooling system. The VSD coolant must be changed to the inhibitor provided with the shipped loose items prior to starting the unit or a VSD over temperature fault may occur.***

1. Attach rigging chains from an adequate lifting device to the four lifting holes at the top of the VSD as shown in *Figure 11 on page 23*.
2. Lift the VSD slightly off the ground to check for center of gravity. Make adjustments as necessary to level the VSD.
3. Lift the VSD and remove all packing material, for VSD weight refer to *Table 6 on page 22*.

CAUTION

***Use lifting chains with working load limit each 35% of total VSD weight.***

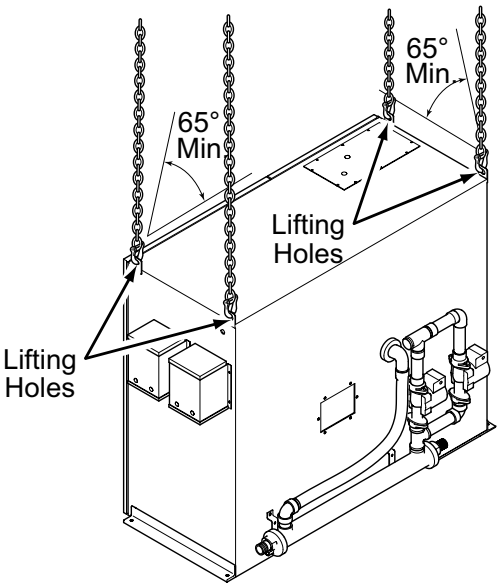



**FIGURE 11 -** VARIABLE SPEED DRIVE RIGGING

## Power Panel

**TABLE 7 -** POWER PANEL

| Description | Pounds | Kilograms |
|---|---|---|
| Power Panel | 300 | 135 |

1. Attach rigging chains to an adequate lifting device.
2. Attach the chains to the lifting holes at the top of the Power Panel as shown in *Figure 12 on page 23*.
3. Lift the Power Panel slightly off the ground to check for center of gravity. Make adjustments as necessary to level the Power Panel.
4. Lift the Power Panel and remove all packing material.

CAUTION

***Use lifting chains with working load limit each 70% of the Power Panel weight.***

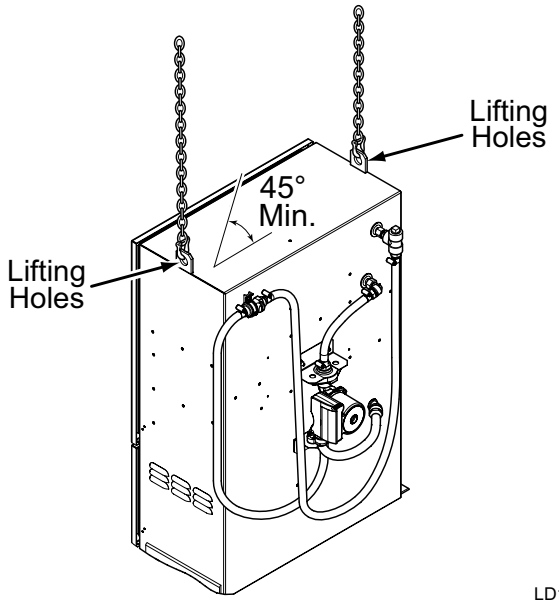



**FIGURE 12 -** POWER PANEL

## OptiView™ Control Center

DANGER

***The OptiView™ Control Center weighs over 50 pounds and a technician and helper are needed for the installation of the panel.***

**TABLE 8 -** CONTROL PANEL WEIGHTS

| Description | Pounds | Kilograms |
|---|---|---|
| OptiView | 75 | 34 |

1. Lift the OptiView™ Control Center and remove all packing material.
2. Carefully lower the OptiView™ Control Center on to the supports on the condenser.
3. Attach the OptiView™ Control Center to the condenser with the proper hardware.

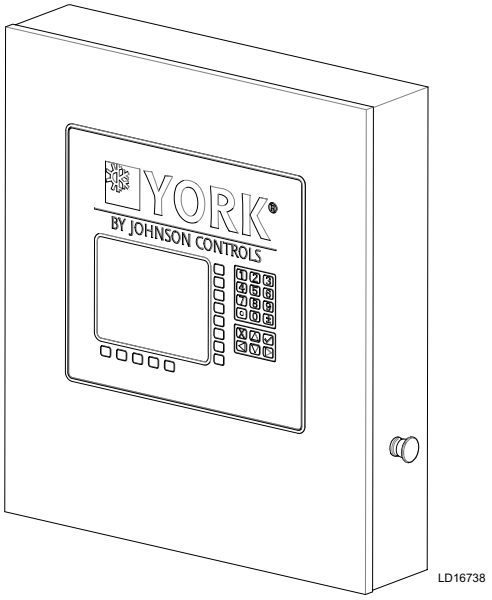



**FIGURE 13 -** OPTIVIEW CONTROL CENTER

## FORM 9 SHIPMENT

The chiller is shipped in two assemblies:

- The chiller unit (less the VSD).
- The VSD.
- Miscellaneous shipped loose items.

The unit is first factory assembled, refrigerant piped, wired and leak tested; then dismantled for shipment.

All wiring integral with compressor is left on it, and all conduit is left on shell. All openings on compressor and shell are closed and charged with dry nitrogen (3 to 7 PSIG (20 to 50 kPa).

NOTE

***Refrigerant charges are shipped separately. Arrangements with the local service office must be made to ensure refrigerant is on-site when unit is ready to be charged.***

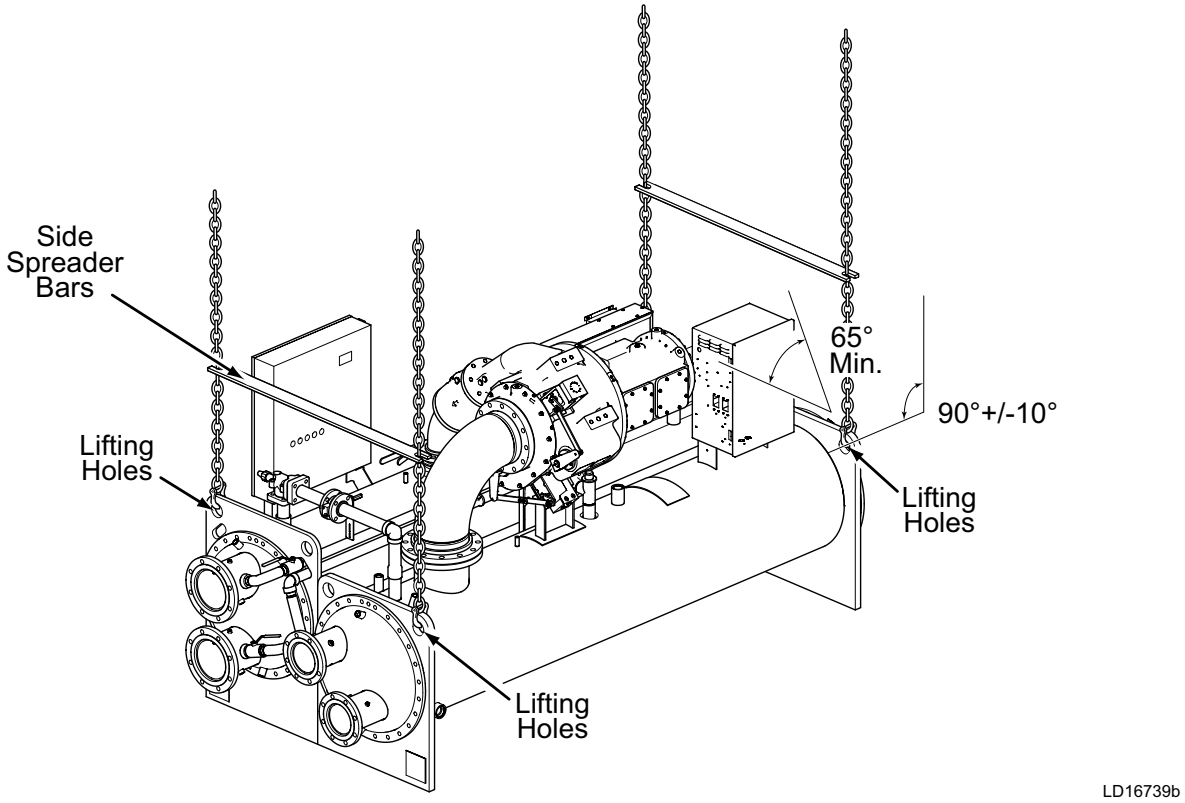



**FIGURE 14 -** FORM 9 AND 10 RIGGING WITH SIDE SPREADER BARS

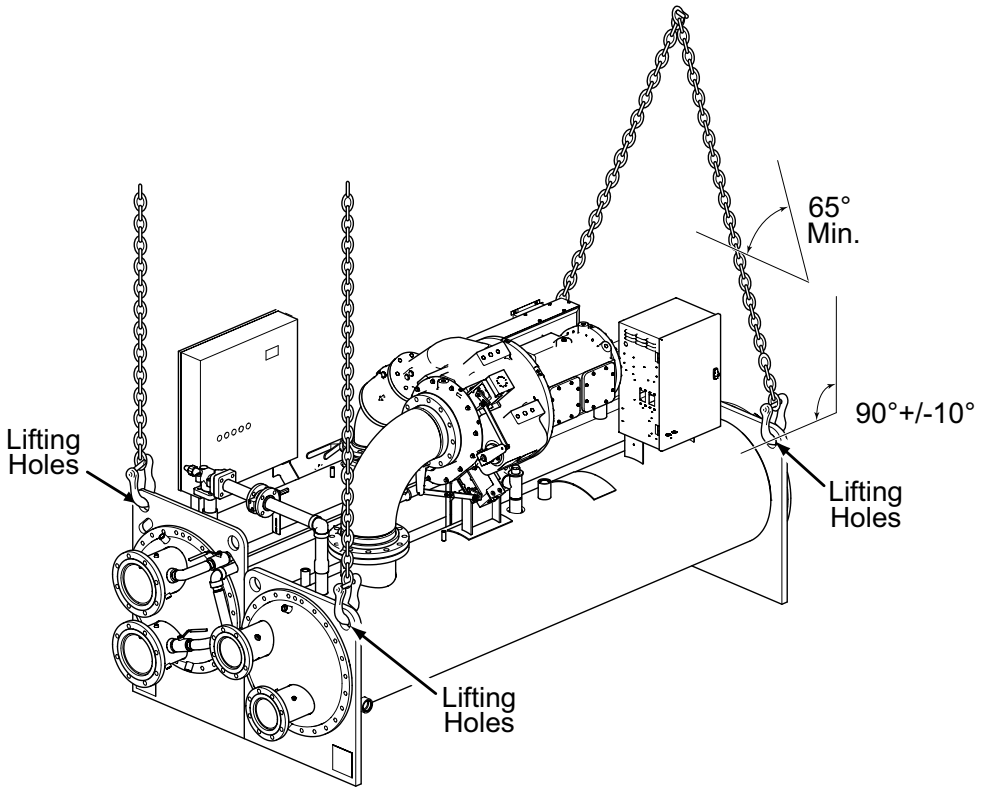



**FIGURE 15 -** FORM 9 AND 10 RIGGING WITHOUT SIDE SPREADER BARS

## Unit Rigging

CAUTION

***One lifting chain is required for each lifting point and each chain having a working load limit 40% of unit total weight.***

***The lifting chains traversing the evaporator/condenser shells should remain 90° +/- 10° from horizontal. A spreader bar may be required to achieve the +/- 10°.***

1. Attach rigging chains to an adequate lifting device.
2. Attach chains to the lifting holes at the corner of each end sheet as shown on *Figure 15 on page 25*.
3. If necessary to avoid contact with chiller components install side spreader bars between the Evaporator and Condenser end sheet lifting chains.
4. The angle of the lifting chains traversing the en sheet should not be less than 65° as shown on *Figure 15 on page 25*.
5. With an adequate lifting device lift the unit slightly off the ground to determine adjustments necessary to keep the unit level. Make adjustments as necessary to level the unit.

## Variable Speed Drive (VSD)

**TABLE 9 -** VARIABLE SPEED DRIVE WEIGHTS

| Model | Pounds | Kilograms |
|---|---|---|
| HYP0490XH | 1,226 | 556 |
| HYP0612XH | 1,954 | 886 |
| HYP0774XH | 2,060 | 934 |
| HYP1278XH | 3,806 | 1,727 |

CAUTION

***The VSD is shipped with glycol in the cooling system. The VSD coolant must be changed to the inhibitor provided with the shipped loose items prior to starting the unit or a VSD over temperature fault may occur.***

1. Attach rigging chains from an adequate lifting device to the four lifting holes at the top of the VSD as shown in *Figure 16 on page 26*.
2. Lift the VSD slightly off the ground to check for

center of gravity. Make adjustments as necessary to level the VSD.

3. Lift the VSD and remove all packing material, for VSD weight refer to *Table 10 on page 26*.
4. Carefully lower the VSD on to the supports on the condenser.
5. Fasten the VSD to the condenser and to the motor terminal box duct. Remove the rigging chains.

CAUTION

***Use lifting chains with working load limit each 35% of total VSD weight.***

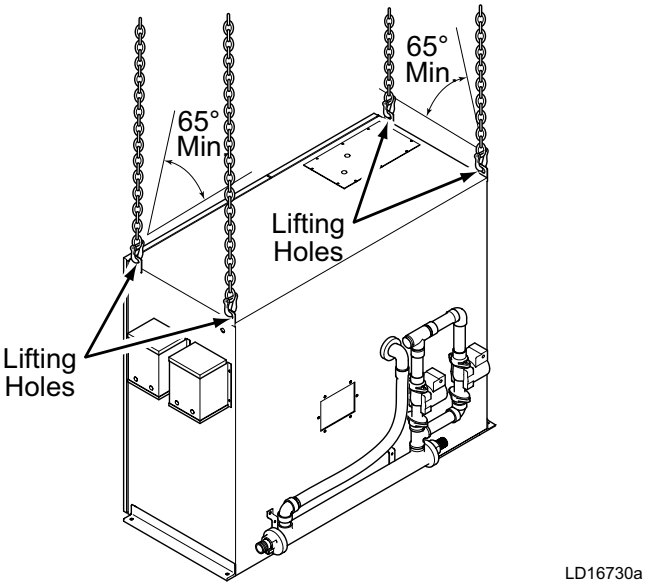



**FIGURE 16 -** VARIABLE SPEED DRIVE RIGGING

## FORM 10 SHIPMENT

The chiller is shipped in two assemblies:

- The chiller unit (less the VSD).
- The VSD.
- Miscellaneous shipped loose items.

The complete unit is factory leak-tested, evacuated, and shipped charged with refrigerant.

The unit is first factory assembled, refrigerant piped, wired and leak tested; then dismantled for shipment. Evaporator/condenser is not skidded. All wiring integral with compressor is left on it, and all conduit is left on shell.

### Unit Rigging

CAUTION

***One lifting chain is required for each lifting point and each chain having a working load limit 30% of unit total weight or heat exchanger being lifted.***

***The lifting chains traversing the evaporator/condenser shells should remain 90° +/- 10° from horizontal. A spreader bar may be required to achieve the +/- 10°.***

1. Attach rigging chains to an adequate lifting device.
2. Attach chains to the lifting holes at the corner of each end sheet as shown on *Figure 14 on page 24*.
3. If necessary to avoid contact with chiller components install side spreader bars between the Evaporator and Condenser end sheet lifting chains.
4. The angle of the lifting chains traversing the en sheet should not be less than 65° as shown on *Figure 14 on page 24*.
5. With an adequate lifting device lift the unit slightly off the ground to determine adjustments necessary to keep the unit level. Make adjustments as necessary to level the unit.

### Variable Speed Drive (VSD)

**TABLE 10 -** VARIABLE SPEED DRIVE WEIGHTS

| Model | Pounds | Kilograms |
|---|---|---|
| HYP0490XH | 1,226 | 556 |
| HYP0612XH | 1,954 | 886 |
| HYP0774XH | 2,060 | 934 |
| HYP1278XH | 3,806 | 1,727 |

CAUTION

***The VSD is shipped with glycol in the cooling system. The VSD coolant must be changed to the inhibitor provided with the shipped loose items prior to starting the unit or a VSD over temperature fault may occur.***

1. Attach rigging chains from an adequate lifting device to the four lifting holes at the top of the VSD as shown in *Figure 17 on page 27*.
2. Lift the VSD slightly off the ground to check for center of gravity. Make adjustments as necessary to level the VSD.

3. Lift the VSD and remove all packing material, for VSD weight refer to *Table 10 on page 26*.
4. Carefully lower the VSD on to the supports on the condenser.
5. Fasten the VSD to the condenser and to the motor terminal box duct. Remove the rigging chains.

CAUTION

***Use lifting chains with working load limit each 35% of total VSD weight.***

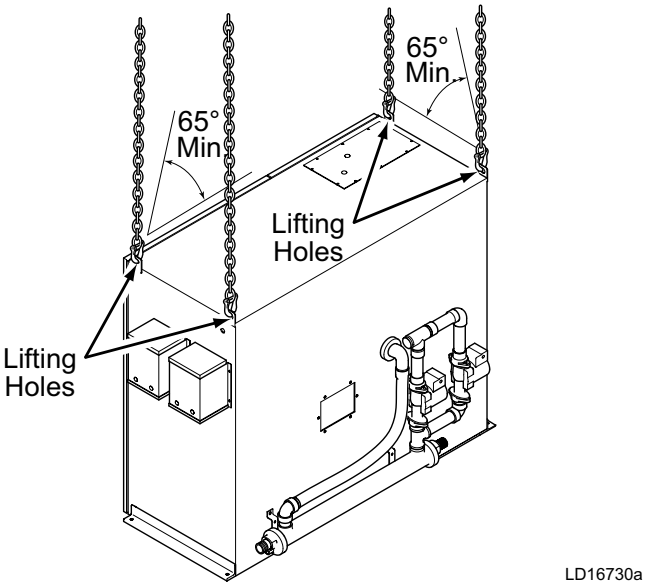



**FIGURE 17 -** VARIABLE SPEED DRIVE RIGGING

## FORM 11 SHIPMENT

The chiller is split down the middle and shipped in three assemblies:

- The condenser-side assembly.
- The evaporator-side assembly.
- The OptiView™ Control Center assembly.
- Miscellaneous shipped loose items.

The unit is first factory assembled, refrigerant piped, wired and leak tested; then dismantled for shipment. All wiring integral with compressor is left on it, and all conduit is left on shell.

All openings on compressor and shell are closed and 3 to 7 PSIG (20 to 50 kPa) holding charge of dry nitrogen.

NOTE

***Refrigerant charges are shipped separately. Arrangements with the local service office must be made to ensure refrigerant is on-site when unit is ready to be charged.***

2

### Condenser Assembly

NOTE

***The lifting chains along the axis of the condenser shell should not exceed 90° +/- 10°. A spreader bar may be required to achieve the +/- 10°.***

CAUTION

***One chain is required per each lifting point.***

***Use lifting chains with working load limit each at least 40% of the total shell installed component weight.***

1. Attach rigging chains to an adequate lifting device.
2. Attach chains to the lifting holes at the corner of the end sheets as shown in *Figure 18 on page 28*.
3. If necessary to maintain minimum angles install side spreader between the condenser end sheets to have the chains as shown in *Figure 18 on page 28*.

CAUTION

***The angle of the lifting chains is critical and damage to the unit may occur if the rigging is not completed as described.***

4. With an adequate lifting device lift the unit slightly off the ground to check for center of gravity. Make adjustments as necessary to level the unit.

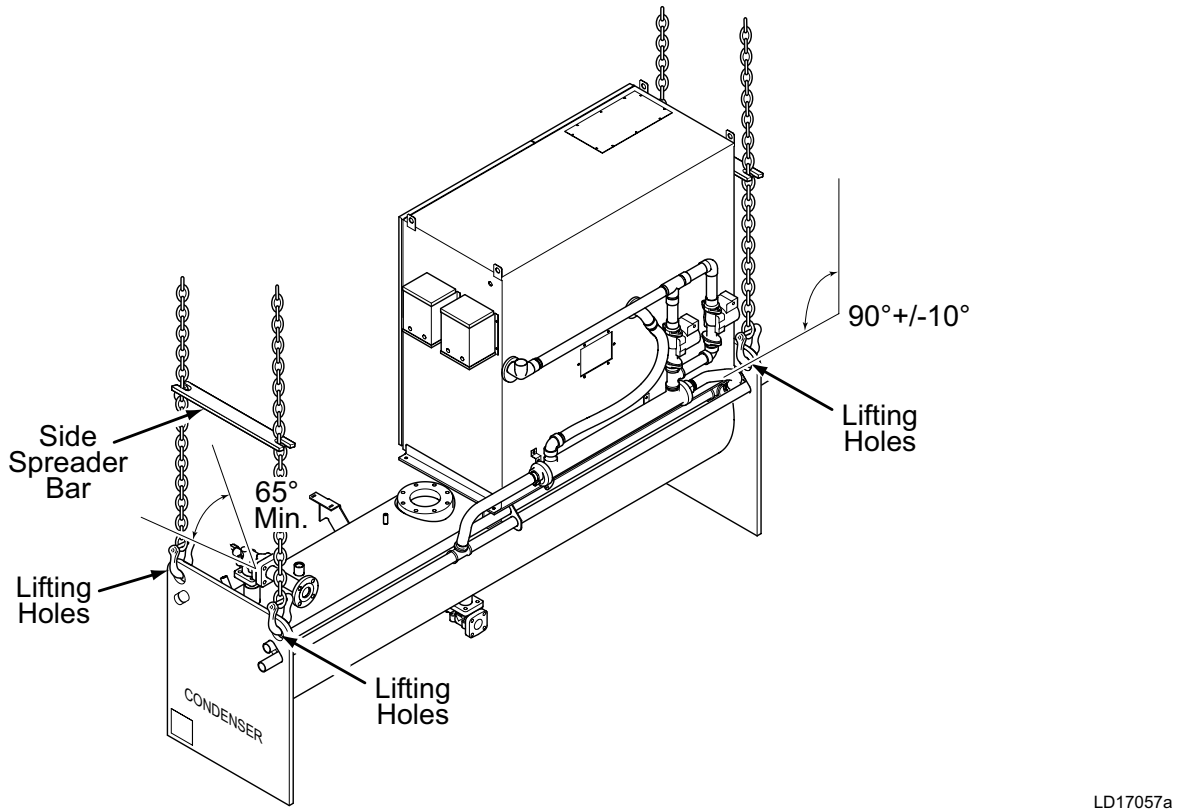



**FIGURE 18 -** FORM 11 CONDENSER ASSEMBLY RIGGING WITH SIDE SPREADER BARS

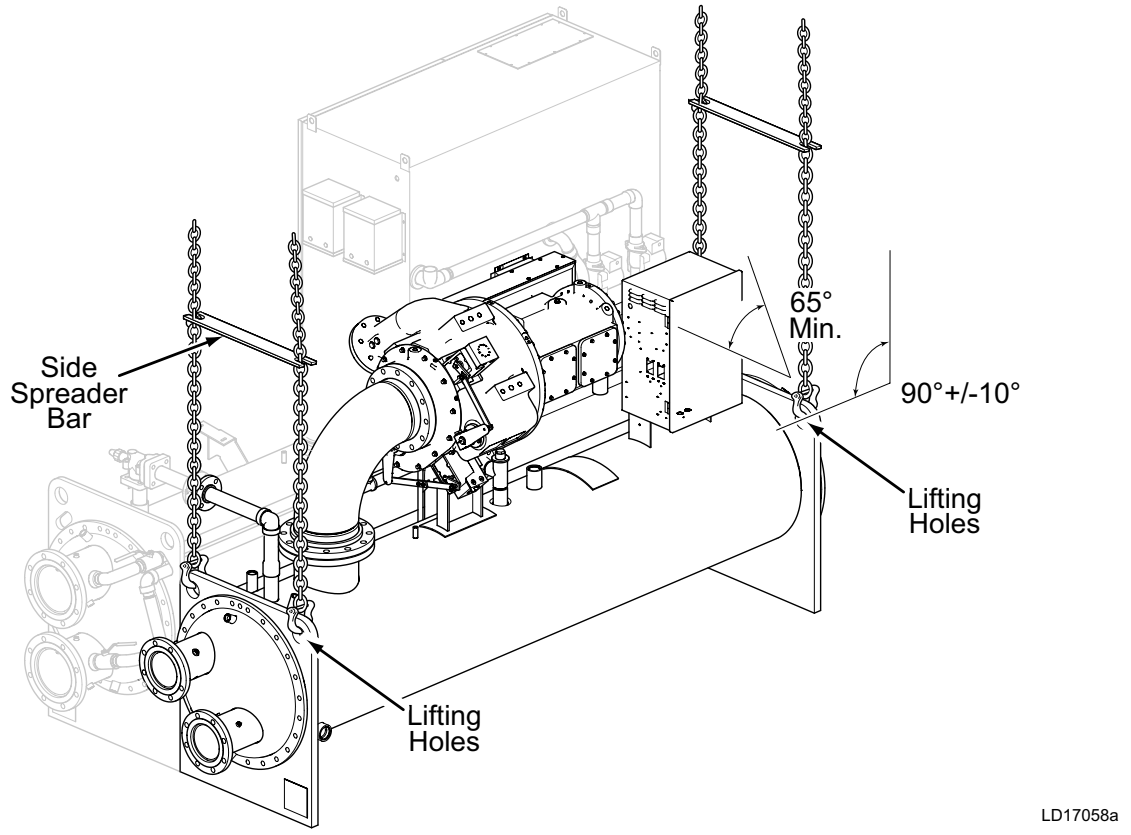



**FIGURE 19 -** FORM 11 EVAPORATOR ASSEMBLY RIGGING WITH SIDE SPREADER BARS

## Evaporator Assembly

NOTE

***The lifting chains along the axis of the evaporator shell should not exceed 90° +/- 10°. A spreader bar may be required to achieve the +/- 10°.***

CAUTION

***One chain is required per each lifting point.***

***Use lifting chains with working load limit each at least 40% of the total shell and installed component weight.***

1. Attach rigging chains to an adequate lifting device.
2. Attach chains to the lifting holes at the corner of the end sheets as shown in *Figure 19 on page 28*.
3. If necessary to maintain minimum angles install side spreader bars between the evaporator end sheets to have the chains at 90° as shown in *Figure 19 on page 28*.

CAUTION

***The angle of the lifting chains is critical and damage to the unit may occur if the rigging is not completed as described.***

4. With an adequate lifting device lift the unit slightly off the ground to check for center of gravity. Make adjustments as necessary to level the unit.

## OptiView™ Control Center

DANGER

***The OptiView™ Control Center weighs over 50 pounds and a technician and helper are needed for the installation of the panel.***

**TABLE 11 -** CONTROL PANEL WEIGHTS

| Description | Pounds | Kilograms |
|---|---|---|
| OptiView | 75 | 34 |

1. Lift the OptiView™ Control Center and remove all packing material.
2. Carefully lower the OptiView™ Control Center on to the supports on the condenser.
3. Attach the OptiView™ Control Center to the condenser with the proper hardware.
4. Connect all unit wiring and harnesses (refer to YMC² Unit Wiring and Field Control Modifications (Form 160.78-PW2).

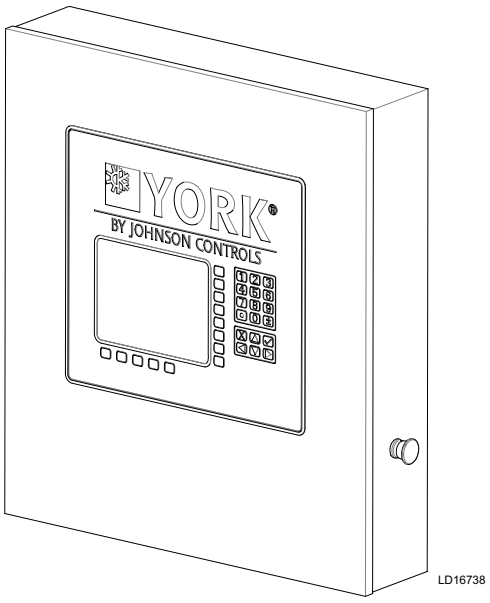



**FIGURE 20 -** OPTIVIEW CONTROL CENTER

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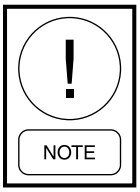
# SECTION 3 - INSTALLATION

## OVERVIEW

The installation process consists of the following steps:

1. Determine Location
    - Foundation Requirements
    - Clearance Requirements
2. Rig Chiller to Final Location
3. Install Isolators
    - Locate and place Isolator Pads, or
    - Install optional Spring Isolators
4. Level Chiller
5. Make Connections
    - Piping
    - Wiring
6. Apply Insulation




***The rigging, operating weights, and overall dimensions are provided in*** *Section 5 - Dimensions, Nozzle Arrangements And Weights* ***to help you determine the clearances required for rigging. Add 6" (15 cm) to overall height for optional skidded unit.***

## DETERMINE LOCATION


***Sufficient clearance to facilitate normal service and maintenance work must be provided 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).***

### Foundation Requirements

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

### Clearance Requirements

Clearances should be adhered to as follows:

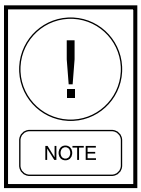
| | |
|---|---|
| Rear and Above Unit | 2 ft (61 cm) |
| Front of Unit | 3 ft (91 cm) |
| Tube Removal | 14 ft* (4.3 m) either end |

* 8' (2.4m): 2508 Shell Codes
10' (3m): 2110 and 2510 Shell Codes
14' (4.3m): 2514 Shell Codes



## RIG 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 in accordance with the Reassembly section of this manual.***

If evaporator is to be field insulated, the insulation can be applied to the evaporator while the unit is in the lift position to gain more access below the shell, if necessary. Be sure unit is properly supported. (Refer to *Insulation* in this section and *Figure 21 on page 32* for further information.)

## INSTALL ISOLATORS

Neoprene isolator pads are furnished standard and typically satisfy the installation engineer's vibration isolation requirements when the chiller foundation is not likely to transmit to occupied spaces. Optional spring isolators can be selected when the location of the equipment room floor dictates more stringent limits on vibration input.

### Neoprene Isolator Pads

#### *Locate And Place Isolator Pads*

The isolator pad mounts are to be located and placed rubber-side down as shown in *Figure 21 on page 32*.

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.

### *Level The Unit*

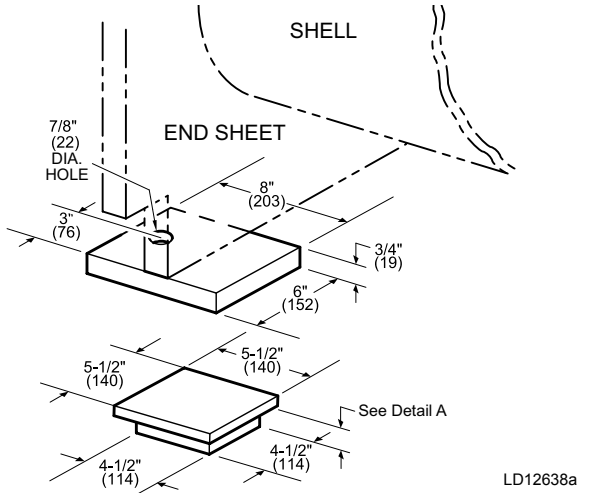
The longitudinal alignment of the unit should be checked by placing a level on the top center of the evaporator shell under the compressor/motor assembly. Transverse alignment should be checked by placing a level on top of the shell end sheets.

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 are furnished by the installer.) Lower unit again and recheck to see that it is level.

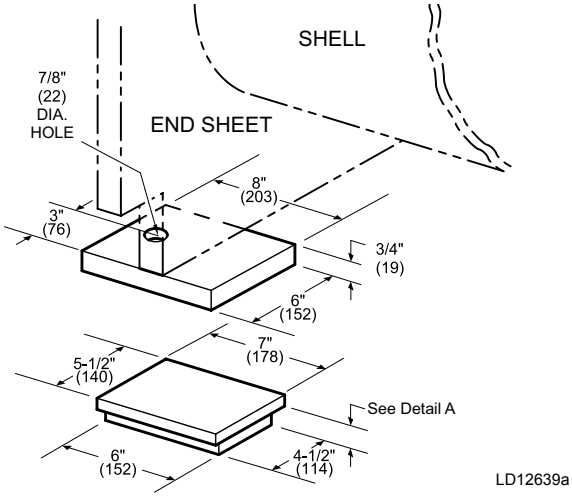
### *Checking The Isolation Pad Deflection*

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.

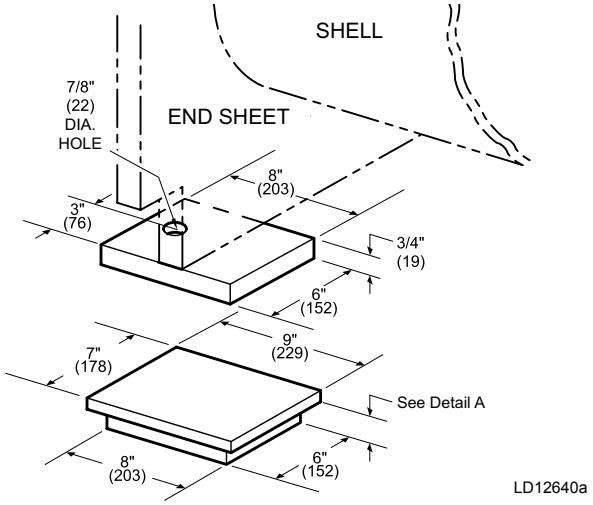
**ALL DIMENSIONS ARE IN INCHES (MM)**




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

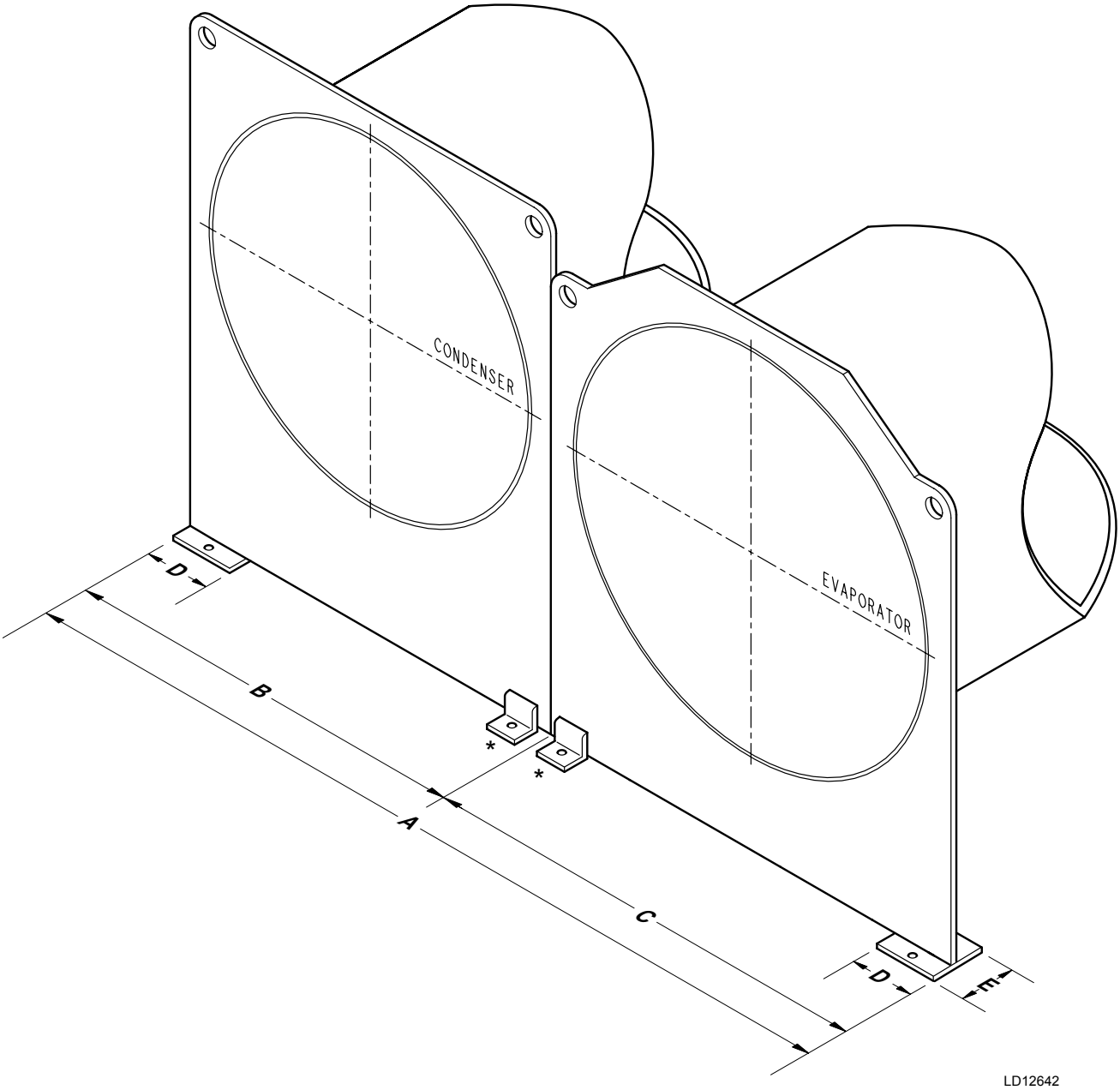



**UNIT WEIGHT 16,366 - 28,835 Lbs (7,424 - 13,080 Kgs)**




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

**FIGURE 21 -** NEOPRENE ISOLATORS




| SHELL LENGTH (FT.) | DIM "A" | DIM "B" | DIM "C" | DIM "D" | DIM "E" |
|---|---|---|---|---|---|
| 8 | 66 | 32 | 34 | 10 | 8 |
| 10 | 79 | 40 | 39 | 10 | 8 |
| 12 | 74 | 35 | 39 | 10 | 8 |
| 14 | 94 | 46 | 48 | 10 | 8 |

**NOTE**: Dimensions are shown in Inches (mm)
***** Brackets installed when skidded option is selected for Form 7 and 11.
* Largest Diameter heat exchanger shown for shell length shown.

**FIGURE 22 -** SKID OPTIONS

## Install Optional Spring Isolators

### *Bolt Isolators To The Unit*

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

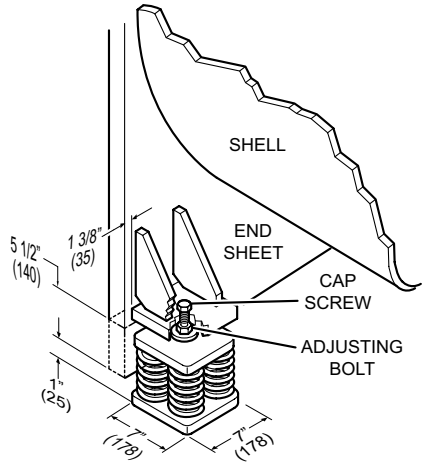
While the unit is still suspended by the rigging, the isolators should be bolted to the unit by inserting the cap screw(s) through the hole(s) in the mounting bracket into the tapped hole in the top of the isolator leveling bolt(s). Then the unit can be lowered onto the floor.

### *Level 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.

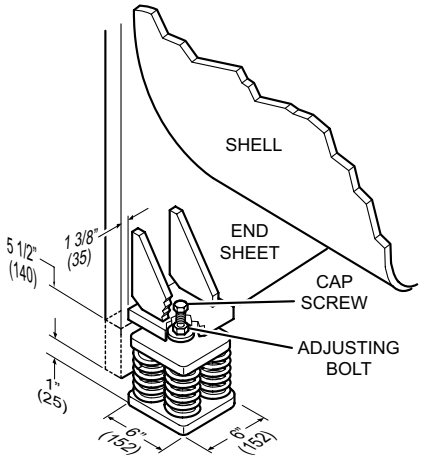
Rotate the leveling bolts one turn at a time, in sequence, until the unit end sheets are clear of the floor by the dimension shown in *Figure 23 on page 34* and the unit is level. If the leveling bolts are not long enough to level unit due to an uneven or sloping floor or foundation, steel shims (grouted, if necessary) must be added beneath the isolator assemblies as necessary.

If the springs are over-compressed at any corner, the levelling bolt has been extended too far compared to at least one of the other corners on the same end sheet or same side of the shell and the isolator is bearing an unequal amount of the chiller load. Correct by backing off the bolts on the overloaded isolator and adjusting opposite isolators as required.



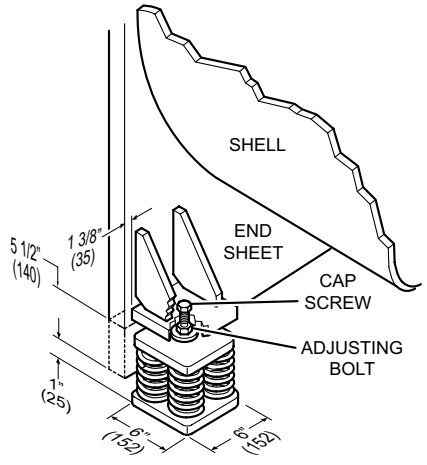

4-SPRING ISOLATORS LD19572

**UNIT WEIGHT**
**10,000 to 19,563 (4,536 to 8,873 Kgs)**



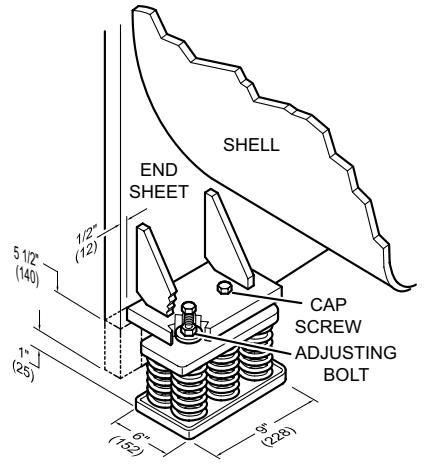

4-SPRING ISOLATORS LD19573

**UNIT WEIGHT**
**30,827 Lbs UP TO 35,009 Lbs (13,983 Kgs UP TO 15,880 Kgs)**




4-SPRING ISOLATORS LD19573

**UNIT WEIGHT**
**19,564 Lbs UP TO 24, 457 Lbs (8874 Kgs UP TO 11093 Kgs)**




6-SPRING ISOLATORS LD19579

**UNIT WEIGHT**
**35,010 Lbs UP TO 58,349Lbs (15881 Kgs UP TO 26467 Kgs)**

ALL DIMENSIONS ARE IN INCHES (mm)

**FIGURE 23 -** SPRING ISOLATORS

## MAKE CONNECTIONS

After the unit is leveled, place wedges and/or shims under each corner to solidly support the unit in this position while connecting and hanging the piping, adjusting the connections, and checking for proper alignment.

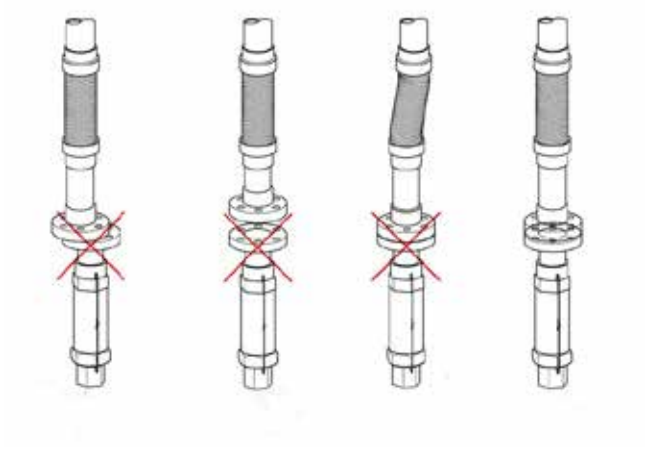
The coolant temperature inside any JCI-supplied liquid-cooled motor starter must be maintained above the dewpoint temperature in the equipment room to prevent condensing water vapor inside the starter cabinet. Therefore, an additional temperature-controlled throttle valve is needed in the flow path for 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.

### 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 refer to *Figure 26 on page 38*. Hangers must allow for alignment of pipe. Isolators (by others) in the piping 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. Piping connecting to chillers on spring isolators should be isolated with properly aligned and supported flexible connections. Otherwise, the piping joint becomes the primary resistance to motion and pipe or fittings are likely to deform or fatigue during operation.

**Check for strain on piping –** It is critical that no strain is present on the relief valve when the piping is connected. Any strain must be eliminated to minimize the potential to deform the seal surfaces and cause a leak. When checking for piping stress in Pressure Relief Piping:

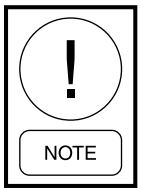
1. Perform a visual inspection of the existing piping to determine if there are any clear signs of strain present.
2. Disconnect piping at flange or union connection if possible. When the piping is disconnected, there should be no springing or movement noted. The piping system must be self supported and in perfect alignment with the relief valves.



LD17201

**FIGURE 24 -** PRESSURE RELIEF PIPING

**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.




***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.***

After the connections are made the unit can be filled with water and checked for leaks.

If spring isolators were installed, final adjustments can be made to the leveling bolts 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.

### *Evaporator And Condenser Water Piping*

The evaporator and condenser liquid heads of chiller have nozzles which are grooved, but also suitable for welding 150 psig DWP flanges or the use of flexible couplings. Factory mounted flanges are optional. If welding is done on the nozzles, flow switches, condenser level sensor, and water temperature thermistors should be disconnected and the welding ground MUST be good contact located at the head to prevent current damage to the devices.

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.

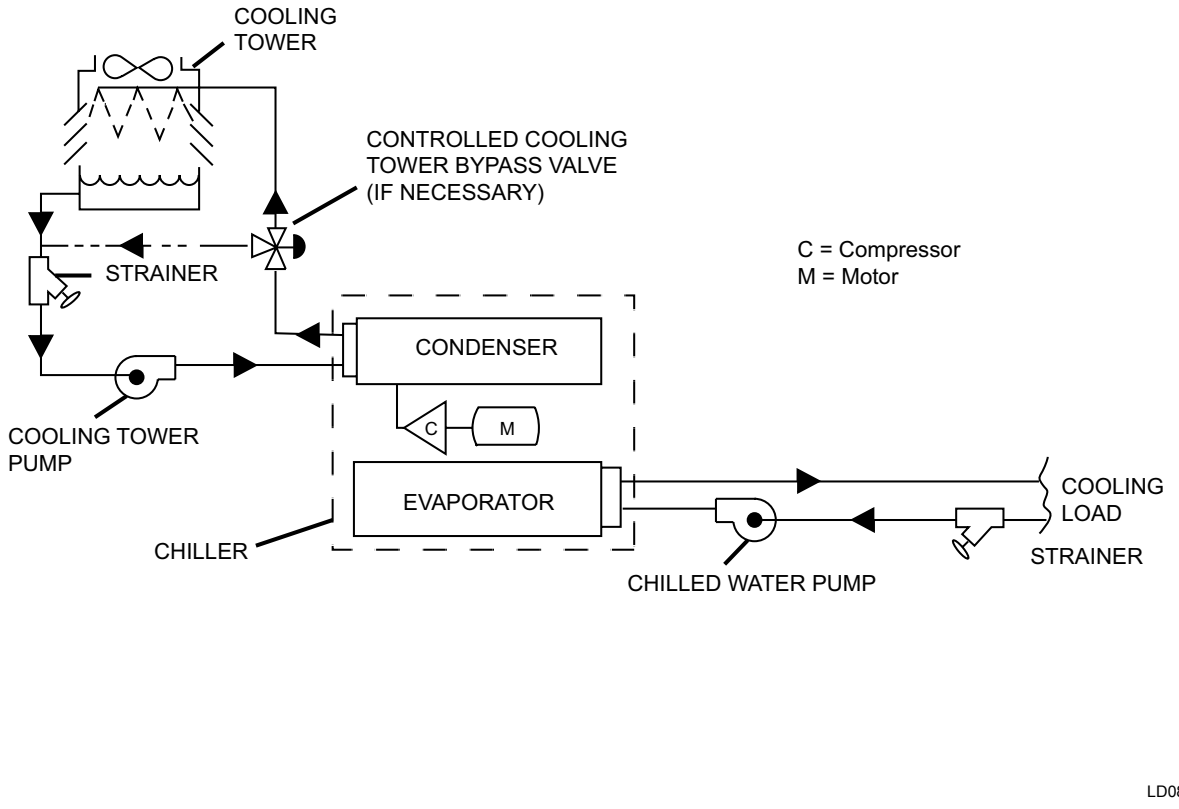



**FIGURE 25 -** SCHEMATIC OF A TYPICAL PIPING ARRANGEMENT

### 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 and condenser liquid line, upstream and near to the chiller.

Water piping circuits should be arranged to avoid water voids to the chiller, and should be controlled as necessary to avoid rapid flow transients.

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.

### 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 it is possible for the entering condenser water temperature to go below the required minimum, condenser water temperature must be maintained equal to or slightly higher than the required minimum. Refer to the *YMC² Engineering Guide (Form 160.84-EG1)* for required minimum Condenser and Evaporator temperatures. Refer to *Figure 8* 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 flow 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. They will assist in proper fill and vent of the chiller waterside prior to starting pumps to ensure no voids exist that could cause damage from a water slug.

### Checking Piping Circuits And Venting Air

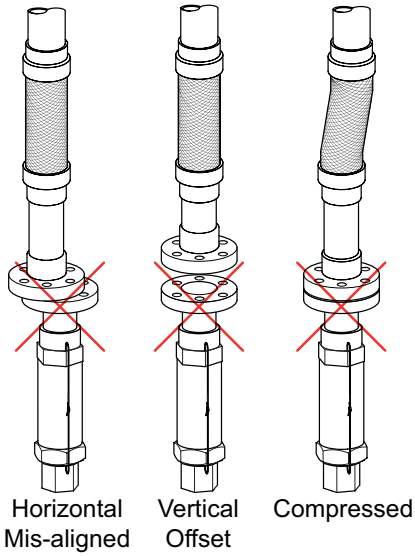
After the water piping is completed, but before any water box insulation is applied. Tighten and torque to maintain between 30 and 60 ft. lbs. (41 and 81 N·m) the nuts on the liquid head flanges. Gasket shrinkage and handling during transit cause nuts to loosen. If water pressure is applied before tightening 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

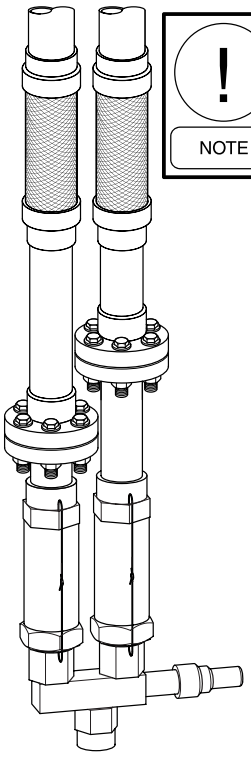
Each unit is equipped with pressure relief valves located on the condenser and on the evaporator for the purpose of quickly relieving excess pressure of the refrigerant charge to the atmosphere as a safety precaution in case of an emergency, such as fire.

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.




NOTE

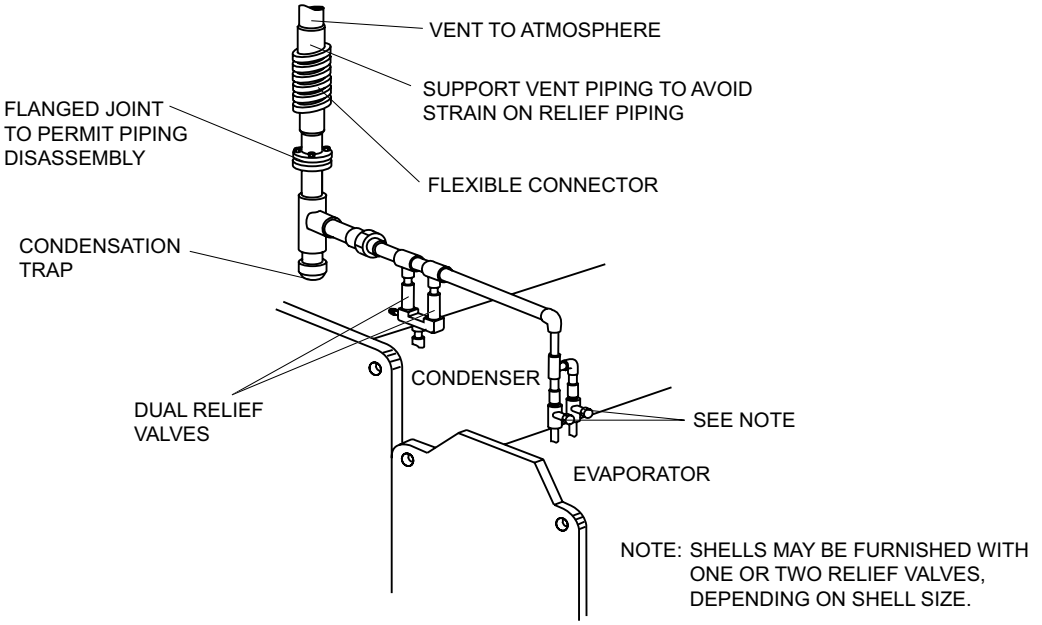
***When installing relief piping there must NOT be any piping strain. Relief piping must be properly aligned and supported to eliminate any possible piping strain.***



NOTE

***When installing relief piping an ANSI flange or a piping union must be used to make a servicable piping connection.***

LD16677




LD03863

**FIGURE 26 -** TYPICAL REFRIGERANT VENT PIPING

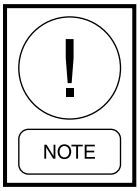
### Unit Piping

Compressor refrigerant piping and system external piping are factory installed on all units shipped assembled. On units shipped dismantled, the piping should be completed under the supervision of the Johnson Controls representative.

### Control Wiring

On units shipped disassembled, after installation of the control center, control wiring must be completed between unit components and control center, variable speed drive and using wiring harness furnished. Refer to *YMC² Field Connections Manual (Form 160.84-PW1)*.

Field wiring connections for commonly encountered control modifications (by others) if required, are shown in the *YMC² Unit Wiring and Field Control Modifications Manual (Form 160.84-PW2)*.




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

### Power Wiring


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

### Supplied Variable Speed Drive.

The factory mounted Variable Speed Drive does not require wiring to the compressor motor. The motor power wiring is factory connected to the Variable Speed Drive (refer to the *YMC² Unit Wiring and Field Control Modifications Manual (Form 160.84-PW2))*. All wiring to the control panel is completed by the factory. A control transformer is factory furnished with the Variable Speed Drive.

## APPLY INSULATION


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

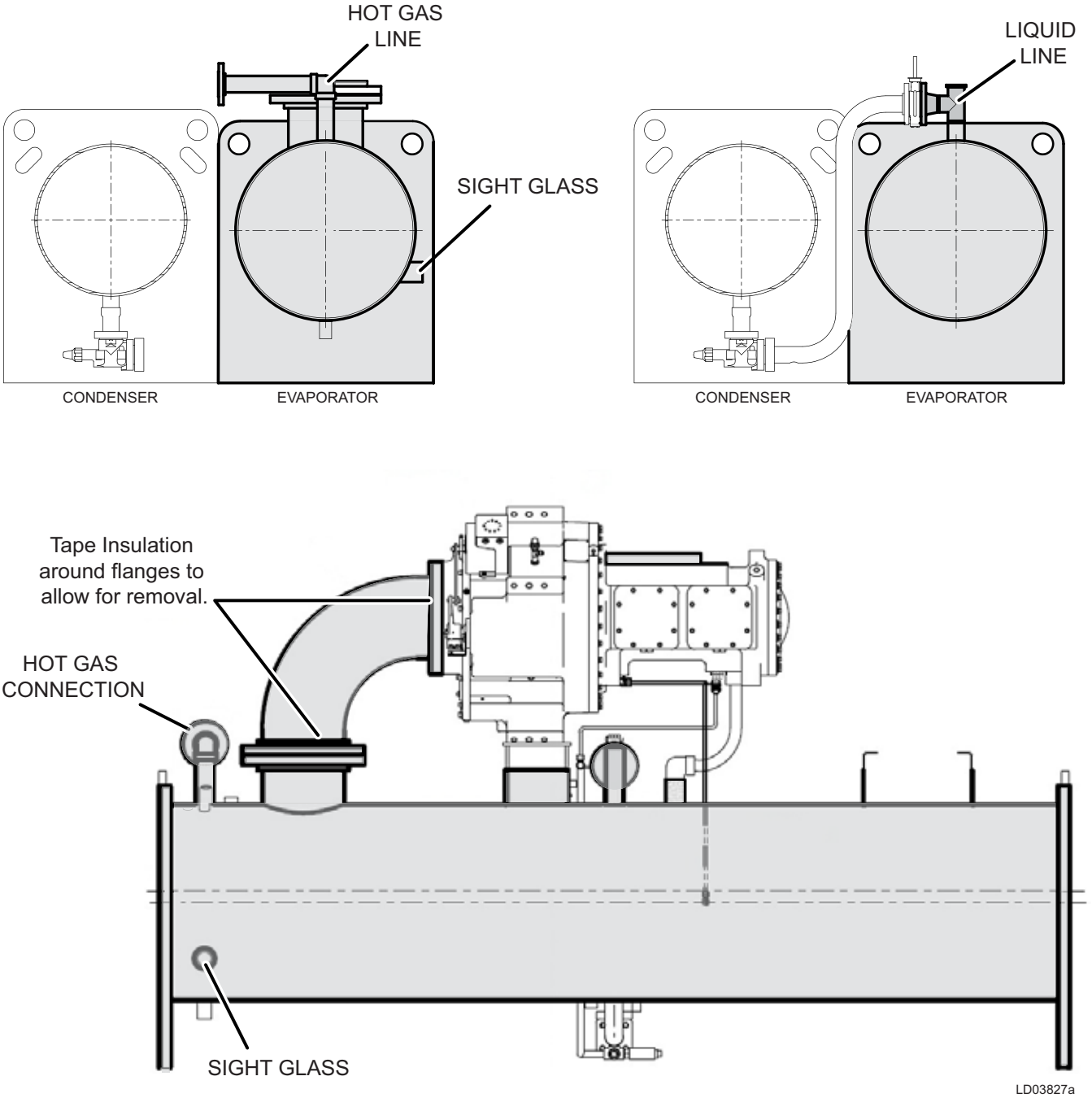
Insulation of the type specified for the job, or minimum thickness to prevent sweating of 30°F (-1°C) surfaces should be furnished (by others) and applied to the evaporator shell, end sheets, liquid feed line to flow chamber, compressor suction connection, and evaporator liquid heads and connections (see *Figure 9*). The liquid head flange insulation must be removable, to allow head removal for the tube maintenance.

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 STARTUP 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. Notify the Johnson Controls office using the *Installation Checklist and Request Form (Form 160.84-CL1)*.




NOTE

***Bold lines and shaded components represent insulation.***

**FIGURE 27 -** UNIT INSULATION

# SECTION 4 - REASSEMBLY

## Form 3 and Form 7 Reassembly

NOTE

***Refer to** Figure 29 on page 43**, Figure 30 on page 44**, Figure 31 on page 45**, Figure 32 on page 46 **and** Figure 33 on page 47 **for reassembly hardware identification.***

1. Rig shells according to the rigging section to final location. See *Section 2 - Rigging and Lifting.*
2. Bolt the tube sheets together as shown in *Figure 28 on page 41*. Note that the outside surfaces of the tube sheets must be flush.

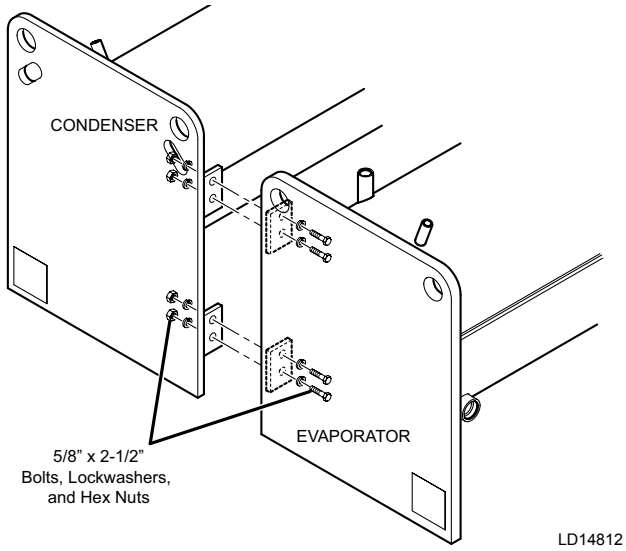



**FIGURE 28 -** SHELL REASSEMBLY

3. Assemble vibration isolators to unit. Refer to *Install Isolators on page 31*.
4. Level shells in both directions. The longitudinal alignment of the shell should be checked by placing a level on the top of the shell, next to the discharge connection. The transverse alignment should be checked by placing a level on the tops of both end sheets. Refer to *Section 3 - Installation on page 31* for additional instructions to level the unit. After shell is leveled, wedge and shim each corner of the shell to solidly support it while assembling the other parts.
5. Install the discharge piece and optional isolation valve between the compressor and the condenser using proper gaskets and hardware.
6. Lift compressor/motor assembly according to rigging section and remove packing materials. Carefully lower the compressor/motor assembly on to the discharge line and motor support on the evaporator. Fasten compressor/motor assembly with the proper hardware. Do not tighten the bolts until all connections are made to the compressor.
7. Bolt the suction line between the compressor and the evaporator using proper gaskets and hardware.
8. Complete the refrigerant liquid line piping between the evaporator and condenser. Be sure hardware are all properly installed.
9. Tighten all hardware installed in steps 3 through 6 above to the specified torque values provided in the reassembly figure.
10. Install refrigerant piping (R*efer to Refrigerant Tubing Reassembly on page 52*).
11. Pressure test the unit with nitrogen per Form 160.84-O1.
12. Lift the Variable Speed Drive in accordance with rigging instructions and remove all packing material. Carefully lower the Variable Speed Drive on to the supports on the condenser. Fasten the Variable Speed Drive to the condenser. Make all necessary connections for the VSD cooling loop to be complete.

    The Variable Speed Drive will be shipped with glycol in the cooling system. The Variable Speed Drive coolant must be changed to the inhibitor provided with the shipped loose items prior to starting the unit or a VSD over temperature fault may occur.
13. Lift the OptiView Control Center in accordance with rigging instructions and remove all packing material. Carefully lower the control panel on to the supports provided on the condenser. Fasten the Control Center to the condenser with the proper hardware.
14. Re-connect motor power leads in the Variable Speed Drive to T1, T2, and T3 terminals and torque to 18-20 Ft-lbs. per the labels in the VSD.
15. Connect the motor terminal box flex duct to the drive.

16. Lift the Power Panel in accordance with rigging instructions and remove all packing material. Carefully lower the Power Panel on to the evaporator. Assemble the Power Panel to the evaporator.
17. Re-connect all unit wiring and harnesses (refer to *YMC² Unit Wiring and Field Control Modifications (Form 160.84-PW2*).
18. Remove Nitrogen and charge unit with Refrigerant. (Refer to Form 160.84-O1).
19. **All Units –** Complete installation and finally level the unit. (Refer *Section 3 - Installation on page 31*).

**TABLE 12 -** ASSEMBLY TORQUE METRIC FOR METRIC TUBE FITTINGS

| FITTING SIZE | PORT-THREAD SIZE | TORQUE | |
|---|---|---|---|
| | | FT-LB | N-M |
| M10 | M10 x 1 | 17 | 23 |
| M12 | M12 x1.5 | 24 | 33 |
| M14 | M14 x 1.5 | 34 | 46 |
| M16 | M16 x 1.5 | 46 | 63 |
| M18 | M18 x 1.5 | 61 | 83 |
| M22 | M22 x 1.5 | 94 | 127 |
| M27 | M27 x 2 | 139 | 189 |
| M30 | M30 x 2 | 167 | 226 |
| M33 | M33 x 2 | 194 | 263 |
| M42 | M42 x 2 | 265 | 359 |
| M48 | M48 x 2 | 302 | 410 |
| M60 | M60 x 2 | 359 | 487 |

**TABLE 13 -** ASSEMBLY TORQUE ENGLISH FOR SAE TUBE FITTINGS

| TUBE SIZE | SAE STRAIGHT THREAD SIZE (O-RING PART NUMBER) | SAE STRAIGHT THREAD TORQUE (FT-LBS.) | FACE SEAL TUBE-SIDE THREAD SIZE (O-RING PART NUMBER) | FACE SEAL TUBE-SIDE TORQUE (FT-LBS.) |
|---|---|---|---|---|
| 1/4" | 7/16-20 (028-12961-001) | 25 | 9/16-18 (028-12961-011) | 18 |
| 3/8" | 9/16-18 (028-12961-003) | 35 | 11/16-16 (028-12961-012) | 30 |
| 1/2" | 3/4-16 (028-12961-004) | 60 | 13/16-16 (028-12961-013) | 40 |
| 5/8" | 7/8-14 (028-12961-005) | 100 | 1-14 (028-12961-014) | 60 |
| 3/4" | 1 1/16-12 (028-12961-006) | 135 | 1-3/16-12 (028-12961-015) | 85 |
| 1" | 1 5/16-12 (028-12961-008) | 200 | 1-7/16-12 (028-12961-016) | 110 |
| 1-1/4" | 1 5/8-12 (028-12961-017) | 250 | 1-11/16-12 (028-12961-022) | 140 |
| 1-1/2" | 1 7/8-12 (028-12961-020) | 305 | 2-12-UN2A (028-12961-019) | 180 |
| ** | 2 1/4-12 (028-12961-) | 225 | - | - |

**NOTE:**
** = SAE SIGHTGLASS

**TABLE 14 -** RE-ASSEMBLY TORQUE VALUES

| UNIT | | | | | | | |
|---|---|---|---|---|---|---|---|
| ITEM | | DESCRIPTION | YORK PART NUMBER | SAP NUMBER | QUANTITY | TORQUE VALUE | |
| | | | | | | FT-LBS. | N-M |
| A | 4 | HCS M24 X 3 X 90MM LG. | 021-33185-090 | 731065 | 12 | 170 | 230 |
| B | 10 | HCS M20 X 2.5 X 60MM LG. | 021-33184-060 | 731063 | 1 | 470 | 640 |
| C | 13 | HCS5 0.750-10 X 2.000 GR 5 ZN | 021-32012-016 | 588676 | 8 | 50 | 68 |
| D | 30 | HCS M6 X 1 X 16MM LG. | 021-31205-016 | 730686 | 6 | 50 | 68 |
| E | 32 | HCS M20 X 2.5 X 60MM LG. | 021-33184-060 | 731063 | 12 | 95 | 130 |
| F | 38 | NUT HEX 0.375-16 X GR 5 ZN | 021-32006-501 | 616900 | 6 | 50 | 68 |
| **HOT GAS** | | | | | | | |
| G | 7 | HCS5 0.625-11 X 4.500 GR 5 ZN | 021-32010-036 | 616908 | 4 | 65 | 88 |
| **LIQUID LINE** | | | | | | | |
| H | 5 | HCS5 0.625-11 X 2.250 GR 5 ZN | 021-32010-018 | 679632 | 8 | 50 | 68 |
| **END SHEETS (CON-EVAP ASSY)** | | | | | | | |
| J | 3 | HCS5 0.625-11 X 2.500 GR 5 ZN | 021-32010-020 | 616904 | 8 | 154 | 209 |
| **COMPRESSOR PIPING** | | | | | | | |
| K | 33 | Hose, Motor Cooling 1-1/2" (Shell End) | Refer to TABLE 12/13 for Torque Specifications | | | | |
| L | 33 | Hose, Motor Cooling M48x2 (Comp End) | | | | | |
| M | 8 | Metric, Connr 3/8 O.D. Tube M16x1.5 | | | | | |
| N | 15 | Nut, 3/8 O.D. Tube | | | | | |
| **VSD MOUNTING** | | | | | | | |
| O | 1 | HCS5 0.438-14 X 1.250 GR 5 ZN | 021-32007-010 | 730831 | 4 | 50 | 68 |
| **PANEL MOUNTING** | | | | | | | |
| P | 14 | HCS5 0.250-20 X 1.000 GR 5 ZN | 021-32004-008 | 730793 | 8 | 7 | 10 |

**NOTES:**

Unless otherwise specified, all screw must be tightened to the following torque values with lightly oiled threads.

** Lubricated with oil and graphite on male and female threads and under bolt heads. Do NOT use Moly-kote.

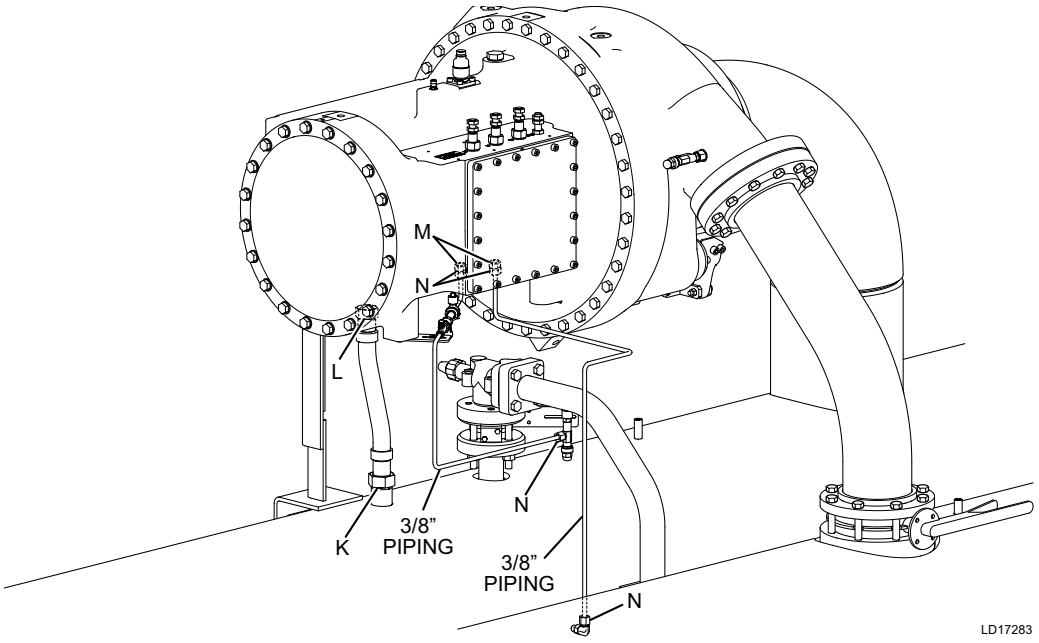
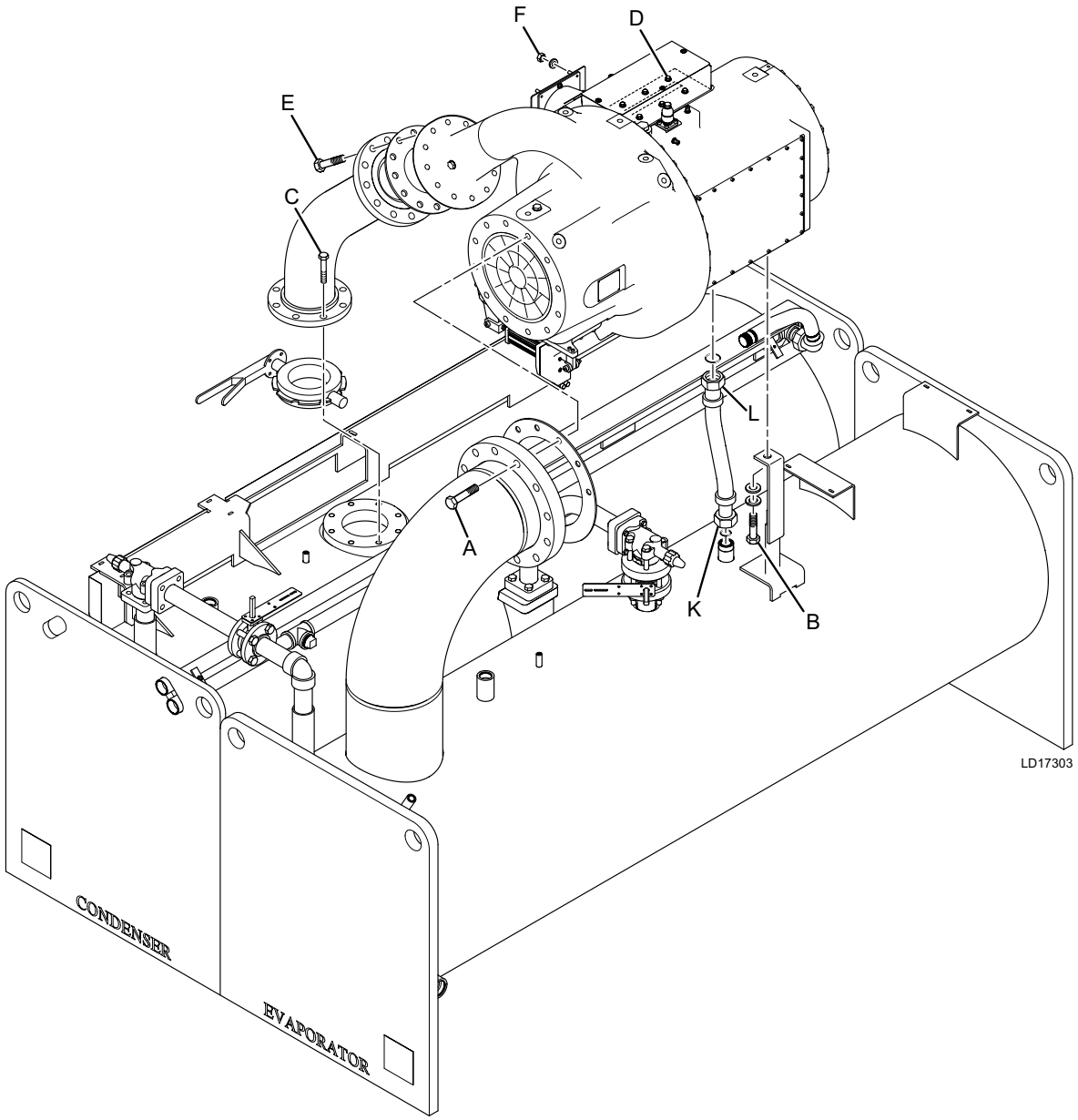


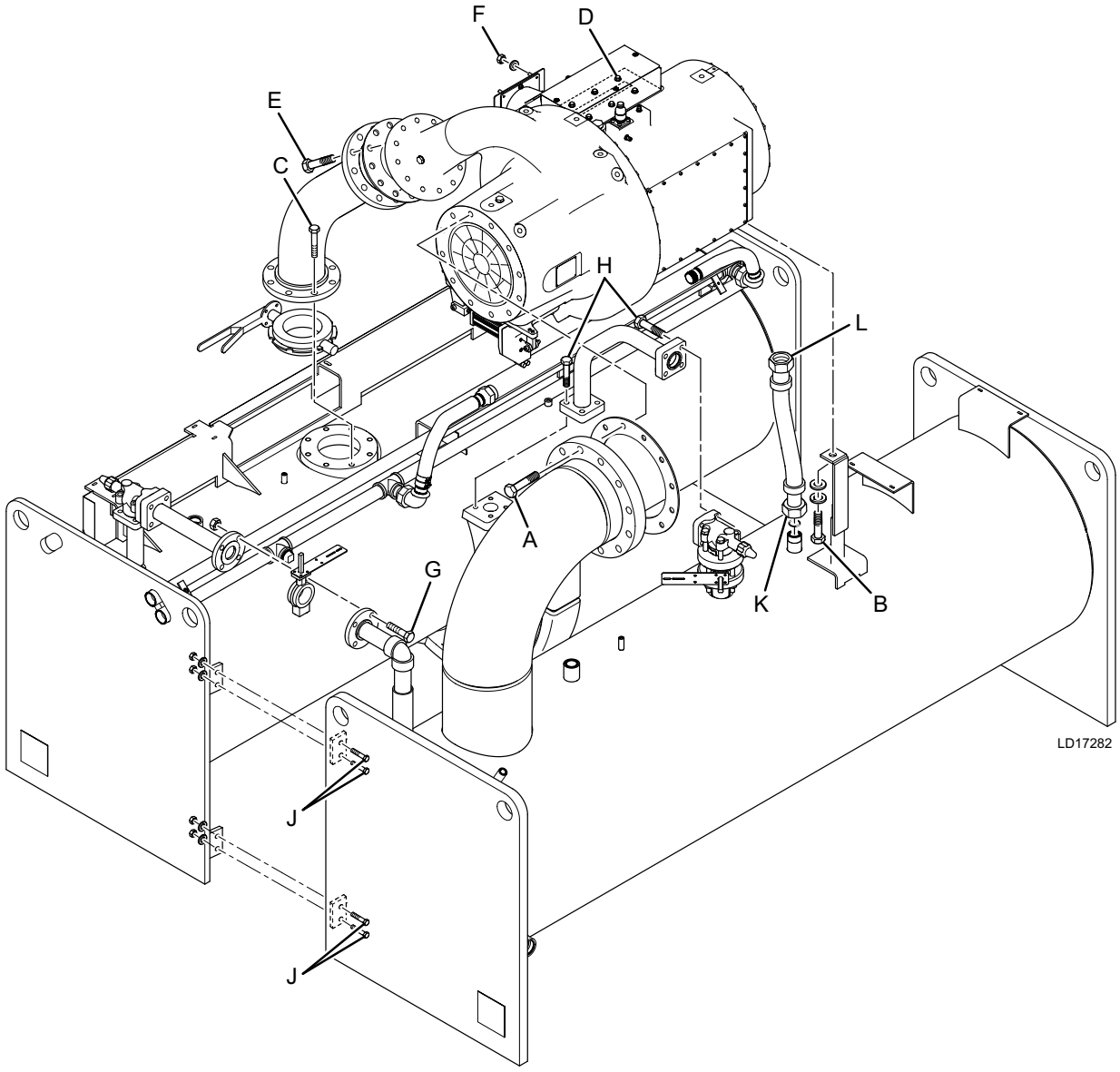

**FIGURE 29 -** YMC² PIPING REASSEMBLY HARDWARE IDENTIFICATION




Refer to *Table 14 on page 43* for the torque values.

LD17303

**FIGURE 30 -** YMC² FORM 3 REASSEMBLY HARDWARE IDENTIFICATION




Refer to *Table 14 on page 43* for the torque values.

LD17283

**FIGURE 31 -** YMC² FORM 7 REASSEMBLY HARDWARE IDENTIFICATION

Refer to *Table 14 on page 43* for the torque values.

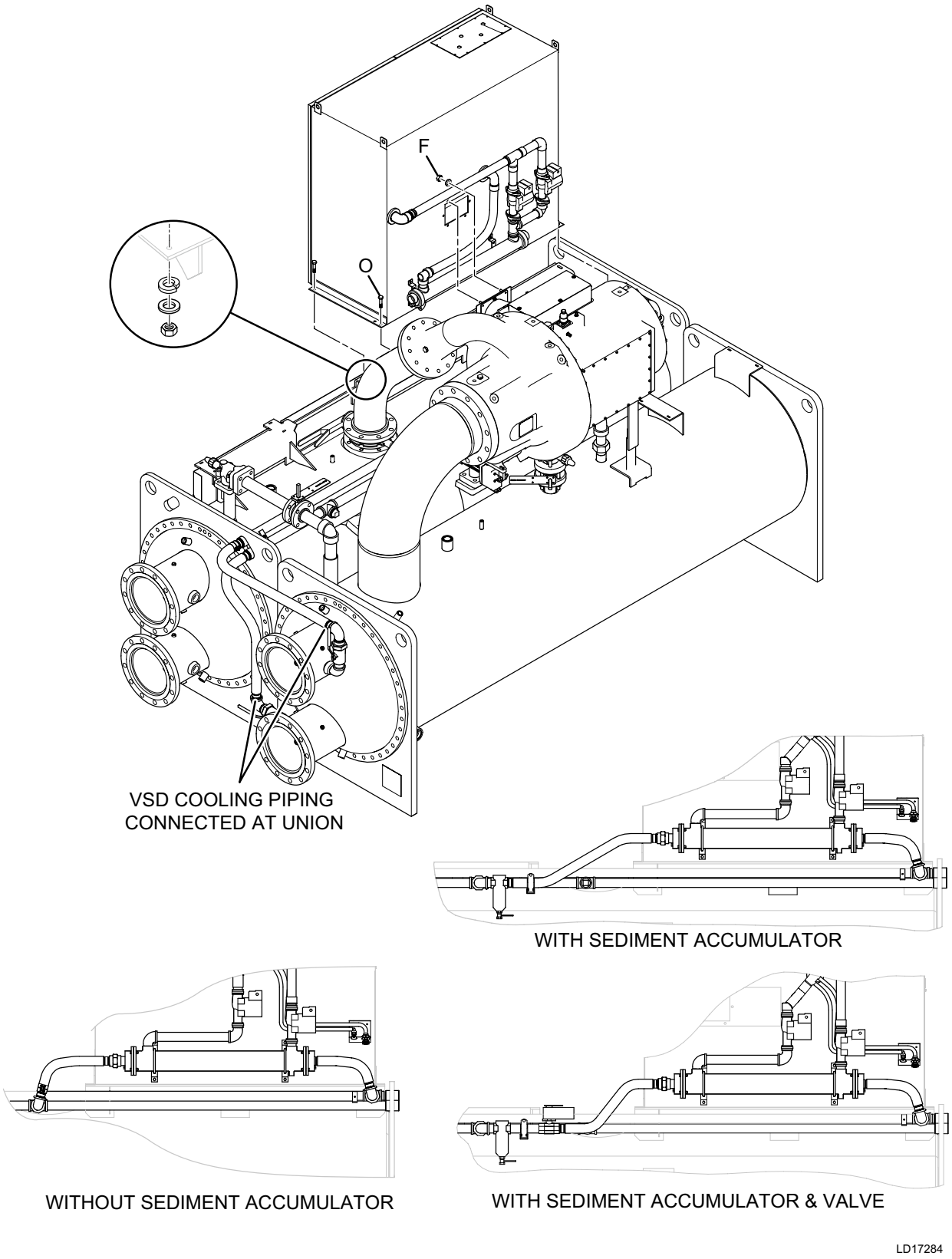
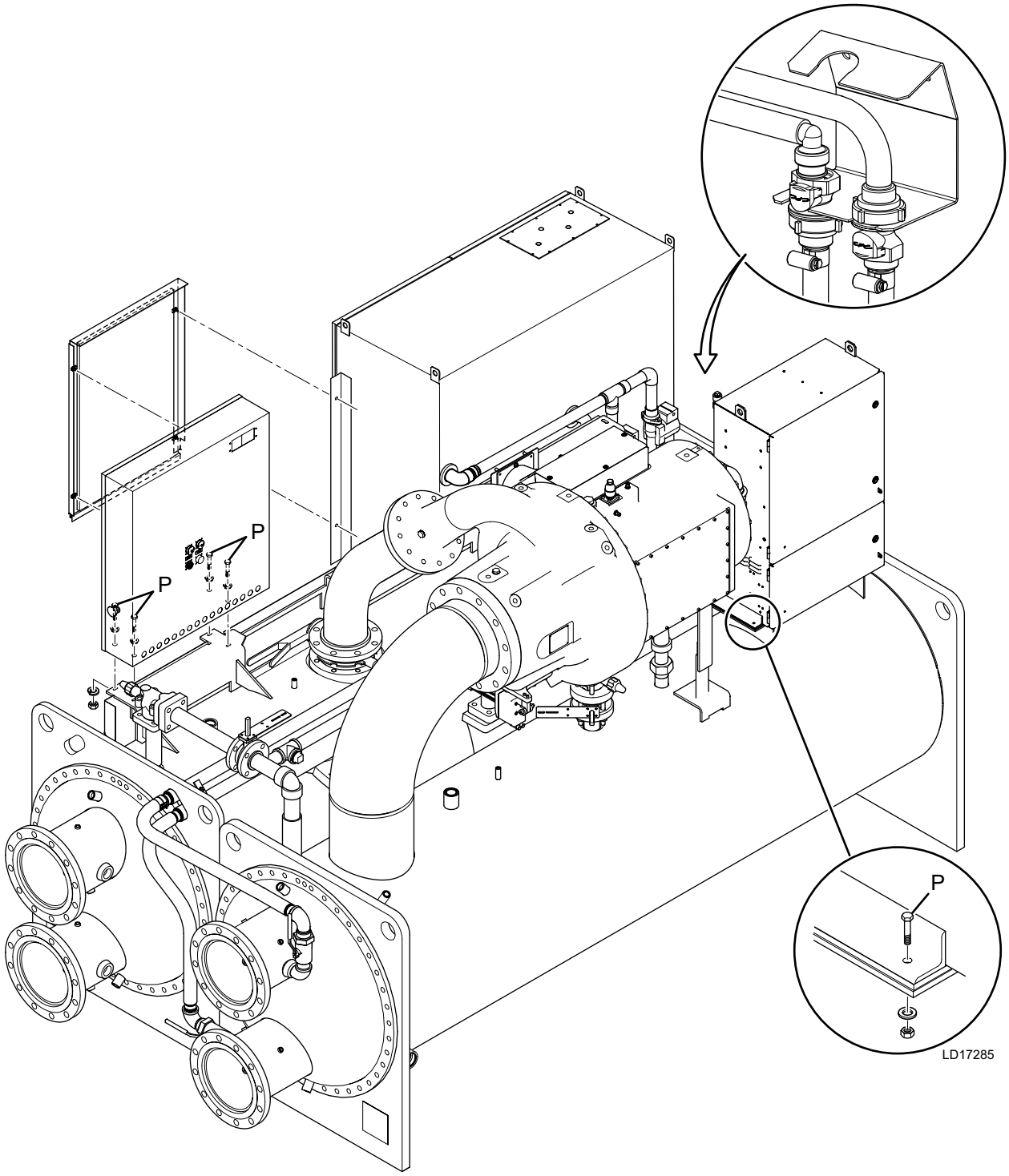



**FIGURE 32 -** VSD MOUNTING HARDWARE IDENTIFICATION




Refer to *Table 14 on page 43* for the torque values.

**FIGURE 33 -** POWER AND CONTROL PANEL MOUNTING HARDWARE IDENTIFICATION

## Form 9 and Form 10 Reassembly

1. Assemble vibration isolators to unit. Refer *Section 3 - Installation on page 31*.
2. Level shells in both directions. The longitudinal alignment of the shell should be checked by placing a level on the top of the shell, next to the discharge connection. The transverse alignment should be checked by placing a level on the tops of both end sheets refer to refer *Section 3 - Installation on page 31*. For additional instructions to level the unit. After shell is leveled, wedge and shim each corner of the shell to solidly support it while assembling the other parts.
3. Tighten all hardware installed to the specified torque values provided in *Table 14 on page 43*.
4. Lift the Variable Speed Drive in according to the rigging section and remove all packing material, for Variable Speed Drive. Carefully lower the Variable Speed Drive on to the supports on the condenser. Fasten the Variable Speed Drive to the condenser and to the motor terminal box duct. Make all necessary connections for the VSD cooling loop to be complete.

   The Variable Speed Drive will be shipped with glycol in the cooling system. The Variable Speed Drive coolant must be changed to the inhibitor provided with the shipped loose items prior to starting the unit or a VSD over temperature fault may occur.
5. Re-connect motor power leads in the Variable Speed Drive to T1, T2, and T3 terminals and torque to 18-20 Ft-lbs. per the labels in the VSD.
6. Re-connect motor winding thermistor shielded cable conductors in the Variable Speed Drive at TB4 (*refer to YMC² Unit Wiring and Field Control Modifications (Form 160.84-PW2)*.
7. Re-connect all unit wiring and harnesses (refer to *YMC² Unit Wiring and Field Control Modifications (Form 160.84-PW2)*.
8. For Form 9 shipment remove Nitrogen and charge unit with Refrigerant (refer *Form 160.84-OM1)*.
9. **All Units –** Complete installation and finally level the unit. Refer *Section 3 - Installation on page 31*.

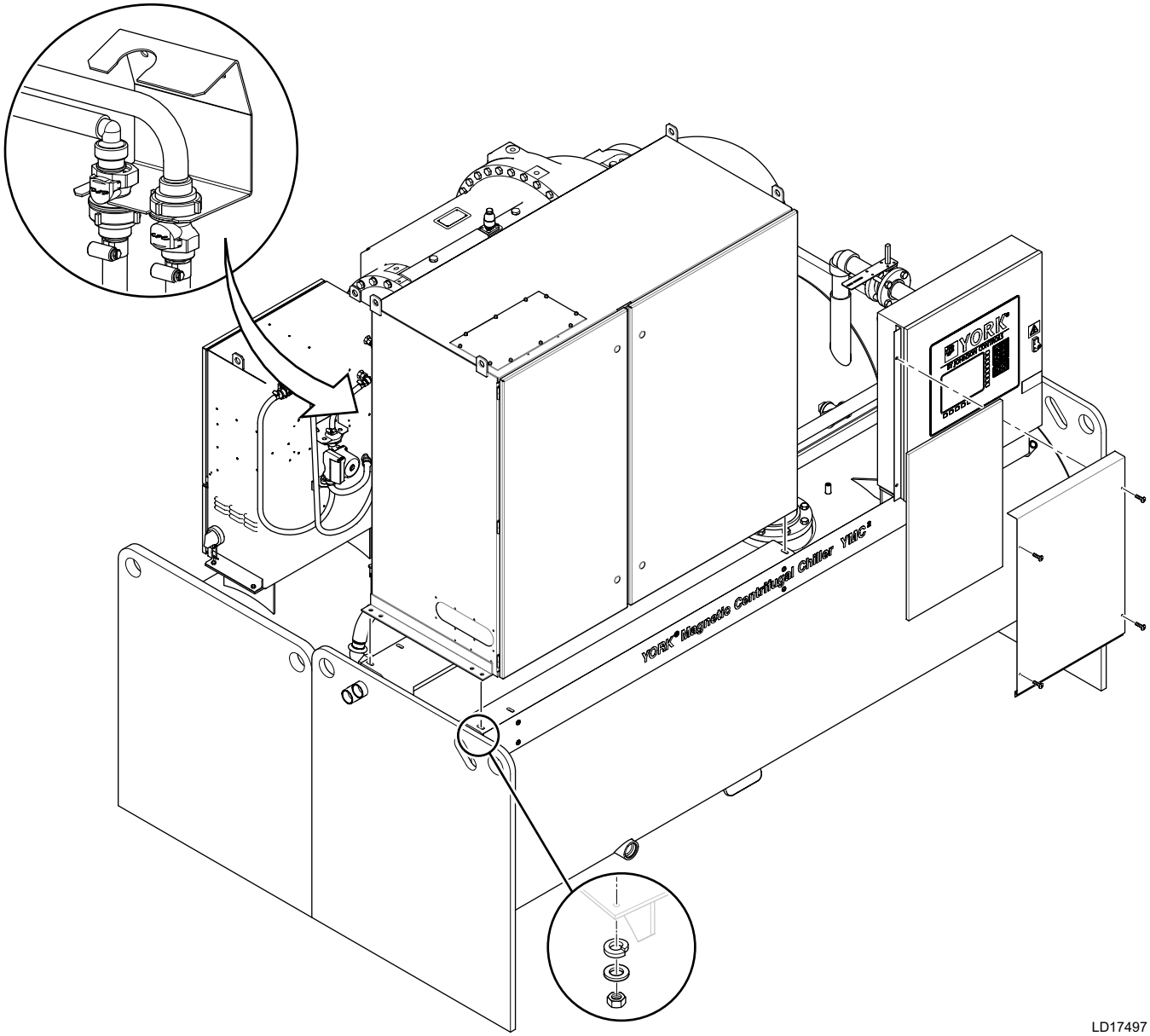



**FIGURE 34 -** YMC² FORM 9 AND FORM 10 REASSEMBLY HARDWARE IDENTIFICATION

## Form 11 Reassembly

1. Bolt the tube sheets together as shown in *Figure 35 on page 50*. Note that the outside surfaces of the tube sheets must be flush.

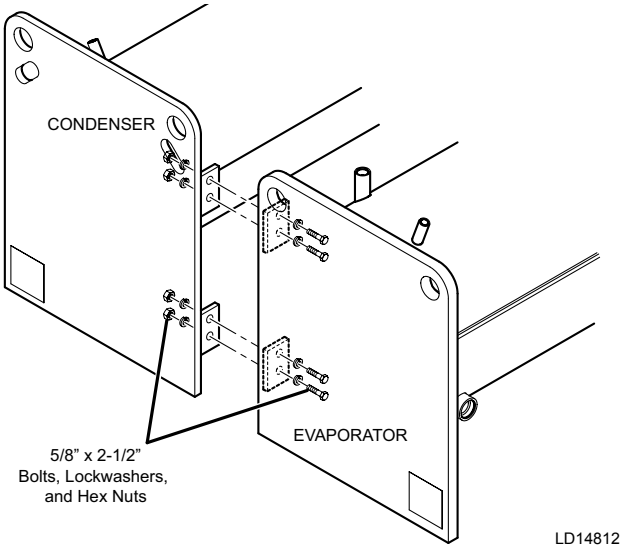



**FIGURE 35 -** SHELL REASSEMBLY

2. Assemble vibration isolators to unit. Refer *Section 3 - Installation on page 31*.
3. Level shells in both directions. The longitudinal alignment of the shell should be checked by placing a level on the top of the shell, next to the discharge connection. The transverse alignment should be checked by placing a level on the tops of both end sheets. Refer *Section 3 - Installation on page 31* for additional instructions to level the unit. After shell is leveled, wedge and shim each corner of the shell to solidly support it while assembling the other parts.
4. Install the discharge piece and optional isolation valve between the compressor and the condenser using proper gaskets and hardware.
5. Complete the refrigerant liquid piping between the evaporator and condenser. Be sure hardware are all properly installed.
6. Tighten all hardware installed to the specified torque values provided on *Figure 37 on page 51*.
7. The Variable Speed Drive will be shipped with glycol in the cooling system. The Variable Speed Drive coolant must be changed to the inhibitor provided with the shipped loose items prior to starting the unit or a VSD over temperature fault may occur.
8. Re-connect motor power leads in the Variable Speed Drive to T1, T2, and T3 terminals and torque to 18-20 Ft-lbs. per the labels in the VSD.
9. Re-connect all unit wiring and harnesses (refer to *YMC² Unit Wiring and Field Control Modifications (Form 160.84-PW2)*.
10. Install refrigerant piping (*refer to Refrigerant Tubing Reassembly section of this manual for proper connection of O-ring fittings*).
11. Pressure test the unit with nitrogen per Form 160.84-O1.
12. Remove Nitrogen and charge unit with refrigerant (refer *Form 160.84-OM1)*.

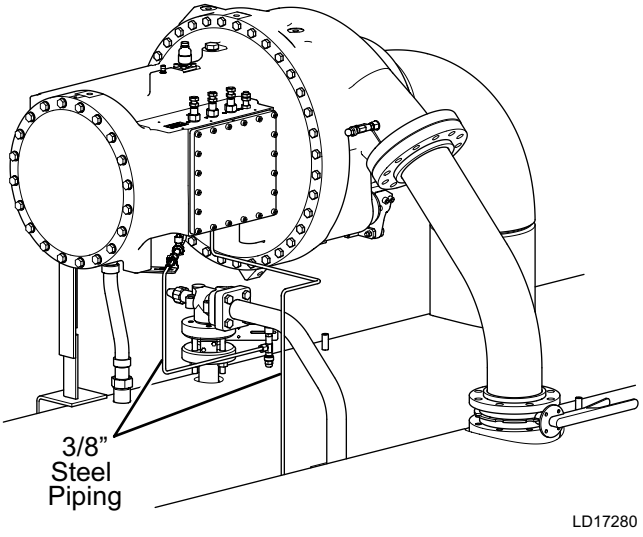
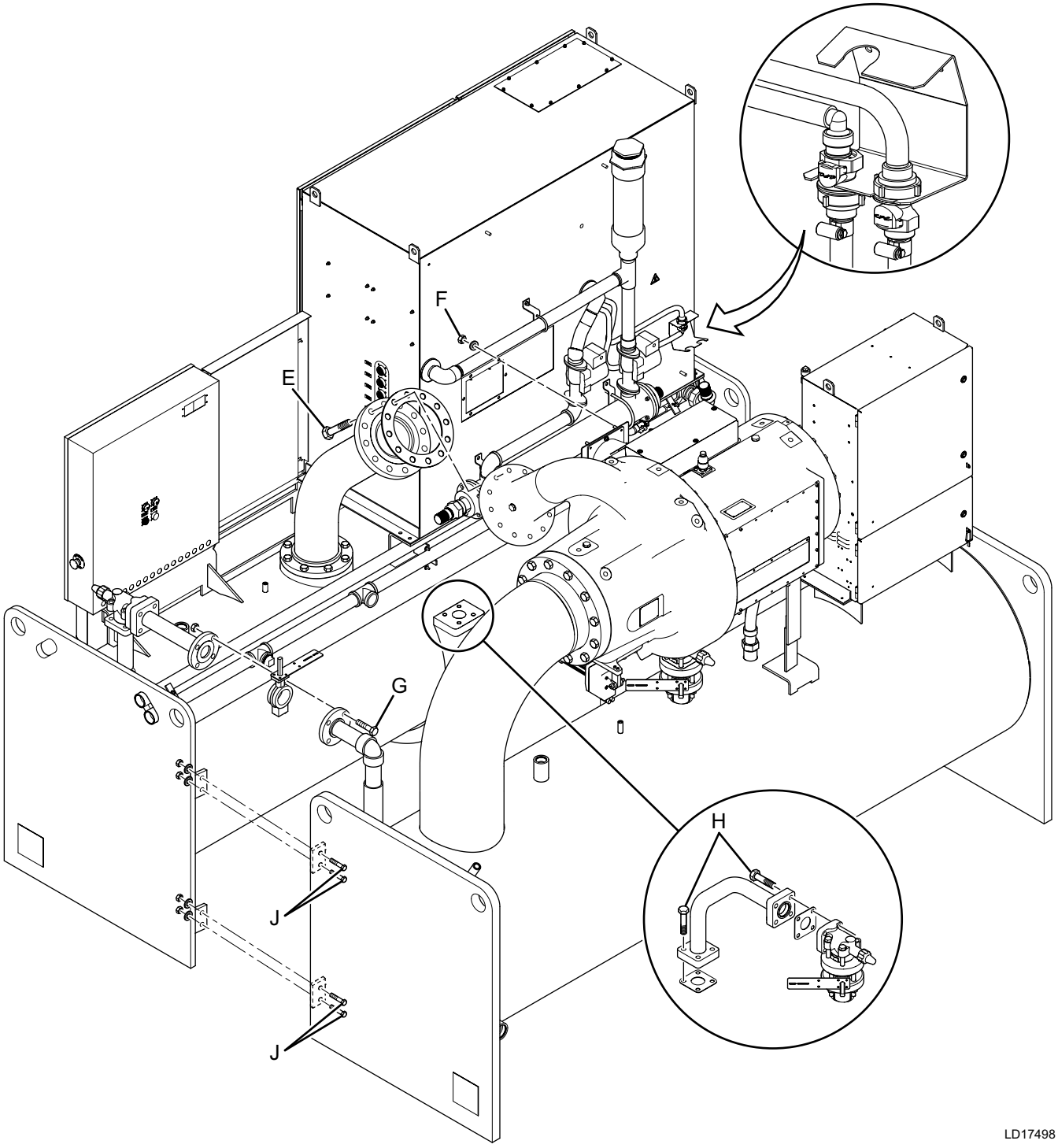



**FIGURE 36 -** REFRIGERANT PIPING

13. Complete installation and finally level the unit per Installation Instruction. Refer *Section 3 - Installation on page 31*.




Refer to *Table 14 on page 43* for the torque values.

**FIGURE 37 -** YMC² FORM 11 REASSEMBLY HARDWARE IDENTIFICATION

## REFRIGERANT TUBING REASSEMBLY

The following is a step-by-step procedure to be used to reassemble the chiller refrigerant piping.

### Assembly of Straight Thread O-ring Port Fittings

The male and female ends of SAE and ISO 6149 straight thread O-ring ports have UN/UNF or metric straight threads. An elastomeric O-ring is fitted to the male end. During assembly, the O-ring is firmly sandwiched between the angular sealing surface of the female port and the shoulder of the male end. Sealing is thus affected and maintained by the O-ring compression which results from the clamping force generated by tightening. The straight threads do NOT offer sealing action; they provide the resistance (holding power) for service pressure.

#### *Adjustable End Assembly*

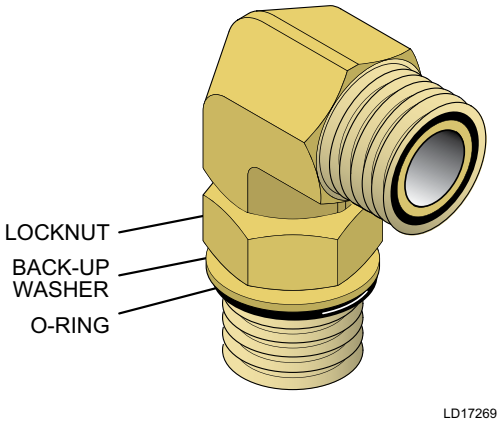



**FIGURE 38 -** ADJUSTABLE END FITTING

1. Inspect to ensure that both matching parts are free of burrs, nicks, scratches or any foreign particles.
2. Install O-ring on port end of fitting, if it is NOT pre-installed, take care NOT to nick the O-ring.
3. Lubricate O-ring with a light coat of synthetic Polyolester (POE) oil or POE grease.
4. Back off locknut as far as possible. Make sure back-up washer is NOT loose and is pushed up as far as possible. This ensures the O-ring is completely at the back of the land so it remains in the land area when the fitting is turned out at Step 6.

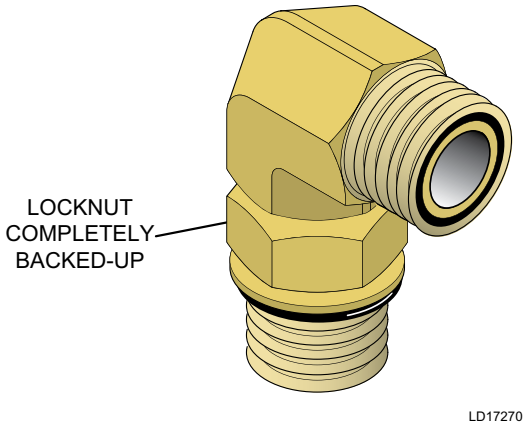



**FIGURE 39 -** BACK OFF LOCKNUT

5. Screw fitting into port until the back-up washer contacts the face of the port. Light wrenching may be necessary.

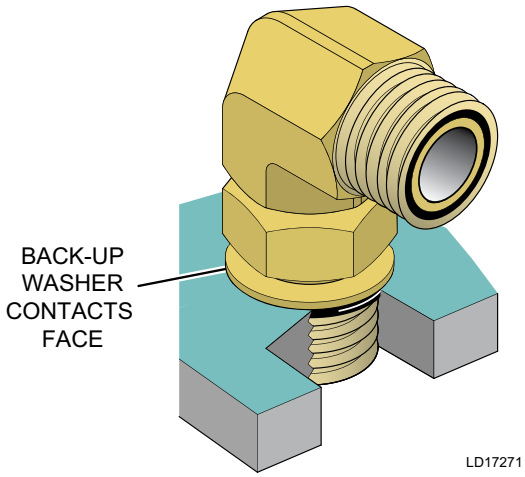



**FIGURE 40 -** SCREW FITTING INTO PORT

6. To align the tube end of fitting to accept incoming tube or hose assembly, unscrew by required amount, but NOT more than one full turn. More then one turn makes the locknut push the O-ring into the machine threads beyond the fitting land area during step 7.
7. Using two wrenches, hold fitting in desired position and tighten locknut to the appropriate torque value shown in *Table 13 on page 42 or Table 12 on page 42*.
8. Inspect to ensure that O-ring is NOT pinched and the back-up washer seats flat on face of port.

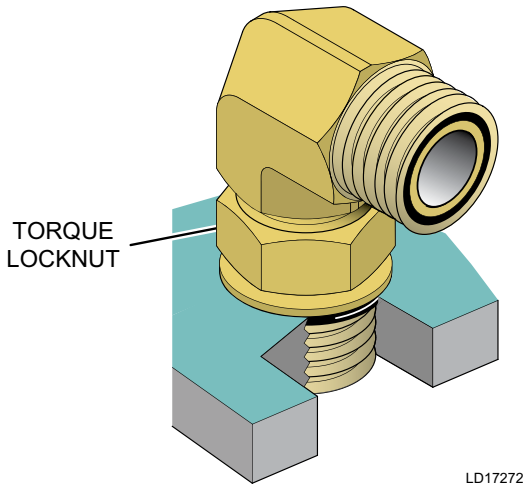



**FIGURE 41 -** TORQUE FITTING

### *Straight Non-Adjustable End Assembly*

1. Inspect to ensure that both matching parts are free of burrs, nicks, scratches or any foreign particles.
2. Install O-ring on port end of fitting, if it is NOT pre-installed, use care NOT to nick the O-ring.
3. Lubricate O-ring with a light coat of synthetic Polyolester (POE) oil or POE grease.
4. Screw fitting into port until the hex flat contacts the port face. Light wrenching may be necessary.
5. Tighten to give torque for the specified size as specified in *Table 13 on page 42 or Table 12 on page 42*.

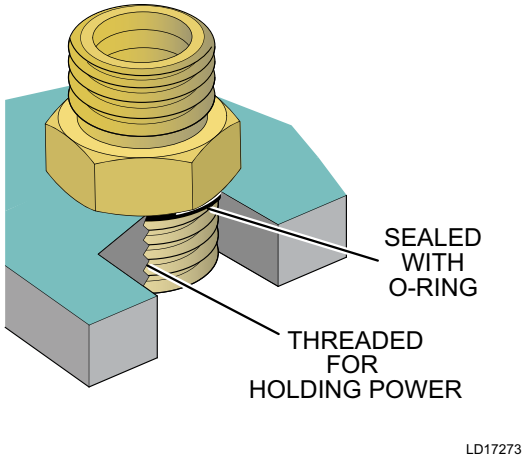



**FIGURE 42 -** SAE OR ISO 6149 STRAIGHT THREAD O-RING PORT

### Assembly of O-ring Face Seal Fittings

The male end and female nut of face seal fittings have UN/UNF straight threads. An elastomeric O-ring is fitted into the grooved male end. During assembly, the O-ring is firmly sandwiched between the sealing surfaces. Sealing is thus affected and maintained by the O-ring compression which results from the clamping force generated by tightening the nut. The straight threads do NOT offer sealing action; they provide the resistance (holding power) for service pressure.

### *O-ring Face Seal Assembly*

1. Inspect to ensure that both matching parts are free of burrs, nicks, scratches or any foreign particles.
2. Install O-ring in grooved face seal end of fitting, if it is NOT pre-installed, use care NOT to nick the O-ring.
3. Lubricate O-ring with a light coat of synthetic Polyolester (POE) oil or POE grease.
4. Thread the nut by hand, and tighten nut to the appropriate torque value shown in *Table 13 on page 42 or Table 12 on page 42*.

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# SECTION 5 - DIMENSIONS, NOZZLE ARRANGEMENTS AND WEIGHTS

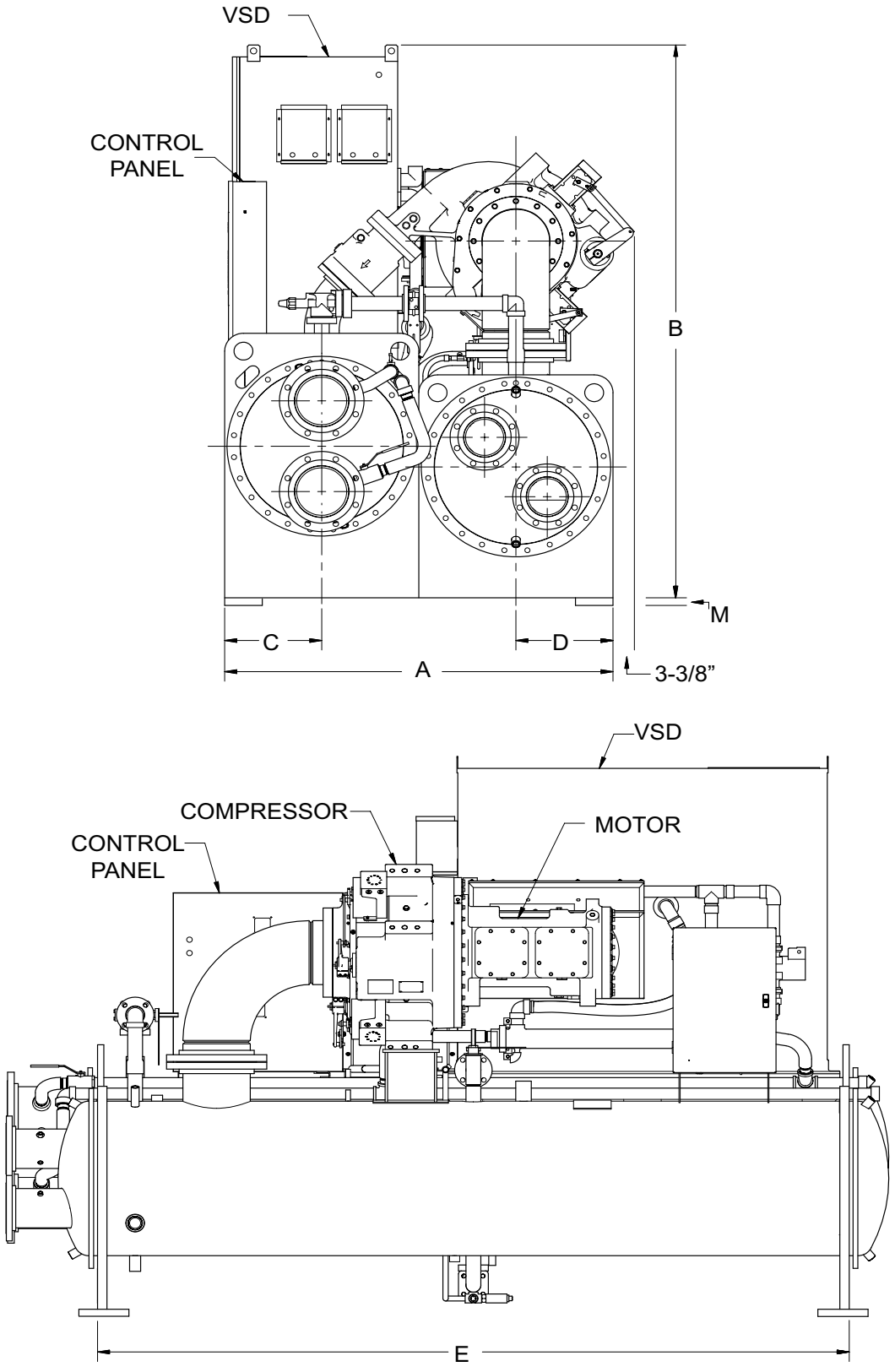
## COMPRESSOR UNIT DIMENSIONS

| ADDITIONAL OPERATING HEIGHT CLEARANCE TO FLOOR FT - IN (MM) | |
|---|---|
| Type Of Chiller Mounting | M |
| Neoprene Pad Isolators | 1 - 3/4" (45) |
| Spring Isolators 1" Deflection | 1" (25) |
| Direct Mount | 3/4" (19) |

| EVAPORATOR CODE | CONDENSER CODE | DIMENSIONS - 197 - 246 COMPRESSOR UNITS FT - IN (MM) | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | B | | C | D | E |
| | | | 490 VSD | 774 VSD | | | |
| EB2508 | CC2508 | 5'-5" (1651) | 6'-1/2" (1842) | — | 1'-3/8" (419) | 1'-1/2" (457) | 8' (2438) |
| EB2510 | CB2110 | 5'-5-1/4" (1657) | 6'-9-9/32" (2065) | 7'-11 (2419) | 1'-4-5/8" (406) | 1'-4-5/8" (422) | 10' (3048) |
| EB2510 | CB2510 | 5'-5-1/4" (1657) | 6'-7-11/16" (2024) | 7'-9-11/16" (2380) | 1'-4-5/8" (406) | 1'-4-5/8" (422) | 10' (3048) |
| EB2514 | CB2514 | 5'-5-1/4" (1657) | 6'-7-11/16" (2024) | 7'-9-11/16" (2380) | 1'-4-5/8" (406) | 1'-4-5/8" (422) | 14' (4267) |
| EB2910 | CB2510 | 5'-7" (1702) | 6'-9-15/16" (2081) | 7'-9-5/8" (2378) | 1'-4" (406) | 1'-5-1/2" (445) | 10' (3048) |
| EB2910 | CB2910 | 5'-10" (1778) | 7'-2-3/8" (2194) | 8'-1-7/8" (2486) | 1'-5-1/2" (445) | 1'-5-1/2" (445) | 10' (3048) |
| EB2914 | CB2514 | 5'-7" (1702) | 6'-9-15/16" (2081) | 7'-9-5/8" (2378) | 1'-4" (406) | 1'-5-1/2" (445) | 14' (4267) |
| EB2914 | CB2914 | 5'-10" (1778) | 7'-2-3/8" (2194) | 8'-1-7/8" (2486) | 1'-5-1/2" (445) | 1'-5-1/2" (445) | 14' (4267) |
| EB3310 | CB2910 | 6'-2" (1880) | 7'-2-3/8" (2194) | 8'-1-7/8" (2486) | 1'-5-1/2" (445) | 1'-7-1/2" (495) | 10' (3048) |
| EB3310 | CB3310 | 6'-7" (2007) | 7'-3-3/8" (2219) | 8'-5-5/16" (2573) | 1'-8" (508) | 1'-7-1/2" (495) | 10' (3048) |
| EB3314 | CB2914 | 6'-2" (1880) | 7'-2-3/8" (2194) | 8'-1-7/8" (2486) | 1'-5-1/2" (445) | 1'-7-1/2" (495) | 14' (4267) |
| EB3314 | CB3314 | 6'-7" (2007) | 7'-3-3/8" (2219) | 8'-5-5/16" (2573) | 1'-8" (508) | 1'-7-1/2" (495) | 14' (4267) |

**NOTES:**

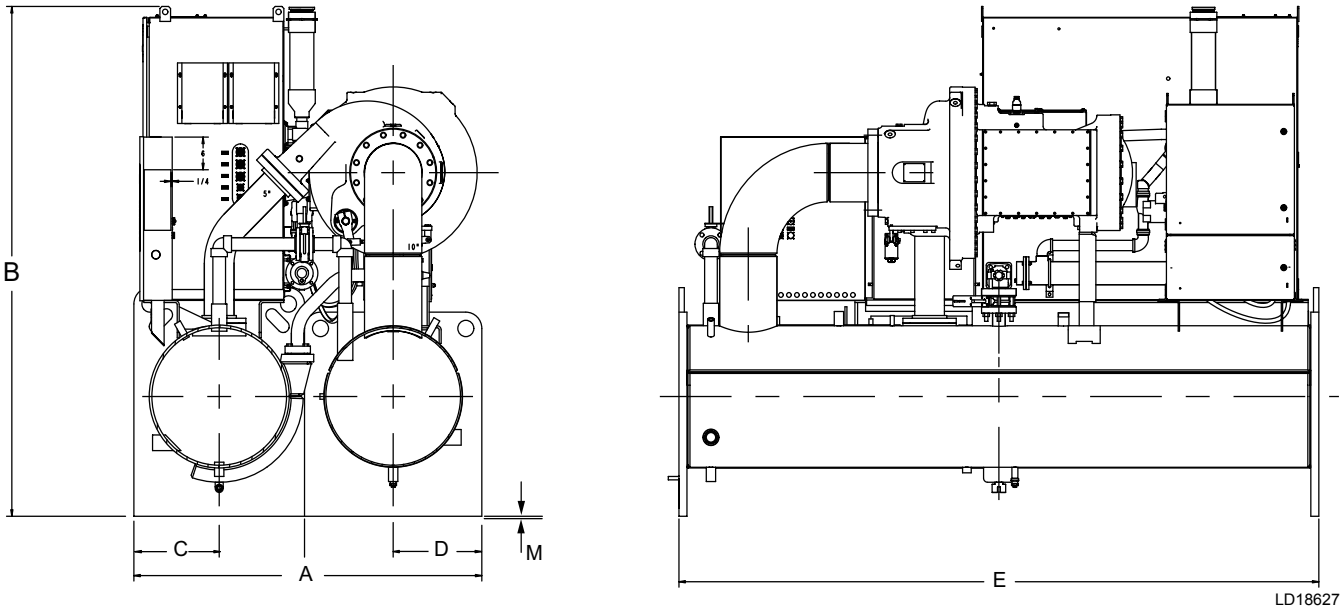
1. See Figure 43 on page 56 for dimension location points as designated on this table.
2. All dimensions are approximate. Certified dimensions are available on request.
3. Standard water nozzles are Schedule 40 pipe size, furnished as welding stub-outs with ANSI/AWWA C-606 grooves, allowing the option of welding, flanges, or use of ANSI/AWWA C-606 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.
4. One, two, and three-pass nozzle arrangements are available only in pairs shown for all shell codes. Any pair of evaporator nozzles may be used in combination with any pair of condenser nozzles Compact water boxes on one heat exchanger may be used with Marine Water Boxes on the other heat exchangers.
5. Condenser water must enter the water box through the bottom connection for proper operation of the sub-cooler to achieve rated performance.
6. To determine overall height, add dimension "M" for the appropriate isolator type.




LD17200

**FIGURE 43 -** DIMENSIONS - 197 & 246 COMPRESSOR UNITS FT-IN (MM)

# M6 MOTOR




| ADDITIONAL OPERATING HEIGHT CLEARANCE TO FLOOR - IN (MM) | |
|---|---|
| **TYPE OF CHILLER MOUNTING** | **M** |
| **NEOPRENE PAD ISOLATORS** | 1-3/4" (45) |
| **SPRING ISOLATORS 1" DEFLECTION** | 1" (25) |
| **DIRECT MOUNT** | 3/4" (19) |

| EVAPORATOR CODE | CONDENSER CODE | M6 MOTOR DIMENSIONS FT - IN (MM) | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | B | | C | D | E |
| | | | 774A VSD | 1278A VSD | | | |
| **EC3312** | CB2912 | 6'-2" (1880) | 8'-3-1/2" (2527) | 8'-3" (2527) | 1'-5-1/2" (445) | 1'-7-1/2" (495) | 12'-0" (3658) |
| **EC3314** | CB3314 | 6'-7" (2007) | 8'-7-1/2" (2629) | 8'-6-1/2" (2629) | 1'-8" (508) | 1'-7-1/2" (495) | 14'-0" (4267) |
| **EC3914** | CB3314 | 7'-4" (2235) | 8'-8-1/2" (2654) | 8'-8" (2654) | 1'-8" (508) | 2'-0" (610) | 14'-0" (4267) |
| **EC3914** | CB3914 | 7'-10" (2388) | 9'-1-1/8" (2772) | 9'-1-1/8" (2772) | 1'-11" (584) | 2'-0" (610) | 14'-0" (4267) |

# M6 MOTOR

**TABLE 15 -** EVAPORATOR WEIGHTS, DRY*

| M6 MOTOR CHILLERS | EVAPORATOR | | 150PSI COMPACT WATER BOX WEIGHT LBS (KG) | | | 300PSI COMPACT WATER BOX WEIGHT LBS (KG) | | | 150PSI MARINE WATER BOX WEIGHT LBS (KG) | | | 300PSI MARINE WATER BOX WEIGHT LBS (KG) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CODE | WEIGHT LBS (KG) | 1-PASS | 2-PASS | 3-PASS | 1-PASS | 2-PASS | 3-PASS | 1-PASS | 2-PASS | 3-PASS | 1-PASS | 2-PASS | 3-PASS |
| | EC3312 | 7477 (3392) | 340 (154) | 383 (174) | 380 (172) | 1062 (482) | 943 (428) | 878 (398) | 1822 (826) | 1101 (499) | 1850 (839) | 3214 (1458) | 1998 (906) | 2986 (1354) |
| | EC3314 | 8389 (3805) | 340 (154) | 383 (174) | 380 (172) | 1062 (482) | 943 (428) | 878 (398) | 1822 (826) | 1101 (499) | 1850 (839) | 3214 (1458) | 1998 (906) | 2986 (1354) |
| | EC3914 | 11834 (5368) | 678 (308) | 712 (323) | 740 (336) | 1430 (649) | 1310 (594) | 1266 (574) | 2778 (1260) | 1785 (810) | 2856 (1295) | 4740 (2150) | 2947 (1337) | 4502 (2042) |

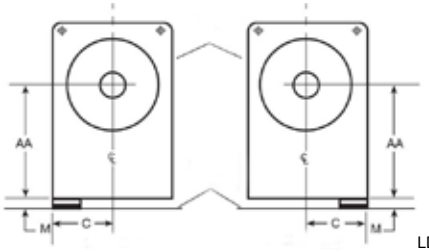
*Weights based on maximum tube bundle allowed per shell.
Shell weights assume max bundle size (for 3/4" tube), heaviest tube (e-179; c-203), 300#water (if available)
Waterbox weight includes both waterboxes and covers/return

**TABLE 16 -** CONDENSER WEIGHTS, DRY*

| M6 MOTOR CHILLERS | CONDENSER | | 150PSI COMPACT WATER BOX WEIGHT LBS (KG) | | | 300PSI COMPACT WATER BOX WEIGHT LBS (KG) | | | 150PSI MARINE WATER BOX WEIGHT LBS (KG) | | | 300PSI MARINE WATER BOX WEIGHT LBS (KG) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CODE | WEIGHT LBS (KG) | 1-PASS | 2-PASS | 3-PASS | 1-PASS | 2-PASS | 3-PASS | 1-PASS | 2-PASS | 3-PASS | 1-PASS | 2-PASS | 3-PASS |
| | CB2912 | 7473 (3390) | 340 (154) | 354 (161) | 354 (161) | 852 (386) | 735 (333) | 678 (308) | 1408 (639) | 891 (404) | 1416 (642) | 2360 (1070) | 1468 (666) | 2170 (984) |
| | CB3314 | 9782 (4437) | 406 (184) | 419 (190) | 444 (201) | 1066 (484) | 845 (383) | 872 (396) | 1918 (870) | 1159 (526) | 1888 (856) | 3098 (1405) | 1827 (829) | 2816 (1277) |
| | CB3914 | 10297 (4671) | 692 (314) | 757 (343) | 740 (336) | 1630 (739) | 1436 (651) | 1272 (577) | 2944 (1335) | 1849 (839) | 2964 (1344) | 4924 (2234) | 2998 (1360) | 4410 (2000) |

*Weights based on maximum tube bundle allowed per shell.
Shell weights assume max bundle size (for 3/4" tube), heaviest tube (e-179; c-203), 300#water (if available)
Waterbox weight includes both waterboxes and covers/return

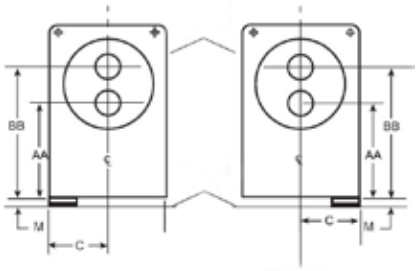
## EVAPORATOR 150 & 300 PSI COMPACT WATER BOXES




LD17202

| 1-Pass Evaporator Nozzle Arrangements | |
|---|---|
| **In** | **Out** |
| Left End | Right End |
| Right End | Left End |

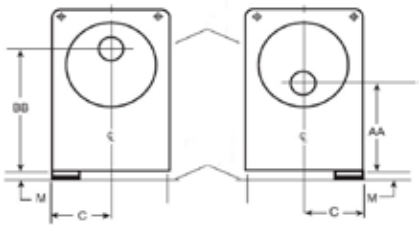
**FIGURE 44 -** EVAPORATOR - COMPACT WATER BOXES (1-PASS NOZZLE ARRANGEMENTS)



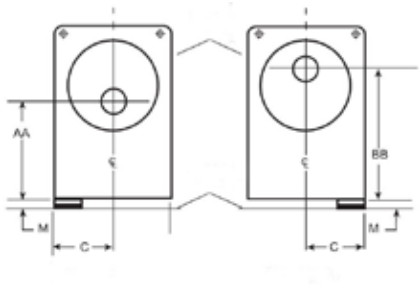

LD17203

| 2-Pass Evaporator Nozzle Arrangements | |
|---|---|
| **In** | **Out** |
| Lower Right End | Upper Right End |
| Lower Left End | Upper Left End |

**FIGURE 45 -** EVAPORATOR - COMPACT WATER BOXES (2-PASS NOZZLE ARRANGEMENTS)




LD17204




LD17205

| 3-Pass Evaporator Nozzle Arrangements | |
|---|---|
| **In** | **Out** |
| Right End | Left End |

| 3-Pass Evaporator Nozzle Arrangements | |
|---|---|
| **In** | **Out** |
| Left End | Right End |

**FIGURE 46 -** EVAPORATOR - COMPACT WATER BOXES (3-PASS NOZZLE ARRANGEMENTS)

| COMPACT WATER BOXES - 150 & 300 PSI DIMENSIONS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Evaporator Shell Code | Nozzle Pipe Size Ft-In (mm) | | | Evaporator Nozzle Dimensions Ft-In (mm) | | | | | |
| | No. Of Passes | | | C | 1-Pass | 2-Pass | | 3-Pass | |
| | 1 | 2 | 3 | | AA | AA | BB | AA | BB |
| EB25 | 8" (203) | 6" (152) | 4" (102) | 1' - 4-5/8" (422) | 1' - 10" (559) | 1'-2" (356) | 2'-6" (762) | 1'-2" (356) | 2'-6" (762) |
| EB29 | 10" (254) | 8" (203) | 6" (152) | 1'-5-1/2" (445) | 2' (610) | 1'-3" (381) | 2'-9" (838) | 1'-4" (406) | 2'-8" (813) |
| EB33 | 14" (356) | 10" (254) | 8" (203) | 1'-7-1/2" (495) | 2'-2" (660) | 1'-4" (406) | 3' (914) | 1'-6" (457) | 2'-10" (864) |
| EC33 | 16 | 12 | 10 | 1'-7-1/2" (495) | 2'-2" (660) | 1'-4-1/2" (419) | 2'-11-1/2" (902) | 1'-4-1/2" (419) | 2'-11-1/2" (902) |
| EC39 | 16 | 12 | 10 | 1'-7-1/2" (495) | 2'-2" (660) | 1'-4-1/2" (419) | 2'-11-1/2" (902) | 1'-4-1/2" (419) | 2'-11-1/2" (902) |

**NOTE**: Dimensions are shown in Inches (mm)

## EVAPORATOR AND CONDENSER 150 & 300 PSI COMPACT WATER BOXES DIMENSIONS

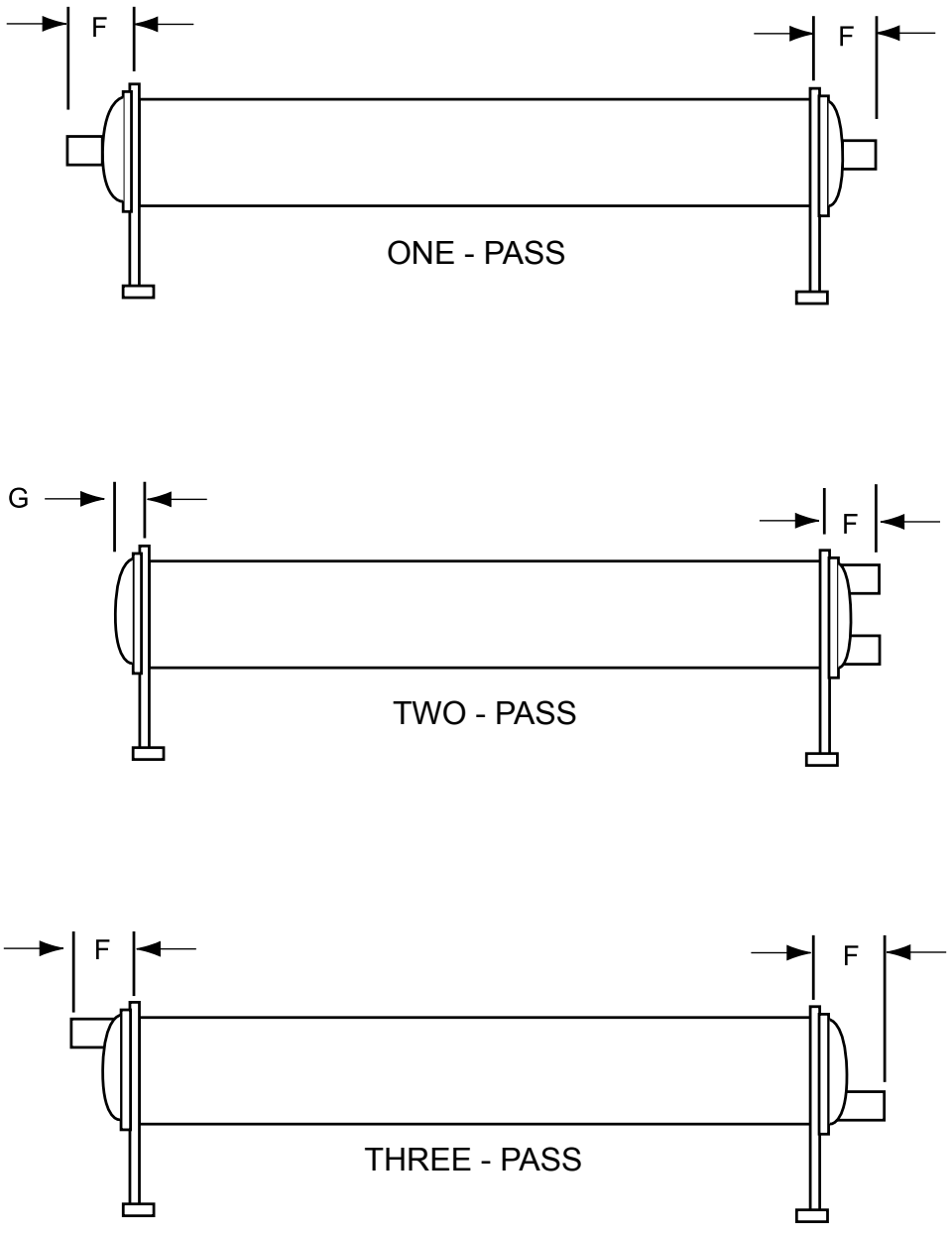



**FIGURE 47 -** EVAPORATOR AND CONDENSER - 150 & 300 PSI COMPACT WATER BOXES

# EVAPORATOR AND CONDENSER 150 & 300 PSI COMPACT WATER BOXES DIMENSIONS

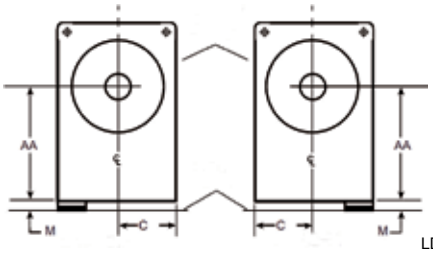
| 150 AND 300 PSI COMPACT WATER BOXES DIMENSIONS FT - IN (MM) | | | | | | |
|---|---|---|---|---|---|---|
| EVAPORATOR SHELL CODE | "F" NOZZLE - DIAMETER | | | | | G |
| | 10 | 12 | 14 | 16 | 20 | |
| EA25 | - | - | - | - | - | 0'-6-7/16" (164) |
| EB25 | - | - | - | - | - | 0'-6-7/16" (164) |
| EB29 | 1'-5-7/16" (443) | - | - | - | - | 0'-6-31/32" (177) |
| EB33 | 1'-6" (443) | - | 1'-6" (443) | - | - | 0'-7-1/2" (191) |
| EC33 (150 PSI) | 1'-6-3/4" (476) | 2'-1-3/4" (638) | - | 1'-6-3/4" (476) | - | 0'-9-1/4" (235) |
| EC33 (300 PSI) | 1'-8-1/8" (511) | 2'-3-1/8" (689) | - | 1'-8-1/8" (511) | - | 0'-9-1/4" (235) |
| EC39 (150 PSI) | 1'-8-1/4" (514) | 1'-8-1/4" (514) | - | 1'-8-1/4" (514) | - | 0'-10-1/4" (260) |
| EC39 (300 PSI) | 1'-9-1/4" (540) | 1'-9-1/4" (540) | - | 1'-9-1/4" (540) | - | 0'-9-3/4" (249) |

| 150 AND 300 PSI COMPACT WATER BOXES DIMENSIONS FT - IN (MM) | | | | | | |
|---|---|---|---|---|---|---|
| CONDENSER SHELL CODE | "F" NOZZLE - DIAMETER | | | | | G |
| | 10 | 12 | 14 | 16 | 20 | |
| CA21 | 1'-2-3/8" (365) | - | - | - | - | 0'-5-29/32" (150) |
| CA25 | - | 1'-2-3/8" (365) | - | - | - | 0'-6-7/16" (164) |
| CB21 | 1'-4-3/8" (416) | - | - | - | - | 0'-5-29/32" (150) |
| CB25 | - | 1'-4-3/8" (416) | - | - | - | 0'-6-7/16" (164) |
| CC25 | - | 1'-4-3/8" (416) | - | - | - | 0'-6-7/16" (164) |
| CB29 | 1'-5-1/2" (445) | - | 1'-5-1/2" (445) | - | - | 0'-6-31/32" (177) |
| CB33 (150 PSI) | 1-7-1/2" (495) | - | - | 1-7-1/2" (495) | - | 0'-7-1/2" (191) |
| CB33 (300 PSI) | 1-7-1/2" (495) | - | - | 1-7-1/2" (495) | - | 0'-7-1/2" (191) |
| CB39 (150 PSI) | 1-8-1/4" (514) | - | 2-4-1/4" (718) | - | 1-8-1/4" (514) | 0'-11-1/4" (286) |
| CB39 (300 PSI) | 1-9-1/4" (540) | - | 2-5-1/4" (743) | - | 1-9-1/4" (540) | 0'-11-5/8" (297) |

**NOTES:**

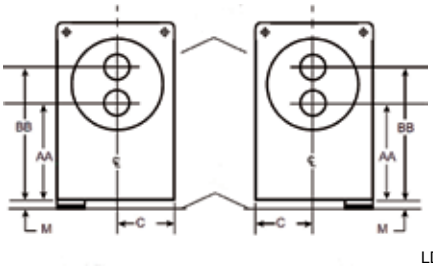
1. All dimensions shown in Ft/In (mm)
2. Standard water nozzles are furnished as welding stub-outs with ANSI/AWWA C-606 grooves, allowing the option of welding, flanges, or use of ANSI/AWWA C-606 couplings. Factory-installed, class 150 (ANSI B16.5, round slip-on, forged carbon steel with 1.6mm raised face), water flanged nozzles are optional (add 13mm 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.
4. Evaporator and condenser water must enter the water box through the bottom connection to achieve rated performance.
5. Connected piping should allow for removal of compact water boxes for tube access and cleaning.
6. Add dimension "M" as shown on the unit dimensions page for the appropriate isolator type.

# CONDENSER 150 & 300 PSI COMPACT WATER BOXES



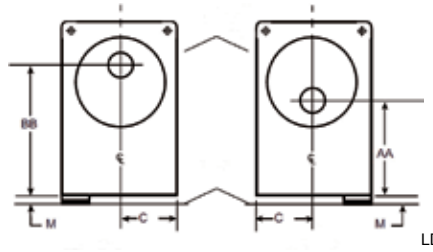

| 1-Pass Condenser Nozzle Arrangements | |
|---|---|
| **In** | **Out** |
| Left End | Right End |
| Right End | Left End |

**FIGURE 48 -** CONDENSER - COMPACT WATER BOXES (1-PASS NOZZLE ARRANGEMENTS)

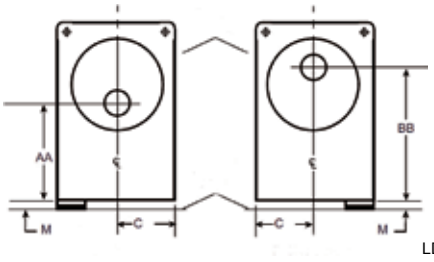



| 2-Pass Condenser Nozzle Arrangements | |
|---|---|
| **In** | **Out** |
| Lower Right End | Upper Right End |
| Lower Left End | Upper Left End |

**FIGURE 49 -** CONDENSER - COMPACT WATER BOXES (3-PASS NOZZLE ARRANGEMENTS)




| 3-Pass Condenser Nozzle Arrangements | |
|---|---|
| **In** | **Out** |
| Right End | Left End |



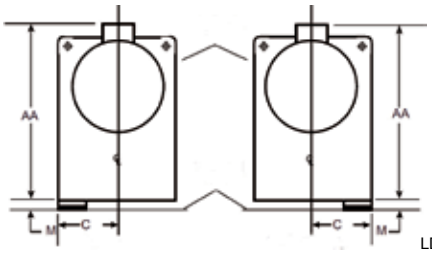

| 3-Pass Condenser Nozzle Arrangements | |
|---|---|
| **In** | **Out** |
| Left End | Right End |

**FIGURE 50 -** CONDENSER - COMPACT WATER BOXES (2-PASS NOZZLE ARRANGEMENTS)

| COMPACT WATER BOXES -150 & 300 PSI DIMENSIONS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Condenser Shell Code | Nozzle Pipe Size In (mm) | | | Condenser Nozzle Dimensions Ft-In (mm) | | | | | |
| | No. of Passes | | | C | 1-Pass | 2-Pass | | 3-Pass | |
| | 1 | 2 | 3 | | AA | AA | BB | AA | BB |
| CB21 | 10" (254) | 6" (152) | 6" (152) | 1'-4" (406) | 2'-2-3/8" (670) | 1'-7-7/8" (505) | 2'-8-7/8" (835) | 1'-7-7/8" (505) | 2'-8-7/8" (835) |
| CB25 | 12" (305) | 8" (203) | 6" (152) | 1'-4" (406) | 1'-10" (559) | 1'-2-3/8" (365) | 2'-5-5/8" (752) | 1'-2-3/8" (365) | 2'-5-5/8" (752) |
| CC25 | 12" (305) | 8" (203) | 6" (152) | 1'-4" (406) | 1'-10" (559) | 1'-2-3/8" (365) | 2'-5-5/8" (752) | 1'-2-3/8" (365) | 2'-5-5/8" (752) |
| CB29 (150 PSI) | 14" (356) | 10" (254) | 8" (203) | 1'-4" (406) | 1'-10" (559) | 1'-1-3/4" (349) | 2'-6-1/4" (768) | 1'-1-3/4" (349) | 2'-6-1/4" (768) |
| | 14" (356) | 10" (254) | 8" (203) | 1'-5-1/2" (445) | 2'-0" (610) | 1'-3-3/4" (400) | 2'-8-1/4" (819) | 1'-3-3/4" (400) | 2'-8-1/4" (819) |
| CB29 (300 PSI) | 14" (356) | 10" (254) | 8" (203) | 1'-4" (406) | 1'-10" (559) | 1'-1" (330) | 2'-7" (787) | 1'-1" (330) | 2'-7" (787) |
| | 14" (356) | 10" (254) | 8" (203) | 1'-5-1/2" (445) | 2'-0" (610) | 1'-3" (381) | 2'-9" (838) | 1'-3" (381) | 2'-9" (838) |
| CB33 | 16" (406) | 10" (254) | 10" (254) | 1'-8" (508) | 2'-1" (635) | 1'-4" (406) | 2'-10" (864) | 1'-4" (406) | 2'-10" (864) |
| CB39 | 20" (508) | 14" (356) | 10" (254) | 1'-11" (584) | 2'-3-1/2"(699) | 1'-5-1/2" (446) | 3'-1-1/2" (952) | 1'-5-1/2" (446) | 3'-1-1/2" (952) |

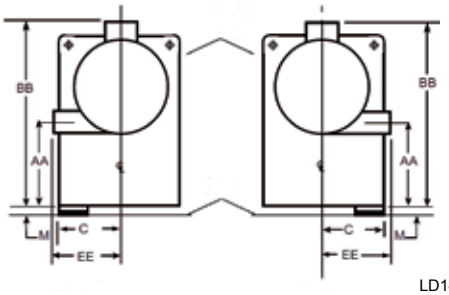
**NOTE**: Dimensions are shown in Inches (mm)

## EVAPORATOR 150 & 300 PSI MARINE WATER BOXES



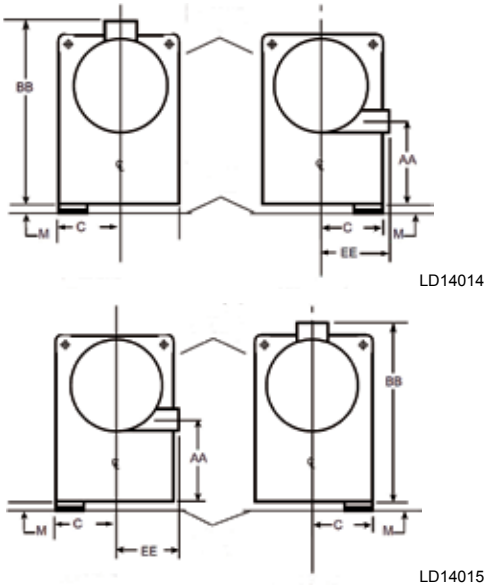

| 1-Pass Evaporator Nozzle Arrangements | |
|---|---|
| **In** | **Out** |
| Left End | Right End |
| Right End | Left End |

**FIGURE 51 -** EVAPORATOR - MARINE WATER BOXES (1-PASS NOZZLE ARRANGEMENTS)




| 2-Pass Evaporator Nozzle Arrangements | |
|---|---|
| **In** | **Out** |
| Lower Right End | Upper Right End |
| Lower Left End | Upper Left End |

**FIGURE 52 -** EVAPORATOR - MARINE WATER BOXES (2-PASS NOZZLE ARRANGEMENTS)



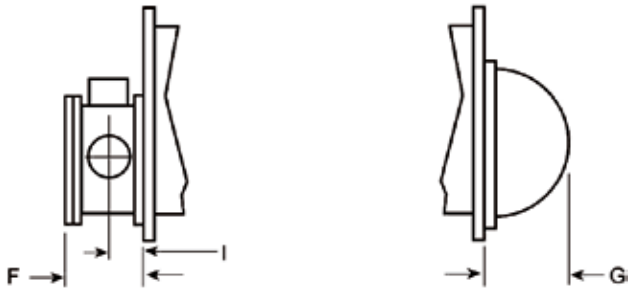

| 3-Pass Evaporator Nozzle Arrangements | |
|---|---|
| **In** | **Out** |
| Right End | Left End |

| 3-Pass Evaporator Nozzle Arrangements | |
|---|---|
| **In** | **Out** |
| Left End | Right End |

**FIGURE 53 -** EVAPORATOR - MARINE WATER BOXES (3-PASS NOZZLE ARRANGEMENTS)

| MARINE WATER BOXES-150 AND 300PSI | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| EVAPORATOR SHELL CODE | NOZZLE PIPE SIZE (IN) | | | Evaporator Nozzle Dimensions Ft-In (MM) | | | | | | | |
| | NUMBER OF PASSES | | | C | 1-PASS | 2-PASS | | | 3-PASS | | |
| | 1 | 2 | 3 | | AA | AA | BB | EE | AA | BB | EE |
| EB25 | 8 | 6 | 4 | 1'-5" (432) | 3'-11" (1194) | 0'-9" (229) | 3'-11" (1194) | 1'-6" (457) | 0'-9" (229) | 3'-11" (1194) | 1'-4-1/2" (419) |
| EB29 | 10 | 8 | 6 | 1'-5-1/2" (445) | 3'-9" (1143) | 0'-10" (254) | 3'-9" (1143) | 1'-7" (483) | 0'-10" (254) | 3'-9" (1143) | 1'-7" (483) |
| EB33 | 14 | 10 | 8 | 1'-7-1/2" (495) | 4'-1" (1245) | 0'-11" (279) | 4'-1" (1245) | 1'-10" (559) | 0'-11" (279) | 4'-1" (1245) | 1'-10" (559) |
| EC33 | 16 | 12 | 10 | 1'-7-1/2" (495) | 4'-7" (1397) | 0'-11" (279) | 4'-7" (1397) | 1-11-1/2" (597) | 0'-11" (279) | 4'-7" (1397) | 1-11-1/2" (597) |
| EC39 | 16 | 12 | 10 | 2'-0" (610) | 4'-11-1/2" (1511) | 0'-10-1/2" (267) | 4'-11-1/2" (1511) | 2'-2-1/2" (673) | 0'-10-1/2" (267) | 4'-11-1/2" (1511) | 2'-2-1/2" (673) |

# EVAPORATOR 150 & 300 PSI MARINE WATER BOXES DIMENSIONS

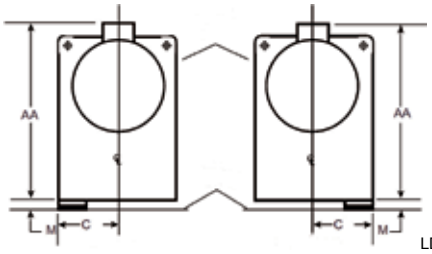



| MARINE WATER BOXES DIMENSIONS FT - IN (MM) | | | | | | |
|---|---|---|---|---|---|---|
| EVAPORATOR SHELL CODE | 150 AND 300 PSI | | | | | |
| | 1-PASS | | 2-PASS | | 3-PASS | |
| | F | I | I | G | F | I |
| **EB25 (150PSI)** | 1'-7" (483) | 0'-8-13/16" (224) | 0'-7-3/4" (197) | 0'-6-7/16" (164) | 1'-3-7/8" (403) | 0'-7-3/4" (197) |
| **EB25 (300PSI)** | 1'-7" (483) | 0'-8-13/16" (224) | 0'-7-3/4" (197) | 0'-8-3/16" (208) | 1'-3-7/8" (403) | 0'-7-3/4" (197) |
| **EB29 (150PSI)** | 1'-10-7/8" (581) | 0'-10-5/8" (270) | 0'-9-9/16" (243) | 0'-6-31/32" (177) | 1'-8-3/4" (527) | 0'-9-9/16" (243) |
| **EB29 (300PSI)** | 1'-10-7/8" (581) | 0'-10-5/8" (270) | 0'-9-9/16" (243) | 0'-9-7/32" (234) | 1'-8-3/4" (527) | 0'-9-9/16" (243) |
| **EB33 (150PSI)** | 2'-2" (660) | 1'-0-1/8" (308) | 0'-10-1/4" (260) | 0'-7-1/2" (191) | 1'-10-1/4" (565) | 0'-10-1/4" (260) |
| **EB33 (300PSI)** | 2'-2" (660) | 1'-0-1/8" (308) | 0'-10-1/4" (260) | 0'-9-1/2" (241) | 1'-10-1/4" (565) | 0'-10-1/4" (260) |
| **EC33 (150PSI)** | 2'-3-1/2" (698) | 1'-1-3/4" (350) | 0'-11-1/2" (292) | 0'-11-7/8" (301) | 1'-11" (584) | 0'-11-1/2" (292) |
| **EC33 (300PSI)** | 2'-6-1/4" (768) | 1'-3-1/8" (384) | 1'-0-5/8" (321) | 1'-0-3/4" (324) | 2'-1-1/4" (641) | 1'-0-5/8" (321) |
| **EC39 (150PSI)** | 2'-4-3/4" (730) | 1'-2-3/8" (365) | 1'-0-3/8" (314) | 1'-2-1/2" (368) | 2'-0-3/4" (629) | 1'-0-3/8" (314) |
| **EC39 (300PSI)** | 2'-7-1/2" (800) | 1'-3-3/4" (400) | 1'-1-1/4" (337) | 1'-3-1/2" (394) | 2'-2-1/2" (673) | 1'-1-1/4" (337) |

**NOTES**:
1. All dimensions shown in Ft/In (mm)
2. All dimensions are approximate. Certified dimensions are available upon request.
3. Standard water nozzles are Schedule 40 pipe size, furnished as welding stub-outs with ANSI/AWWA C-606 grooves, allowing the option of welding, flanges, or use of ANSI/AWWA C-606 couplings. Factory-installed, class 150 (ANSI B16.5, round slip-on, forged carbon steel with 1.6 mm raised face), water flanged nozzles are optional (add 13 mm to nozzle length). Companion flanges, nuts, bolts, and gaskets are not furnished.
4. 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 water boxes on one heat exchanger may be used with Marine Water Boxes on the other heat exchanger.
5. Water must enter the water box through the bottom connection to achieve rated performance.

**FIGURE 54 -** EVAPORATOR - 150 AND 300 PSI MARINE WATER BOXES

# CONDENSER 150 PSI MARINE WATER BOXES

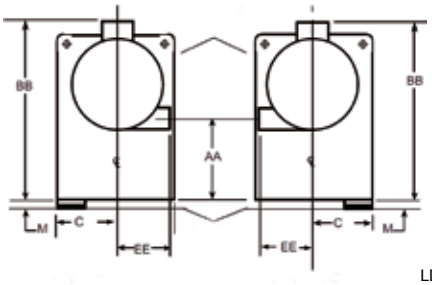



LD14016

| 1-Pass Condenser Nozzle Arrangements | |
|---|---|
| **In** | **Out** |
| Left End | Right End |
| Right End | Left End |

**FIGURE 55 -** CONDENSER - MARINE WATER BOXES (1-PASS NOZZLE ARRANGEMENTS)

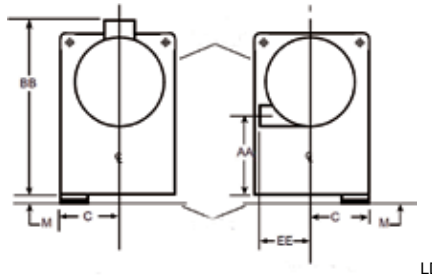





LD14017

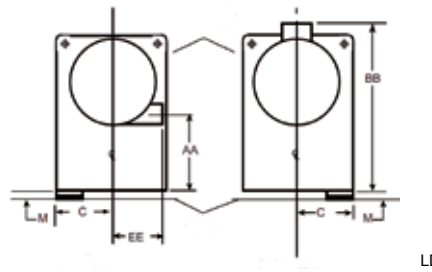
| 2-Pass Condenser Nozzle Arrangements | |
|---|---|
| **In** | **Out** |
| Lower Right End | Upper Right End |
| Lower Left End | Upper Left End |

**FIGURE 56 -** CONDENSER - MARINE WATER BOXES (2-PASS NOZZLE ARRANGEMENTS)




LD14018

| 3-Pass Condenser Nozzle Arrangements | |
|---|---|
| **In** | **Out** |
| Right End | Left End |

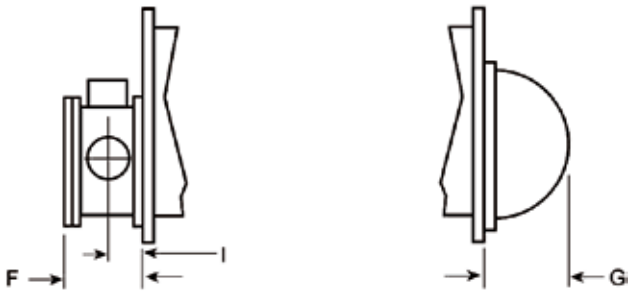



LD14019

| 3-Pass Condenser Nozzle Arrangements | |
|---|---|
| **In** | **Out** |
| Left End | Right End |

**FIGURE 57 -** CONDENSER - MARINE WATER BOXES (3-PASS NOZZLE ARRANGEMENTS)

# CONDENSER 150 & 300 PSI MARINE WATER BOXES DIMENSIONS




LD14021

| MARINE WATER BOXES DIMENSIONS FT - IN (MM) | | | | | | |
|---|---|---|---|---|---|---|
| CONDENSER SHELL CODE | 150 AND 300 PSI | | | | | |
| | 1-PASS | | 2-PASS | | 3-PASS | |
| | F | I | I | G | F | I |
| CB21 (150PSI) | 1'-9" (533) | 0'-9-7/8" (251) | 0'-7-13/16" (198) | 0'-5-29/32" (150) | 1'-4-7/8" (429) | 0'-7-13/16" (198) |
| CB21 (300PSI) | 1'-11-7/16" (595) | 0'-10-29/32" (277) | 0'-8-27/32" (225) | 0'-7-9/32" (185) | 1'-7-5/16" (491) | 0'-8-27/32" (225) |
| CB25 (150PSI) | 1'-11-5/8" (600) | 0'-11-1/8" (283) | 0'-9-1/16" (230) | 0'-6-7/16" (164) | 1'-7-1/2" (495) | 0'-9-1/16" (230) |
| CB25 (300PSI) | 2'-2-3/8" (670) | 1'-0-1/4" (311) | 0'-10-3/16" (259) | 0'-8-3/16" (208) | 1'-10-1/4" (565) | 0'-10-3/16" (259) |
| CC25 (150PSI) | 1'-11-5/8" (600) | 0'-11-1/8" (283) | 0'-9-1/16" (230) | 0'-6-7/16" (164) | 1'-7-1/2" (495) | 0'-9-1/16" (230) |
| CC25 (300PSI) | 2'-2-3/8" (670) | 1'-0-1/4" (311) | 0'-10-3/16" (259) | 0'-8-3/16" (208) | 1'-10-1/4" (565) | 0'-10-3/16" (259) |
| CB29 (150PSI) | 2'-0-5/8" 625 | 0'-11-1/2" (292) | 0'-9-7/8" (251) | 0'-6-31/32" (177) | 1'-9-3/8" (543) | 0'-9-7/8" (251) |
| CB29 (300PSI) | 2'-2-3/4" (680) | 1'-0-1/4" (311) | 0'-10-5/8" (270) | 0'-9-7/32" (234) | 1'-11-1/2" (597) | 0'-10-5/8" (270) |
| CB33 (150PSI) | 2'-2-3/4" (679) | 1'-0-1/2" (318) | 0'-9-7/8" (251) | 0'-7-1/2" (191) | 1'-9-1/2" (546) | 0'-9-7/8" (251) |
| CB33 (300PSI) | 2'-4-1/4" (718) | 1'-0-7/8" (327) | 0'-10-1/4" (260) | 0'-9-1/2" (241) | 1'-11" (584) | 0'-10-1/4" (260) |
| CB39 (150PSI) | 2'-9-3/4" (857) | 1'-4-7/8" (429) | 1'-1-7/8" (352) | 0'-10-3/4" (249) | 2'-3-3/4" (705) | 1'-1-7/8" (352) |
| CB39 (300PSI) | 2'-6-1/2" (775) | 1'-3-1/4" (387) | 1'-0-1/4" (311) | 0'-10-3/4" (249) | 2'-0-1/2" (622) | 1'-0-1/4" (311) |

**NOTES**:

1. All dimensions shown in Ft/In (mm)
2. All dimensions are approximate. Certified dimensions are available upon request.
3. Standard water nozzles are Schedule 40 pipe size, furnished as welding stub-outs with ANSI/AWWA C-606 grooves, allowing the option of welding, flanges, or use of ANSI/AWWA C-606 couplings. Factory-installed, class 150 (ANSI B16.5, round slip-on, forged carbon steel with 1.6 mm raised face), water flanged nozzles are optional (add 13 mm to nozzle length). Companion flanges, nuts, bolts, and gaskets are not furnished.
4. 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 water boxes on one heat exchanger may be used with Marine Water Boxes on the other heat exchanger.
5. Condenser water must enter the water box through the bottom connection for proper operation of the sub-cooler to achieve rated performance. Add dimension "M" as shown on pages per unit dimensions page for the appropriate isolator type.

**FIGURE 58 -** CONDENSER - 150 AND 300 PSI MARINE WATER BOXES

# CONDENSER 150 & 300 PSI MARINE WATER BOXES DIMENSIONS

| MARINE WATER BOXES -150 & 300 PSI | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONDENSER SHELL CODE | NOZZLE PIPE SIZE FT - IN (MM) | | | EVAPORATOR NOZZLE DIMENSIONS FT - IN (MM) | | | | | | | | | |
| | NO. OF PASSES | | | C | 1-PASS | 2-PASS | | | | 3-PASS | | | |
| | 1 | 2 | 3 | | AA | AA | BB | EE | EE FLANGE | AA | BB | EE | EE FLANGE |
| CB21 | 10" (254) | 6" (152) | 6" (152) | 1'-4" (406) | 4'-3-3/8" (1305) | 1'-6-3/8" (467) | 4'-3-3/8" (1305) | 1'-4-1/2" (419) | 1'-5-1/2" (445) | 1'-6-3/8" (467) | 4'-3-3/8" (1305) | 1'-4-1/2" (419) | 1'-5-1/2" (445) |
| CB25 | 12" (305) | 8" (203) | 6" (152) | 1'-4" (406) | 4'-1" (1245) | 1'-0-1/8" (308) | 4'-1" (1245) | 1'-6-1/2" (470) | 1'-7-3/8" (492) | 1'-0-1/8" (308) | 4'-1" (1245) | 1'-6-1/2" (470) | 1'-7-3/8" (492) |
| CC25 | 12" (305) | 8" (203) | 6" (152) | 1'-4" (406) | 4'-1" (1245) | 1'-0-1/8" (308) | 4'-1" (1245) | 1'-6-1/2" (470) | 1'-7-3/8" (492) | 1'-0-1/8" (308) | 4'-1" (1245) | 1'-6-1/2" (470) | 1'-7-3/8" (492) |
| CB29 | 14" (356) | 10" (254) | 8" (203) | 1'-4" (406) | 4'-3" (1295) | 1'-0" (305) | 4'-3" (1295) | 1'-9" (533) | 1'-10-1/8" (562) | 1'-0" (305) | 4'-3" (1295) | 1'-9" (533) | 1'-10-1/8" (562) |
| | 14" (356) | 10" (254) | 8" (203) | 1'-5-1/2" (445) | 4'-5" (1346) | 1'-2" (356) | 4'-5" (1346) | 1'-9" (533) | 1'-10-1/8" (562) | 1'-2" (356) | 4'-5" (1346) | 1'-9" (533) | 1'-10-1/8" (562) |
| CB33 | 16" (406) | 10" (254) | 10" (254) | 1'-8" (508) | 4'-8" (1422) | 0'-10" (254) | 4'-8" (1422) | 1'-9-1/2" (546) | 1'-10-5/8" (575) | 0'-10" (254) | 4'-8" (1422) | 1'-9-1/2" (546) | 1'-10-5/8" (575) |
| CB39 | 20" (508) | 14" (356) | 10" (254) | 1'-11" (584) | 5'-1" (1549) | 0'-11-1/2" (292) | 5'-1" (1549) | 2'-3-1/2" (699) | 2'-4" (711) | 0'-11-1/2" (292) | 5'-1" (1549) | 2'-3-1/2" (699) | 2'-4" (711) |

**NOTE:** Dimensions are shown in Inches (mm)

# WEIGHTS

**TABLE 17 -** APPROXIMATE EVAPORATOR WEIGHTS 150 PSI COMPACT WATER BOXES

| EVAPORATOR | | COMPACT WATER BOX WEIGHT LBS (KG) | | | MARINE WATER BOX WEIGHT LBS (KG) | | |
|---|---|---|---|---|---|---|---|
| CODE | WEIGHT LBS (KG) | 1-PASS | 2-PASS | 3-PASS | 1-PASS | 2-PASS | 3-PASS |
| **EB2508** | 2830 (1284) | 264 (120) | 269 (122) | 272 (123) | 474 (215) | 563 (255) | 514 (233) |
| **EB2510** | 3628 (1646) | 264 (120) | 269 (122) | 272 (123) | 474 (215) | 563 (255) | 514 (233) |
| **EB2514** | 4545 (2062) | 264 (120) | 269 (122) | 272 (123) | 474 (215) | 563 (255) | 514 (233) |
| **EB2910** | 4338 (1968) | 332 (151) | 355 (161) | 360 (163) | 624 (283) | 731 (332) | 688 (312) |
| **EB2914** | 5502 (2496) | 332 (151) | 355 (161) | 360 (163) | 624 (283) | 731 (332) | 688 (312) |
| **EB3310** | 5372 (2437) | 402 (182) | 421 (191) | 432 (196) | 776 (352) | 851 (386) | 826 (375) |
| **EB3314** | 6779 (3075) | 402 (182) | 421 (191) | 432 (196) | 776 (352) | 851 (386) | 826 (375) |

**NOTE**: Weights based on maximum tube bundle allowed per shell.

**TABLE 18 -** APPROXIMATE CONDENSER WEIGHTS 150 PSI COMPACT WATER BOXES

| CONDENSER | | COMPACT WATER BOX WEIGHT LBS (KG) | | | MARINE WATER BOX WEIGHT LBS (KG) | | |
|---|---|---|---|---|---|---|---|
| CODE | WEIGHT LBS (KG) | 1-PASS | 2-PASS | 3-PASS | 1-PASS | 2-PASS | 3-PASS |
| **CC2508** | 2918 (1324) | 282 (128) | 281 (127) | 284 (129) | 588 (267) | 606 (275) | 574 (260) |
| **CB2110** | 2635 (1195) | 230 (104) | 219 (99) | 230 (104) | 464 (210) | 457 (207) | 444 (201) |
| **CB2510** | 3309 (1501) | 282 (128) | 281 (127) | 284 (129) | 588 (267) | 606 (275) | 574 (260) |
| **CB2514** | 4532 (2056) | 282 (128) | 281 (127) | 284 (129) | 588 (267) | 606 (275) | 574 (260) |
| **CB2910** | 4258 (1931) | 340 (154) | 354 (161) | 354 (161) | 688 (312) | 752 (341) | 710 (322) |
| **CB2914** | 5854 (2655) | 340 (154) | 354 (161) | 354 (161) | 688 (312) | 752 (341) | 710 (322) |
| **CB3310** | 5343 (2424) | 406 (184) | 419 (190) | 444 (201) | 816 (370) | 851 (386) | 814 (369) |
| **CB3314** | 7362 (3339) | 406 (184) | 419 (190) | 444 (201) | 816 (370) | 851 (386) | 814 (369) |

**NOTE**: Weights based on maximum tube bundle allowed per shell.

# M6 MOTOR

**TABLE 19 -** EVAPORATOR WEIGHTS, DRY*

| M6 MOTOR CHILLERS | EVAPORATOR | | 150PSI COMPACT WATER BOX WEIGHT LBS (KG) | | | 300PSI COMPACT WATER BOX WEIGHT LBS (KG) | | | 150PSI MARINE WATER BOX WEIGHT LBS (KG) | | | 300PSI MARINE WATER BOX WEIGHT LBS (KG) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CODE | WEIGHT LBS (KG) | 1-PASS | 2-PASS | 3-PASS | 1-PASS | 2-PASS | 3-PASS | 1-PASS | 2-PASS | 3-PASS | 1-PASS | 2-PASS | 3-PASS |
| | EC3312 | 7477 (3392) | 340 (154) | 383 (174) | 380 (172) | 1062 (482) | 943 (428) | 878 (398) | 1822 (826) | 1101 (499) | 1850 (839) | 3214 (1458) | 1998 (906) | 2986 (1354) |
| | EC3314 | 8389 (3805) | 340 (154) | 383 (174) | 380 (172) | 1062 (482) | 943 (428) | 878 (398) | 1822 (826) | 1101 (499) | 1850 (839) | 3214 (1458) | 1998 (906) | 2986 (1354) |
| | EC3914 | 11834 (5368) | 678 (308) | 712 (323) | 740 (336) | 1430 (649) | 1310 (594) | 1266 (574) | 2778 (1260) | 1785 (810) | 2856 (1295) | 4740 (2150) | 2947 (1337) | 4502 (2042) |

*Weights based on maximum tube bundle allowed per shell.
Shell weights assume max bundle size (for 3/4" tube), heaviest tube (e-179; c-203), 300#water (if available)
Waterbox weight includes both waterboxes and covers/return

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**TABLE 20 -** CONDENSER WEIGHTS, DRY*

| M6 MOTOR CHILLERS | CONDENSER | | 150PSI COMPACT WATER BOX WEIGHT LBS (KG) | | | 300PSI COMPACT WATER BOX WEIGHT LBS (KG) | | | 150PSI MARINE WATER BOX WEIGHT LBS (KG) | | | 300PSI MARINE WATER BOX WEIGHT LBS (KG) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CODE | WEIGHT LBS (KG) | 1-PASS | 2-PASS | 3-PASS | 1-PASS | 2-PASS | 3-PASS | 1-PASS | 2-PASS | 3-PASS | 1-PASS | 2-PASS | 3-PASS |
| | CB2912 | 7473 (3390) | 340 (154) | 354 (161) | 354 (161) | 852 (386) | 735 (333) | 678 (308) | 1408 (639) | 891 (404) | 1416 (642) | 2360 (1070) | 1468 (666) | 2170 (984) |
| | CB3314 | 9782 (4437) | 406 (184) | 419 (190) | 444 (201) | 1066 (484) | 845 (383) | 872 (396) | 1918 (870) | 1159 (526) | 1888 (856) | 3098 (1405) | 1827 (829) | 2816 (1277) |
| | CB3914 | 10297 (4671) | 692 (314) | 757 (343) | 740 (336) | 1630 (739) | 1436 (651) | 1272 (577) | 2944 (1335) | 1849 (839) | 2964 (1344) | 4924 (2234) | 2998 (1360) | 4410 (2000) |

*Weights based on maximum tube bundle allowed per shell.
Shell weights assume max bundle size (for 3/4" tube), heaviest tube (e-179; c-203), 300#water (if available)
Waterbox weight includes both waterboxes and covers/return

# M6 WEIGHTS

**TABLE 21 -** VSD WEIGHTS

| | VSD | WEIGHT LBS (KG) |
|---|---|---|
| M6 MOTOR CHILLERS | HYP0774XHC30B-46 | 2060 (935) |
| | HYP1278XHC30B-46 | 3806 (1727) |

**TABLE 22 -** COMPRESSOR WEIGHTS

| | COMPRESSOR | WEIGHT LBS (KG) |
|---|---|---|
| M6 MOTOR CHILLERS | M6C-295FAC | 4298 (1950) |
| | M6C-331FAC | 4439 (2014) |

**TABLE 23 -** UNIT ASSEMBLY – PANELS, PIPING, WIRING, ETC

| | UNIT ASSEMBLY PANELS, PIPING, WIRING, ETC. | WEIGHT LBS (KG) |
|---|---|---|
| M6 MOTOR CHILLERS | M6C-295FAC | 1300 (591) |
| | M6C-331FAC | 1300 (591) |

**TABLE 24 -** REFRIGERANT & WATER WEIGHT

| | EVAPORATOR | CONDENSER | REFRIGERANT WEIGHT LBS (KG)* | WATER WEIGHT LBS (KG)** |
|---|---|---|---|---|
| M6 MOTOR CHILLERS | EC3312 | CB2912 | 1331 (605) | 2863 (1299) |
| | EC3314 | CB3314 | 1626 (739) | 3589 (1628) |
| | EC3914 | CB3314 | 1908 (867) | 4232 (1920) |
| | | CB3914 | 2072 (942) | 4892 (2220) |

*Refrigerant weight based on maximum tube bundle.
** Water weight is the total water in both shells and for 150psi, 2-pass, compact water boxes.

## WEIGHTS (CONT'D)

**TABLE 25 -** APPROXIMATE VARIABLE SPEED DRIVE (VSD) WEIGHTS

| VSD | WEIGHT LBS (KG) |
|---|---|
| HYP0490XH | 1226 (556) |
| HYP0612XH | 1954 (886) |
| HYP0774XH | 2060 (934) |
| HYP1278XH | 3806 (1727) |

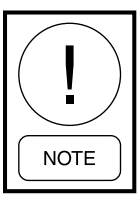
**TABLE 26 -** APPROXIMATE DRIVELINE WEIGHTS

| COMPRESSOR | WEIGHT LBS (KG) |
|---|---|
| M2C-197FAC | 2872 (1303) |
| M2C-197FACD | 2,861 (1292) |
| M2C-205FAC | 2879 (1306) |
| M2C-205FACD | 2,867 (1295) |
| M2C-218FAC | 2998 (1360) |
| M2C-233FAC | 3011 (1366) |
| M2C-246FAC | 3009 (1365) |
| M6C-295FAC | 4298 (1950) |
| M6C-331FAC | 4500 (2041) |

**TABLE 27 -** APPROXIMATE REFRIGERANT & WATER WEIGHT

| EVAPORATOR | CONDENSER | REFRIGERANT WEIGHT LBS (KG)* | WATER WEIGHT LBS (KG)** |
|---|---|---|---|
| **EB2508** | CC2508 | 487 (220) | 748 (340) |
| **EB2510** | CB2110 | 540 (250) | 980 (450) |
| | CB2510 | 600 (270) | 1310 (600) |
| **EB2514** | CB2514 | 840 (380) | 1680 (770) |
| **EB2910** | CB2510 | 640 (290) | 1510 (690) |
| | CB2910 | 860 (390) | 1760 (800) |
| **EB2914** | CB2514 | 900 (410) | 1940 (880) |
| | CB2914 | 1210 (550) | 2240 (1020) |
| **EB3310** | CB2910 | 920 (420) | 2070 (940) |
| | CB3310 | 980 (450) | 2580 (1170) |
| **EB3314** | CB2914 | 1290 (590) | 2640 (1200) |
| | CB3314 | 1380 (630) | 3310 (1510) |
| **EC3312** | CB2912 | 1331 (605) | 2863 (1299) |
| **EC3314** | CB3314 | 1626 (739) | 3589 (1628) |
| **EC3914** | CB3314 | 1908 (867) | 4232 (1920) |
| | CB3914 | 2072 (942) | 4892 (2220) |

*Refrigerant Weight based on maximum tube bundle.
** Water Weight is the total water in both shells and for 150PSI, 2-pass, compact water boxes.




***Refer to product submittal drawings for detailed weight information specific to the unit ordered.***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