CUSTOM AIR PRODUCTS & SERVICES, INC.
35 Southbelt Industrial Drive • Houston, Texas 77047
(713) 460-9009 • Fax (713) 460-9499
www.customairproducts.com

HERC RENTALS

2018 RENTAL FLEET

PO#

17F-0878

(15) 200 TON INDUSTRIAL AIR COOLED CHILLER

SKID MOUNTED & CAGED

W/ 4" CONNECTIONS

600 GPM @ 100 TDH

460V/3PH/60HZ

GENERAL PURPOSE

8/10/2018

INSTALLATION & OPERATION MANUAL

BOOK ASSEMBLED BY: JONATHAN O'MALLEY
DATE: 8/10/2018

Table Of Contents 17F-0878

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SECTION

01

JOB SCOPE

Quote No:	DW17-11-08-29 R3
Quote Date:	11-08-2017
Project Type:	(15) 200 Ton Industrial Chillers & Pump Packages
Drawing Delivery:	2 weeks after receipt of order
Equipment Delivery:	12-14 weeks After Receipt of Approved Drawings (ARAD)
Freight Terms:	FOB HERC
Payment Terms:	*Net 45* **100% upon completion*

Item	Qty	Description		
1.	15	CAPS Model # **PCHH-200TC-0NN0NN-5E5-0-PG2CEUP** Provide one (1) York model # YCIV-0197 air cooled with the following features: • VSD Power/Control Panel includes VSD and fan motor contactors, current overloads, and factory wiring. Standard design includes NEMA 3R (IP55) rating • Compressors are direct drive, semi-hermetic, rotary twin-screw type, including: muffler, temperature actuated 'off-cycle' heater, rain-tight terminal box, discharge shut-off service valve, and precision machined cast iron housing mounted on elastomeric isolators • Compressor motors are regulated by a variable-speed drive. Therefore, motor current never exceeds the rated load amps (RLA), providing soft starts with no electrical inrush. This eliminates the motor heating and stress always found with conventional motor starters. In addition, by eliminating the heat buildup during starting, the required off-time between starts is reduced to a maximum of two minutes • Refrigerant Type-134a • Dual circuit machine for staging and efficiency • Variable speed-drive compressors for dynamic staging control and energy conservation. • 460-3-60 application • Single point power connection • Control transformer power • Integrated non-fused disconnect-" thru the panel operator" • TEAO fan motors • Low sound fans • Insulated evaporator & protective aluminum jacketing • 1 year York parts, labor and refrigeration warranty • Service isolation valves • Condenser coil guards • Phase monitor and phase fail indicator light (red) • Main power on indicator (green) • Master on switch		

Item	Qty	Description		
		• Common trouble alarm terminal • Installed flow switch safety • Condenser coil corrosion protection applied (Energy Guard) • Temperature and pressure gauges provided • Chiller will be provided with standalone York DDC temperature controls. • Chilled water barrel heaters for freeze protection • Chiller provided with hydronic isolation and drain valves. • Main power wiring will include dual (2) Cam Lok electrical connections and associated wiring. The Cam Lok connectors shall be repositioned on the main high voltage panel to provide additional connection clearance • Chiller shall be furnished with a 2" x 4" label with white backing and black lettering stating "NOTE: 480 volt power should be applied a minimum of 1 hour before starting chiller. Compressor oil heaters utilize 480 volt power." • Minimum warm up timer shall be installed for cold start protection with shore power connection. • York factory start up provided at the CAPS campus in Houston, Texas • Provide and install pump rated @ 600 GPM @ 100 foot/head. Pump will be mounted to the chiller skid. The close coupled pump will be integrated into the interconnecting piping and hydronic components. Installation to include a pump starter, overload, control switch and breaker. Internal chiller piping package to include: • Integrated bypass to provide operation of local or remote pumps • All pipe, valves and applicable components to be flanged. • Piping will be provided with 4" quick connect style pipe connections. • Chiller to be provided with isolation/balancing valves, bypass valve for remote pump operation, in-line strainer with blow down valve, and low level drain valve. • Entering and leaving fluid temperature ports and thermometers • Entering and leaving pressure ports and gauges • Drain valves at chiller barrel, pump housing and at the piping manifold lowest point. • Chiller will be provided with an additional differential pressure safety switch. This pressure switch is independent of the factory installed safety switch. The pump differential flow switch shall have a "delay on make" timer installed to air in chiller operation during start up for the purpose of bleeding air from the system without interruption. • Provide two (2) additional ¼" access ports for field pressure/temperature testing. • Perform hydrostatic pressure testing to 125 PSIG of the entire pump, piping and component assembly to verify no leaks are present. • Apply specified urethane coating on the piping manifold and component assembly. • Provide structural mounting frame for the pump on chiller skid. Hot dipped galvanized structural members. • Provide and install all required electrical power wiring and control devices. • Provide all required starters, overloads and disconnects.		

Item	Qty	Description		
		• The skid shall be fabricated from 1/4” thick, 8” X 4” rectangular steel tube. The skid size is length and width plus piping headers so that no part of the unit is outside of the rack. The fork truck lifting slots are 6” X 10” X 1/4” and made of the same material and are incorporated into the design on 54” centers apart. The skid components are continuously welded at all joints. All tubing ends are capped and continuously welded. The skid incorporates 4” X 4” tie-down holes in each corner of the tubing and is welded solid. All unit serial numbers and weight tags shall be cutout on a steel plate and attached to the skid at diagonal corner locations. Center of gravity will be clearly marked on the upper and lower portion of the skid / frame assembly. • The lifting frame material shall be 4” X 4” square steel tubing. This frame is designed for overhead lifting and stacking of the units. All tubing ends are capped and continuously welded. The tubing is cut and fit to the height, width, and length of the unit. All corners have a 45 degree, 3/8" steel plate gusset. The top of the frame has a 3/8” steel plate superman gusset welded to the horizontal tubing and incorporates a 1½ inch hole that aligns with the drag eye to secure stacking of units. • The entire skid/lifting frame assembly shall be hot dipped galvanized before component installation. • The chiller shall be attached to the structure along all sides. • The unit shall be manufactured in accordance with NEC codes, ETL requirements and labeled with the appropriate 3rd party NRTL as requested. • Chiller / pump assembly shall be provided with a certified skid / lifting frame structural calculations and certificates issued by a 3rd party engineering firm. • All painting of these components to be Herc specified color. • CAPS will provide and install the Herc decal package as per provided layout drawing by Herc. • Unit to be tested and verified for proper operation at Custom Air Products & Services prior to shipment. • Herc Representatives will also have full access to schedules and production progress as units are being manufactured.		
		EXCLUSIONS • Extended warranty (available at an additional cost) • Installation, Equipment and Start-up Commissioning by others • Hose • Sales tax not included • Freight not included • Overtime not included • Proposal valid for 30 days • Any items not listed in the above scope of work to be performed		

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SECTION

02

CHILLER SUBMITTAL

IV 200T YCIV DX - AIR COOLED SCREW CHILLERS

Items Included by Johnson Controls

- Provide Model **YCIV0197EA46VAB: Qty: 8**
- Refrigerant Type: **R134a**
- **460/3/60** Application
- **Control Transformer supplied.**
- Power Connection: **Single Point Breaker w/Lockable Handle**
- Starter Type: **VSD**
- TEAO Fan Motors
- Low Sound/Noise Fans
- 3/4 inch Thick Insulation of Evaporator
- **Louvered Condenser Coil Guards**
- **Service Isolation Valves**
- **Water Connections with grooves for mechanical couplings.**
- **Shell and Tube Evaporator**
- **Copper Tube and Aluminum Fin Condenser**
- **Condenser Coils with Epoxy Coated Fins (Pre-Coated Fin Stock (Houston Standard))**
- **Freeze Protection to -20 Degrees F**
- **1 Year Parts / Labor / Refrigeration Warranty**
- **JCI Factory Start Up**
- **ASHRAE 90.1 Compliance**
- **U.L. / cU.L Listed**
- **ARI Standard 550/590**
- **ANSI/NFPA Standard 70**

Items Included but INSTALLED BY OTHERS

Items NOT Included

- **Hauling or Rigging Equipment Into Place.**
- **Vibration Isolators**
- **Flow Switch**

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SECTION

03

PUMP SUBMITTAL

Submittal Data Information

KV Series Vertical Close Coupled Pumps

301-1058T

MODEL 6011 **1760 RPM**

JOB:

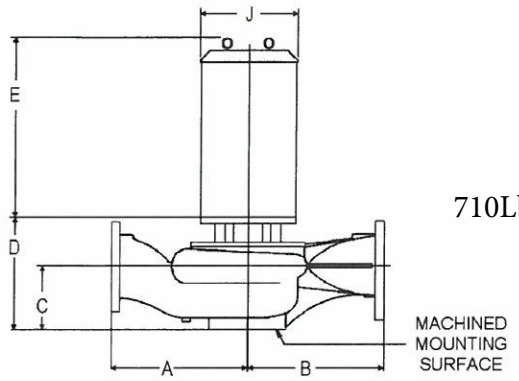
CONTRACTOR: CAPS

ENGINEER: None

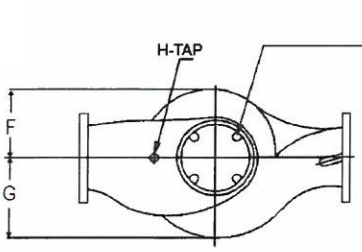
REP: A Waldrep Co

COMMENTS: TEFC Motors

ITEM NO.	MODEL NO.	IMP. DIAM. / IN.	FLOW / GPM	HEAD / FT	POWER / HP	ELEC. CHARS
CHP-1,2,3&4	KV6011	10.4	600	100	25	460/3/60



710Lbs.

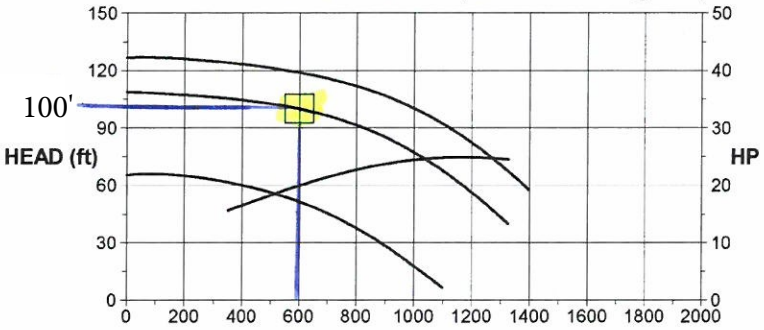


FOUR 1/2 - 13 UNC THREADED MOUNTING HOLES ON A 6.62" BOLT CIRCLE

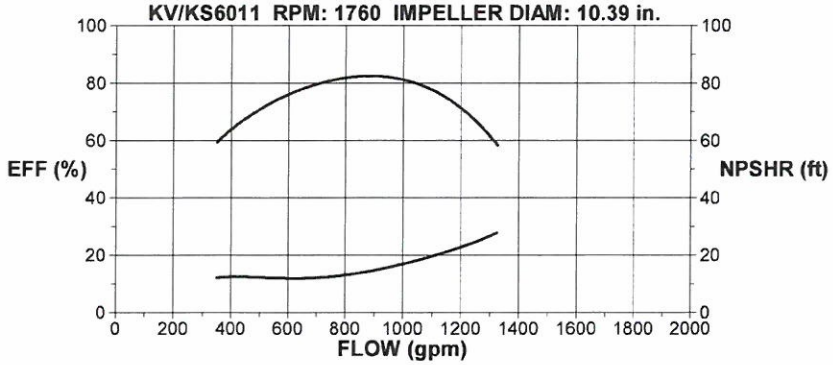
* Dimensions in inches. Do not use for construction purposes unless certified.

CONN.	HP	FRAME	Flange Size ASA	860 kpa Flange A	860 kpa Flange B	C	D	E	F	G	H	J
6x6	25	284JM	6	16	17.50	7.82	13.52	23.39	8.61	10.25	.25	15.29

PUMP PERFORMANCE CURVES (based on Water @ 60 F)



KV/KS6011 RPM: 1760 IMPELLER DIAM: 10.39 in.



Item	BRONZE FITTED Standard	Optional		
Casing	Cast Iron ASTM A48 Class 30A			
Impeller	Bronze ASTM B584-836	CF		
Wear Ring	None			
Shaft	Carbon Steel			
Shaft Sleeve	Bronze ASTM B584-932 SAE660			
Mech. Seal	Ceramic EPT			
Seal Flush Line	Copper	CF		

OPERATING SPECIFICATIONS	Standard		Optional
Flange	125# 860K	250# 1720	
Pressure	175 PSIG	300 PSIG	CF
	1210 KPA	2070 KPA	CF
Temperature	250F 120C	250F 120C	CF

CF - Consult Factory

Do it once. Do it right.

TACO, INC., 1160 Cranston Street, Cranston, RI 02920 Telephone: (401)942-8000 FAX: (401)942-2360.
TACO (Canada), Ltd.,6180 Ordan Drive, Mississauga, Ontario L5T 2B3. Telephone:905/564-9422. FAX: 905/564-9436

4/25/2013
TACO, Inc.
TacoNet Pump Selection, version 7.46

Job Name:
Company:
Customer: CAPS

Engineer: None
Representative: A Waldrep Co
Salesman: JOHN SCHOENEMANN

** INPUT PARAMETERS **

Single Pump System
Fluid Type: Water @ 60 F
Min. Pump Eff.: 0
Motor RPM: 1760
Pump Types: KV

Design Point:
System Flow Rate: 600(gpm)
Head: 100(ft)

** SELECTION RESULTS **

Pump 1

-Model	Imp.Dia.	NPSH(ft)	RPM	Eff%	HP	NOL HP	Suct/Disch
KV/KS6011	10.4	12	1760	76	19.94	24.82	6 x 6

KV Vertical In-Line Pump

302-031

Installation, Operation & Maintenance Manual

SUPERSEDES: 302-031 May 1, 2010 EFFECTIVE: July 1, 2010

Plant ID No. 001-1013

INSTALLATION

SAFETY REQUIREMENTS

1. **IMPORTANT!** These instructions should be read completely prior to installation of the equipment. A copy of these instructions should be retained on file for future reference.
2. This pump is intended for the circulation of water or other suitable HVAC media. It is not intended for hazardous, corrosive, or flammable liquids.
3. Pump must not be operated until all piping and/or electrical connections are in place.
4. Proper care and suitable equipment should be used to move and install this heavy equipment.
5. Care should be taken when installing pipe systems to avoid placing an excessive load on the pump unions.
6. Refer to motor installation instructions to determine proper terminal connections in order to obtain correct pump rotation.
7. When the system piping is used as an earth bonding path for the building electrical services (check local codes), the pump should not be relied upon as part of the circuit. A properly installed bridging connection should be provided.
8. If electrical connection is to be made using any means other than rigid conduit, proper strain relief must be provided (min 100N tension).
9. Pump should be installed according to local electrical and safety codes using appropriate size wire and suitable over current protection. It should use a lockable isolator or circuit breaker conforming to applicable electrical codes.
10. It is recommended that the pump be fitted with a suitable “emergency stop” per the requirements of applicable electrical codes.

A. Receiving Pump

1. Inspect for shipping damage. If a shortage or damage occurs, contact carrier immediately.

B. Location

1. Install vertically with motor up. Consult factory for horizontal mounting.
2. Pump should be accessible for inspection and repair work, head room must be provided for the use of hoist or tackle as necessary.
3. Lift pump by slinging through motor eye bolts and securing through pump adapter.
4. **In no case should any part of motor be covered with insulation.**

C. Foundation

1. The pump must always be supported.
2. Pumps with smaller motors may be suspended in the piping, provided the piping is supported adjacent to the pump.
3. For pumps with larger motors, the pump should be attached to a support utilizing the tapped hole or holes in the bottom of the pump casing. **Note: Piping loads shall not be applied to the pump.**
4. Pump must be allowed to move with piping movement. Expansion of piping must be taken into account when piping and suitable devices should be employed. Do not rigidly connect the pump to the floor. **Note: Provide vibration isolation pads under floor mounted supports. Do not support unit by the motor eye-bolts.**

OPERATION

A. Before operating for the first time check the following:

1. Is motor correctly wired for voltage available.
2. Has pump been primed. Pump should never be run dry. **Extra effort may be required to get the air out of the seal chamber.**

Caution: Make sure power supply to pump motor is locked out before touching motor shaft.

3. All rotating parts turn freely.

B. Starting pump

1. Jog pump to check proper rotation.
2. Start pump with discharge valve closed.

DANGER: MAKE SURE SUCTION VALVE IS OPEN!!

3. When correct pressure has been reached, open discharge valve slowly.
4. **Do not operate pump for prolonged periods with discharge valve closed, so as to avoid overheating and potential damaging loads.**

5. Pump should be stopped if any of the following occur:
   a. No discharge.
   b. Insufficient discharge.
   c. Insufficient pressure.
   d. Loss of suction.
   e. Excessive power consumption.
   f. Vibration.

Check problem analysis further in the manual for help in troubleshooting.

MAINTENANCE

A. Routine Inspections

Routine inspections should be made on a regular basis. Inspections made while pump is running should reveal potential failures.

1. Inspect motor bearings for any sign of temperature rise. Temperature should not exceed 160°F. Temperature rise may indicate the early stages of bearing problems.
2. Listen for any unusual noise.
   a. Air trapped in pump
   b. Hydraulic noise.
   c. Mechanical noise in motor and/or pump.
3. Check suction gauge reading and confirm that it is normal.
4. Check discharge gauge reading and confirm that it is normal. If gauge readings are abnormal find out why.

Note: Suction and discharge gauges should read the same with pump stopped.

B. Close Coupled Pumps

The pump section is attached directly to the motor shaft and does not contain bearings.

C. Close Coupled Motors

The motor must be lubricated in accordance with the manufacturer's recommendations. **Do not over lubricate the motor bearings as this could cause premature bearing failure.**

D. Mechanical Seal

The mechanical seal is the "John Crane" Type 21 General Purpose Seal for the 175 psig pressure rating.

A "John Crane" Type 2 General Purpose Seal is used for the 300 psig pressure rating.

DIS-ASSEMBLY AND RE-ASSEMBLY

A. General

If the pump has been maintained and serviced properly, breakdowns which necessitate the pump being dis-assembled should not occur often.

1. If a problem occurs, the cause should be determined, if possible, before dis-assembling. (See "Problem Analysis")
2. If the pump is being dis-assembled, all parts must be carefully handled, avoid heavy blows and shocks.
3. All parts must be carefully cleaned and inspected for wear. Recondition or replace parts where necessary.

B. Dis-Assembly

1. Drain liquid from casing by removing drain plug.

Caution: Allow pump to cool and secure suction and discharge valves before working on pump!!

2. Remove re-circulation line.
3. Remove bolts holding cover/adapter to casing, pry cover/adapter and motor assembly from casing.
4. Remove impeller bolt in a counterclockwise direction. Remove impeller and key.
5. In all cases of mechanical seal arrangement, after removing the sleeve and its seal assembly, the seal rotating element may be drawn off the shaft sleeve. Note: Apply silicone grease on the OD of the sleeve in the area between the seal and the end of the sleeve. This will help removal of the old seal. The stationary element is to be removed from the cover.
6. All parts must be cleaned and inspected for wear. Replace parts where necessary.

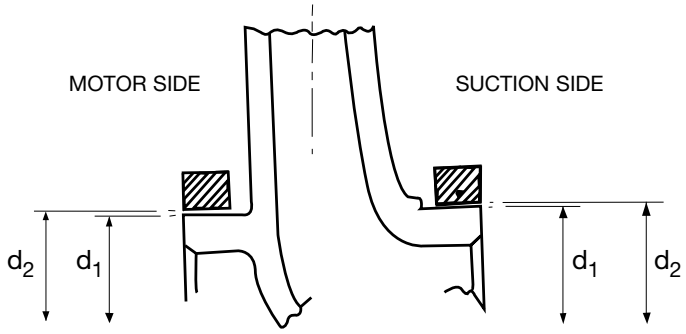
C. Re-Assembly

1. Be certain that all parts to be replaced are free from burrs, with screw threads and connecting faces clear and free from damage.
2. Insert stationary element of seal into cover adapter, slip cover-adapter over shaft and engage rabbit of motor. **Note: Do not touch the seal surfaces because this may result in leakage. Do not contaminate seal faces with fingerprints.**
3. Lubricate smaller OD of shaft sleeve with silicone grease. **Do not use petroleum oil or grease.**
4. Place spring on shaft sleeve to abut against sleeve shoulder. Slide rotary seal on sleeve until it contacts spring.
5. Slide the shaft sleeve on the shaft, larger bore first. Be certain the O-ring is correctly seated in the groove.
6. Assemble impeller key and impeller on shaft. Refit with new impeller washer on impeller bolt and tighten carefully. Be certain that the impeller rotates freely by hand.
7. Apply a few spots of gasket adhesive to gasket surface of cover. Place a new casing gasket against gasket surface and press against adhesive.
8. Assemble cover-adapter complete with motor into casing. Insure that gasket is seated correctly. Install hex-headed cap screws into casing tapings and tighten uniformly.
9. Reconnect re-circulation line and drain plug.

APPLICATION

1. Working Pressure: 175 psig
   Optional Working Pressure: 300 psig
2. Temperature: 250°F Standard
   300°F Hi Temperature

CASING/IMPELLER WEAR RING CLEARANCES



KV CASING/IMPELLER WEAR RING CLEARANCES

PUMP SIZE	WEAR RING-SUCTION SIDE				CLEARANCE	
	DIA d_1		DIA d_2			
	MAX	MIN	MAX	MIN	MAX	MIN
1506	2.363	2.361	2.377	2.375	.016	.012
1507	2.738	2.736	2.752	2.750	.016	.012
2006	2.863	2.861	2.877	2.875	.016	.012
2007	2.938	2.936	2.952	2.950	.016	.012
2009	3.363	3.361	3.377	3.375	.016	.012
2011	3.488	3.486	3.502	3.500	.016	.012
3006	3.238	3.236	3.252	3.250	.016	.012
3007	3.688	3.686	3.702	3.700	.016	.012
3009	3.613	3.611	3.627	3.625	.016	.012
3011	3.988	3.986	4.002	4.000	.016	.012
3013	3.738	3.736	3.752	3.750	.016	.012
4007	4.238	4.236	4.252	4.250	.016	.012
4009	4.611	4.609	4.627	4.625	.018	.014
4011	4.738	4.736	4.752	4.750	.016	.012
4013	4.613	4.611	4.627	4.625	.016	.012
5007	4.988	4.986	5.002	5.000	.016	.012
6009	5.861	5.859	5.877	5.875	.018	.014
6011	5.861	5.859	5.877	5.875	.018	.014
6013	5.861	5.859	5.877	5.875	.018	.014
8011	7.234	7.232	7.252	7.250	.020	.016
8013	7.734	7.732	7.752	7.750	.020	.016

OPTIONAL CASING WEAR RING FITTED TO SUCTION SIDE ONLY

Addendum to KV Installation, Operation & Maintenance Manual

THE FOLLOWING INSTRUCTIONS APPLY TO VERTICAL IN-LINE PUMPS UP THROUGH 10" FLANGE CONNECTIONS.

INSTALLATION

A1. Location

In open systems, locate the unit as close as practical to the liquid supply source, with a short, direct suction pipe. Ensure adequate space is left above and around the unit for operation, maintenance, service and inspection of parts.

In closed systems, where possible, the pumps should be installed immediately downstream of the expansion tank/make-up connection. This is the point of zero pressure change and is necessary for effective pump operation. Do not install more than one expansion tank connection into any closed hydronic system.

Electric motor driven pumps should not be located in damp or dusty location without special protection.

Airflow into the motor and/or motor fan should not be obstructed.

A2. Installation

In order to achieve the full added value of the Vertical In-Line pump design it is important that you ensure the pump is affixed to the system piping by the pump flanges and the pump and motor assembly is allowed to float freely with the expansion and contraction of the piping system. Should any vertical in-line pump use supports to the structure, **it is imperative that no pipe strain is imposed on the pump flanges.** Compliant mounts such as springs or “waffle” style isolation pads should be used under the pipe supports if the pump is not truly pipe mounted.

Various installation arrangements are detailed in Figures A1.1 through A1.12.

Vertical In-Line pumps may be installed directly in the system piping with no additional support. Pipe hangers are simply sized for the additional weight of the pumping unit. Many pumps are installed in this manner and are mounted at sufficient height to take zero floor space. (Figure A1.1)

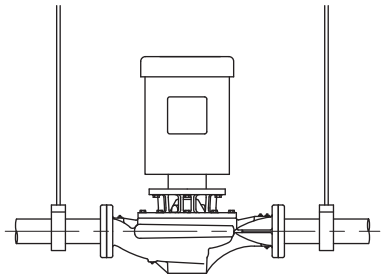


Fig. A1.1 Hanger Supported, Pipe Mounted

Piping for smaller in-line pumps (typically 15 hp and below) is hung close to the ceiling in many mechanical rooms. Larger pumps are often mounted near ground level for ease of maintenance. Figure A1.2 illustrates such an arrangement with the piping supported at the ceiling and the vertical pump installed with a Taco Suction Diffuser (RSP) and Plus Two Multi-Purpose Valve.

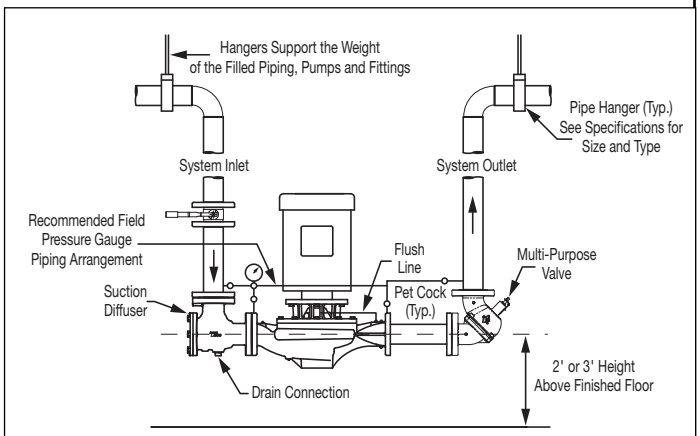


Fig. A1.2 Pipe mounted supported at ceiling

Should additional space saving be required the discharge spool piece and Plus Two Multi-Purpose Valve may be replaced by a long-radius elbow and the Plus Two Multi-Purpose Valve field converted to a straight pattern configuration and installed in the vertical discharge pipe. (Figure A1.3)

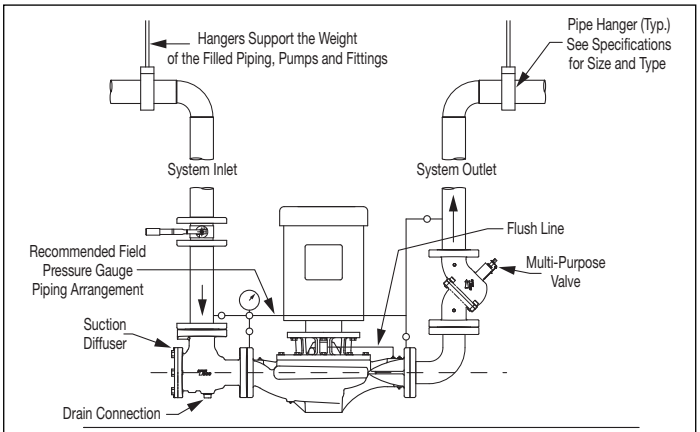


Fig. A1.3 Discharge elbow for minimum footprint

A similar arrangement to Figure A1.2 with additional floor mounted pipe-stools isolated from the structure by 'waffle' style isolation pads under the Suction Diffuser (RSP) and Plus Two Multi-Purpose Valve is illustrated in Figure A1.4.

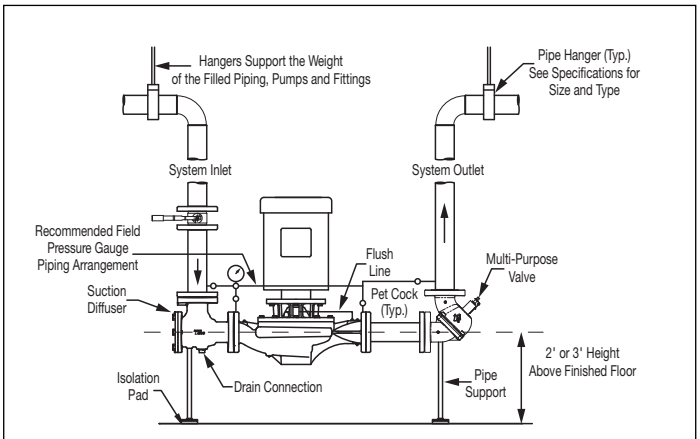


Fig. A1.4 With additional pipe supports

Floor mounted saddle supports (Figure A1.5) are typical for condenser water pumps where cooling tower base is near mechanical room elevation.

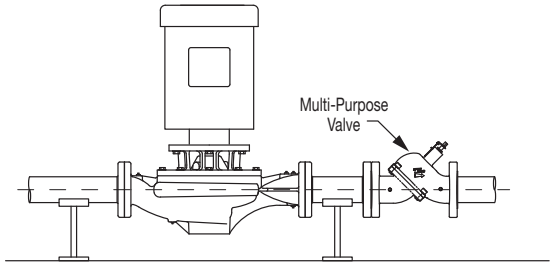


Fig. A1.5 Floor saddle support

Where required, additional floor support may be used as shown in Figure A1.6. Install a "waffle" isolation pad under the pump. **NOTE: The pump should not be rigidly attached to the base/pad structure.**

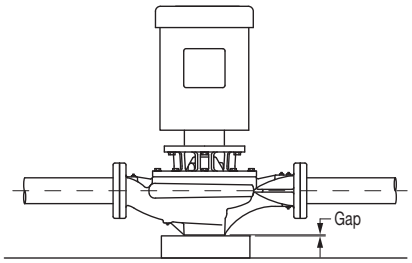


Fig. A1.6 Additional floor support

Stanchion plates at the pump suction and discharge ports may be supplied for installation convenience. Isolation pads must be used under the legs and monitored as pipe hangers are adjusted to ensure the pump flanges are not supporting the piping. Bolting to the floor or housekeeping pad is not recommended. If the stanchions are bolted down the bolts must be isolated from the stanchion or inertia base and flexible pipe connectors used (Figure A1.7).

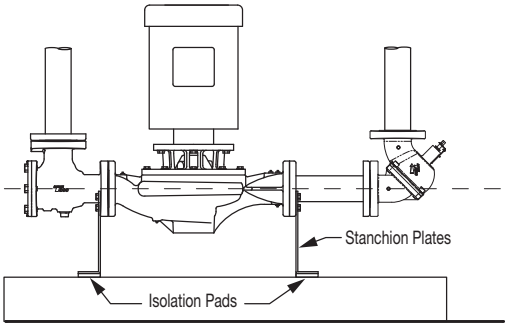


Fig. A1.7 With stanchion plates

An installation with stanchion plates for seismically active regions is illustrated in Figure A1.8. Seismically rated isolation pads or snubbers with bolts isolated from the stanchion plates are installed to restrain the pump during a seismic event. Pipe hangers carry the weight of the equipment as seismic components are designed only to restrain the equipment during a seismic event.

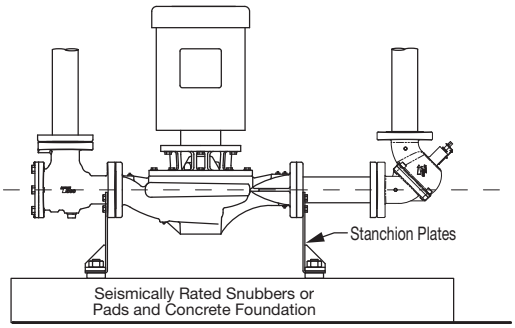


Fig. A1.8 Seismic region installation

Close coupled KV In-line pumps up to 15hp (254 frames) / 11kW may be installed with the shaft horizontal (Figure A1.9).

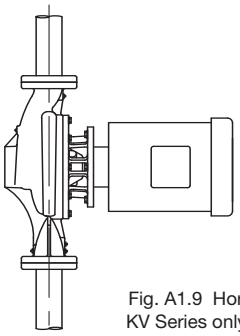


Fig. A1.9 Horizontal Mounting
KV Series only to 15 hp (11kW)

In systems utilizing grooved pipe, flange adapter locking devices or welded flanges at the pump should be used to prevent the possibility of pipe mounted pumps rotating in the piping (Figure A1.10).

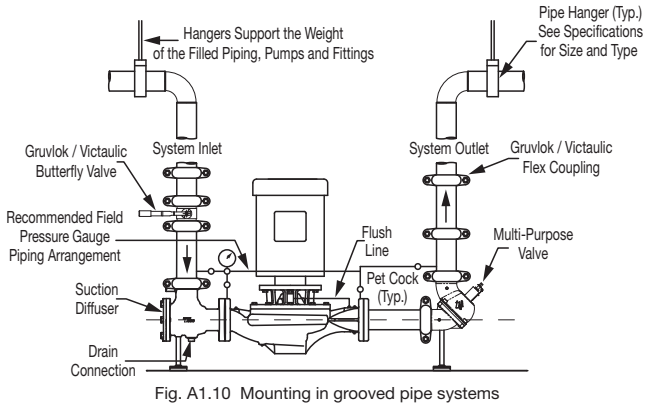


Fig. A1.10 Mounting in grooved pipe systems

DO NOT support the unit by the motor eye bolts (Figure A1.11) or by any other part of the motor.

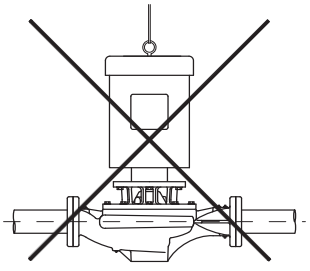


Fig. A1.11 Motor lifting hook supported

Connecting the pump to a permanent rigid base (Figure A1.12) is not recommended unless isolated from the piping by flexible connectors and the base isolated from the building structure on an inertia base. (Figure A1.12 is generally acceptable when using plastic piping.)

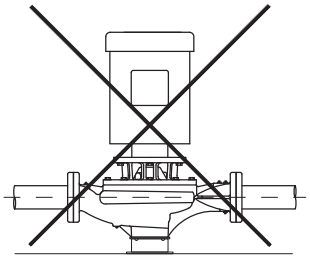


Fig. A1.12 Mounted on rigid base without flexible connectors

PUMP PIPING - GENERAL

NEVER connect any pump to piping, unless extra care is taken to measure and align the piping flanges well. Always start piping from pump. Use as few bends as possible and preferably long radius elbows.

Do not use flexible connectors on the suction or discharge of a vertical in-line pump, unless the pump is rigidly mounted to a foundation. Ensure piping exerts no strain on pump as this could distort the casing causing breakage or early failure due to pump misalignment. All connecting pipe flanges must be square to the pipe work and parallel to the pump flanges.

Suction and discharge pipes may be increased or decreased at pump nozzle to suit pump capacity and particular conditions of installation. Use eccentric reducers on suction connection with flat side uppermost.

Lay out the suction line with a continual rise towards the pump without high points, thus eliminating possibility of air pockets that may prevent the pump from operating effectively.

PROBLEM ANALYSIS

A. No Discharge
1. Pump not primed.
2. Speed too low.
3. System head too high.
4. Suction lift higher than pump is designed.
5. Impeller completely clogged.
6. Incorrect direction of rotation.
7. Air leak in suction line.

B. Insufficient Discharge Flow
1. Air leak in suction line.
2. Speed too low.
3. System head higher than anticipated.
4. Insufficient NPSH. Suction lift too high. Check gauges. Also check for clogged suction line or screen.
5. Impeller partially plugged.
6. Mechanical defects.
   a. Worn wear rings
   b. Impeller damaged.
   c. Incorrect direction of rotation.

C. Insufficient Discharge Pressure
1. Speed too low.
2. System head less than anticipated.
3. Air in system.
4. Mechanical defects.
   a. Worn wear rings.
   b. Impeller damaged.
   c. Impeller diameter too small.
   d. Incorrect direction of rotation.

D. Loss of Suction
1. Leak in suction line.
2. Suction lift too high.
3. Insufficient NPSH.
4. Air in system.
5. Casing gasket defective.

E. Excessive Power Consumption
1. Speed too high.
2. System head lower than rating.
3. Specific gravity of liquid too high.
4. Mechanical defects.
   a. Shaft bent.
   b. Rotating elements bind.
   c. Worn wear ring.

F. Vibration
1. Air leak in suction line.
2. Air in system.
3. Impeller partially plugged.
4. Foundation not rigid.
5. Mechanical defects.
   a. Damaged impeller.
   b. Motor bearings worn.
   c. Rotor out of balance.
   d. Shaft bent.

G. Motor Runs Hot
1. Speed too high.
2. Specific gravity of liquid too high.
3. Mechanical defects.
   a. Shaft bent.
   b. Rotating elements bind.
   c. Defective motor.
   d. Voltage lower than rating.

LIMITED WARRANTY STATEMENT

Taco, Inc. will repair or replace without charge (at the company's option) any commercial pump product or part which is proven defective under normal use within one (1) year from the date of start-up or one (1) year and six (6) months from date of shipment (whichever occurs first).

Motors provided on commercial pumps are not covered by this warranty, and are warranted by the motor manufacturer. For complete details on motor warranty returns, the purchaser should contact the motor manufacturer's local service repair center or contact the motor manufacturer directly.

Seals provided on commercial pumps are not covered by this warranty.

In order to obtain service under this warranty, it is the responsibility of the purchaser to promptly notify the local Taco stocking distributor or Taco in writing and promptly deliver the subject product or part, delivery prepaid, to the stocking distributor. For assistance on warranty returns, the purchaser may either contact the local Taco stocking distributor or Taco. If the subject product or part contains no defect as covered in this warranty, the purchaser will be billed for parts and labor charges in effect at time of factory examination and repair.

Any Taco product or part not installed or operated in conformity with Taco instructions or which has been subject to misuse, misapplication, the addition of petroleum-based fluids or certain chemical additives to the systems, or other abuse, will not be covered by this warranty.

If in doubt as to whether a particular substance is suitable for use with a Taco product or part, or for any application restrictions, consult the applicable Taco instruction sheets or contact Taco at [401-942-8000].

Taco reserves the right to provide replacement products and parts which are substantially similar in design and functionally equivalent to the defective product or part. Taco reserves the right to make changes in details of design, construction, or arrangement of materials of its products without notification.

TACO OFFERS THIS WARRANTY IN LIEU OF ALL OTHER EXPRESS WARRANTIES. ANY WARRANTY IMPLIED BY LAW INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS IS IN EFFECT ONLY FOR THE DURATION OF THE EXPRESS WARRANTY SET FORTH IN THE FIRST PARAGRAPH ABOVE.

THE ABOVE WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR STATUTORY, OR ANY OTHER WARRANTY OBLIGATION ON THE PART OF TACO.

TACO WILL NOT BE LIABLE FOR ANY SPECIAL, INCIDENTAL, INDIRECT OR CONSEQUENTIAL DAMAGES RESULTING FROM THE USE OF ITS PRODUCTS OR ANY INCIDENTAL COSTS OF REMOVING OR REPLACING DEFECTIVE PRODUCTS.

This warranty gives the purchaser specific rights, and the purchaser may have other rights which vary from state to state. Some states do not allow limitations on how long an implied warranty lasts or on the exclusion of incidental or consequential damages, so these limitations or exclusions may not apply to you.

Do it Once. Do it Right.®

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TACO (Canada), Ltd., 8450 Lawson Road, Unit #3, Milton, Ontario L9T 0J8. Telephone: 905/564-9422. FAX: 905/564-9436.

Visit our web site at: http://www.taco-hvac.com

Printed in USA

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www.customairproducts.com

SECTION

04

ELECTRICAL COMPONENTS

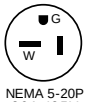
Straight Blade Devices

2 Pole, 3 Wire Grounding

15 and 20 Ampere, 125 Volts

INSULGRIP® Flanged Inlets and Flanged Receptacles

NEMA 5-15P
15A 125V
UL CSA

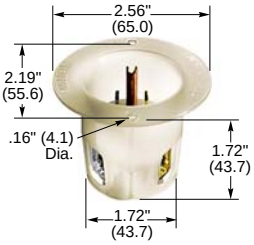


NEMA 5-20P
20A 125V
UL CSA

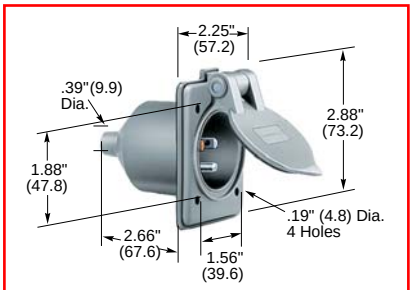
Flanged Inlets

Description	Catalog Numbers	
Nylon casing, back wired.	**HBL5278C**	**HBL5378C**
Weatherproof, gray nylon, with lift cover and boot, multiple drive screws.	**HBL61CM64**	–
Stainless steel flange, phenolic body, miniature style, for molded on connectors only, multiple drive screws.	**HBL5240***	–

* *Specially designed to accept "molded-on" connector bodies. Catalog number HBL5240 will not accept re-wireable size connector bodies listed in this catalog or molded connectors having a "rejection obstruction" as required by Underwriters Laboratories Inc. standard #817 cord sets and power supply cords" effective 7/1/81.*



HBL5278C



HBL61CM64

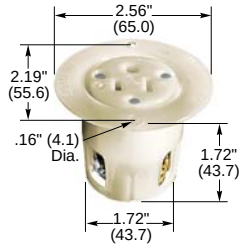
NEMA 5-15R
15A 125V
UL CSA

NEMA 5-20R
20A 125V
UL CSA

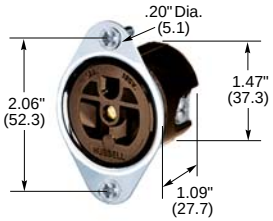
Flanged Receptacles

Description	Catalog Numbers	
Nylon casing, back wired.	**HBL5279C**	**HBL5379C**
Stainless steel flange, phenolic body, covered terminals, multiple drive screws.	**HBL5279**	–
Stainless steel flange, brown phenolic (mounting screws packed separately).	**HBL5256**	–
Weatherproof, gray nylon, with lift cover and boot, multiple drive screws.	–	**HBL61CM65**

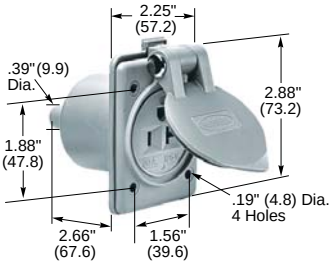
Note: See page A-39 for accessories.



HBL5279C



HBL5256



HBL61CM65

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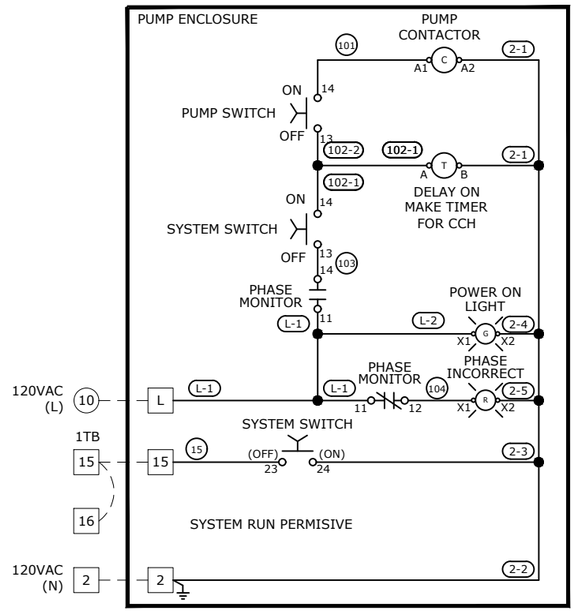
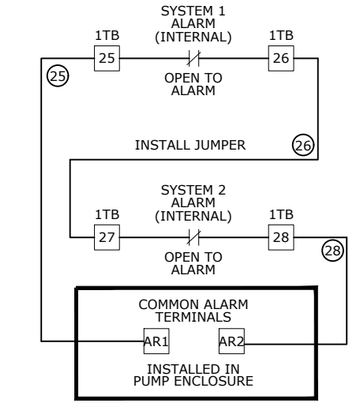
SECTION

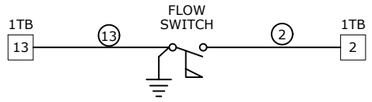
05

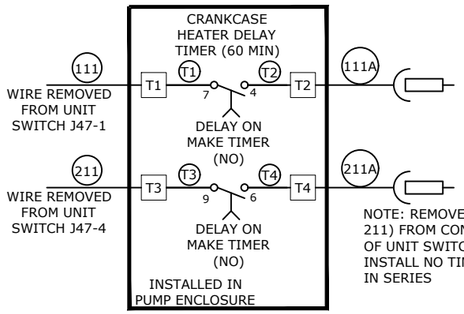
ELECTRICAL DRAWINGS



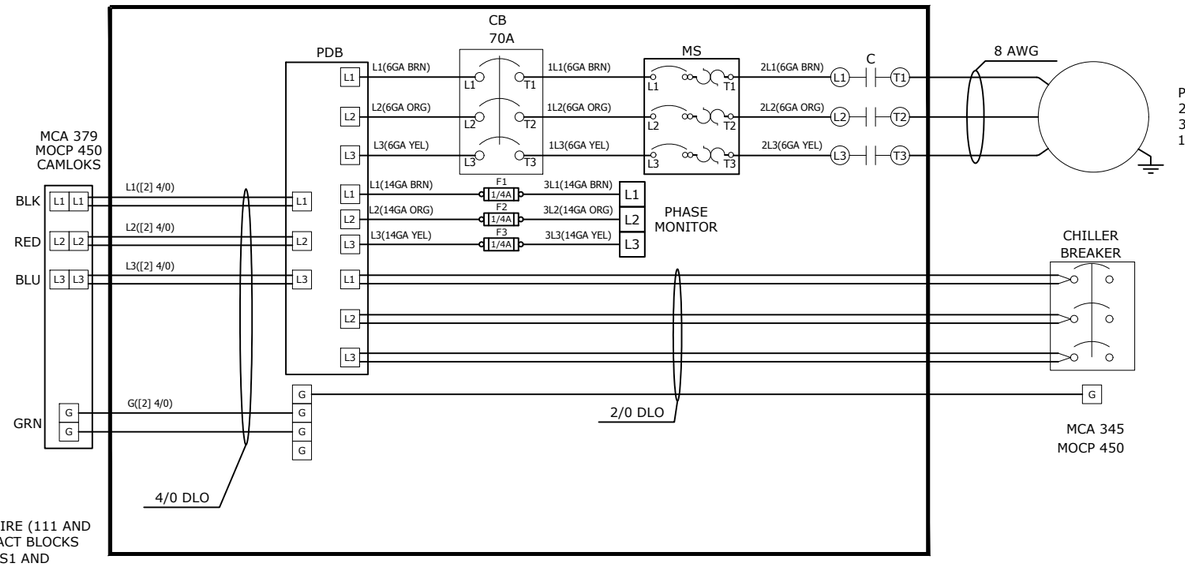
NOTE: ADD JUMPER FROM TERMINAL 15 AND 16 ON 1TB TERMINAL BOARD ON CHILLER.



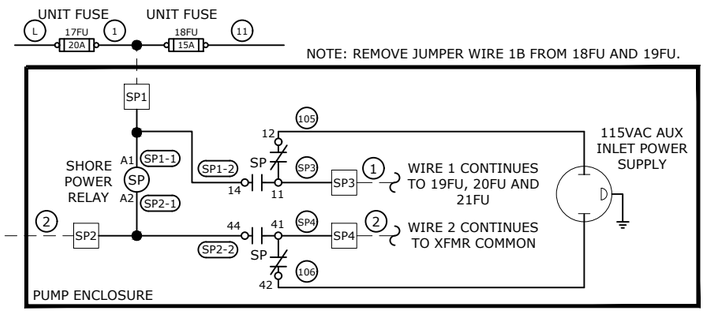




NOTE: REMOVE WIRE (111 AND 211) FROM CONTACT BLOCKS OF UNIT SWITCH S1 AND INSTALL NO TIMER CONTACTS IN SERIES



PUMP ENCLOSURE



DANGER
HIGH VOLTAGE
TURN OFF POWER BEFORE SERVICING

WHITE ON RED, TEX SIZE 0.2"/0.15"
LOCATION: RIGHT TOP OF OUTSIDE DOOR

CAUTION
RISK OF ELECTRIC SHOCK MORE THAN ONE DISCONNECT SWITCH MAY BE REQUIRED TO DE-ENERGIZE THE EQUIPMENT BEFORE SERVICING.

WHITE ON RED, TEXT SIZE 0.2" / 0.15"
LOCATION: RIGHT TOP OF OUTSIDE DOOR

USE COPPER CONDUCTOR ONLY.
60C (140F)
3.5-5.5 LBS. IN. TORQUE

BLACK ON WHITE, TEXT SIZE 0.15"
LOCATION: BACK PANEL ON FIELD SIDE OF TERMINAL BLOCK STRIP

USE COPPER CONDUCTOR ONLY.
60C (140F)
INCOMING LUG 375 LBS. IN. TORQUE

BLACK ON WHITE, TEXT SIZE 0.15"
LOCATION: BACK PANEL ON FIELD SIDE OF TERMINAL BLOCK STRIP

ENCLOSURE RATING:	TYPE 1
MAX VOLTAGE:	480VAC
PHASE:	3
FREQUENCY:	60Hz
SHORT CIRCUIT CURRENT:	5KAIC
RMS SYMMETRICAL:	480VAC
LARGEST MOTOR FLA:	34
TOTAL PANEL FLA:	30A
MFG DATE:	XX/XX/XX

LOCATION: EXTERIOR DOOR INSIDE WALL

WIRING NOTES

208/120VAC	480/277VAC	24VDC
PHASE A - BLACK	PHASE A - BROWN	POSITIVE - DARK BLUE
PHASE B - RED	PHASE B - ORANGE	NEGATIVE - GRAY
PHASE C - BLUE	PHASE C - YELLOW	
NEUTRAL - WHITE	NEUTRAL - GRAY	24VAC
GROUND - GREEN	GROUND - GREEN	PHASE A - RED
		NEUTRAL - BROWN

INTRINSICALLY SAFE WIRING 18AWG LIGHT BLUE AND MUST BE SEPARATED FROM OTHER WIRING BY MINIMUM OF 2". IF CABLE USED IT MUST BE SHIELDED.

IF VAC WIRING GAUGE NOT SPECIFIED USE 18 AWG
IF VDC WIRING GAUGE NOT SPECIFIED USE 18 AWG

NOTES:

1. SEE NC-REF001-C001 FOR FIELD WIRING SPECIFICATION.
2. ALL DEVICES SHOWN DE-ENERGIZED.
3. WIRE POINT TO POINT PER WIRE CHART.
4. EACH END OF EACH CONTROL AND POWER WIRE TO BE MARKED WITH HEAT SHRINK MARKERS.

REV#	DATE	DESIGNER	DESCRIPTION
0	12/09/2017	J.OMALLEY	ISSUED FOR CONSTRUCTION
1	05/04/2018	JOMALLEY	AS BUILT

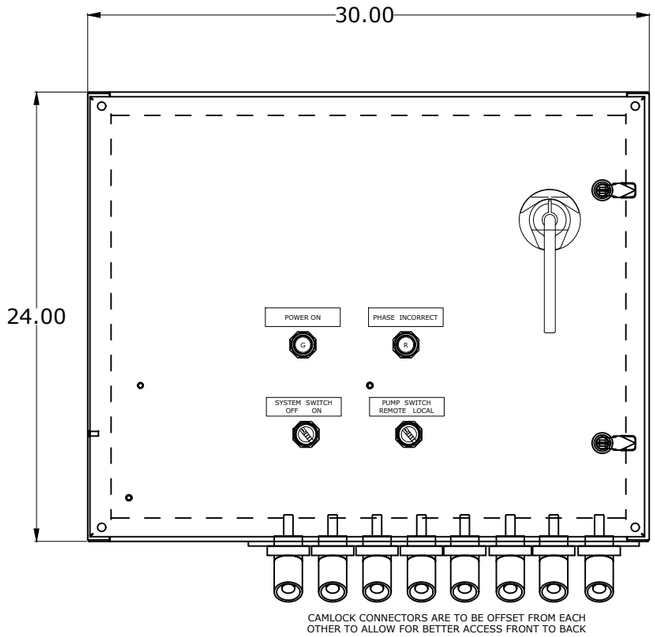
CUSTOM AIR PRODUCTS & SERVICES, INC.
35 SOUTHBELT INDUSTRIAL DR., HOUSTON, TX. 77047
PHONE: (713) 460-9009 FAX: (713) 460-9499
TEXAS BOARD OF PROFESSIONAL ENGINEERS
FIRM NUMBER F-14008

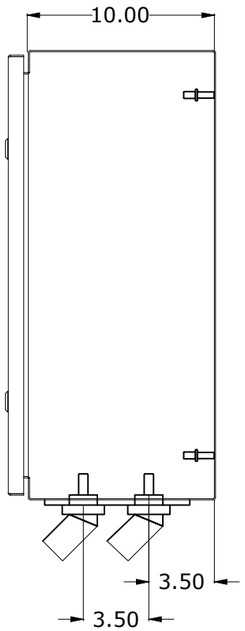
CERTIFIED AS-BUILT

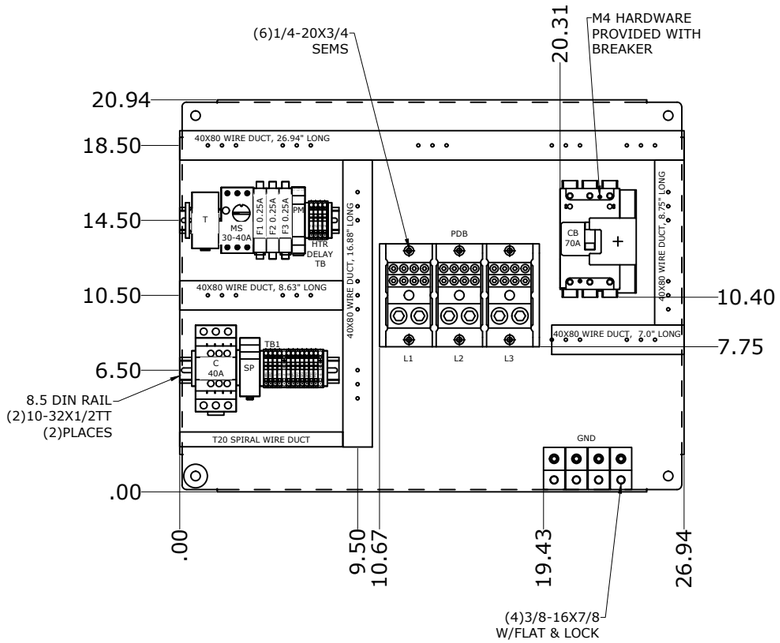
CHECKER: _____ DATE: _____

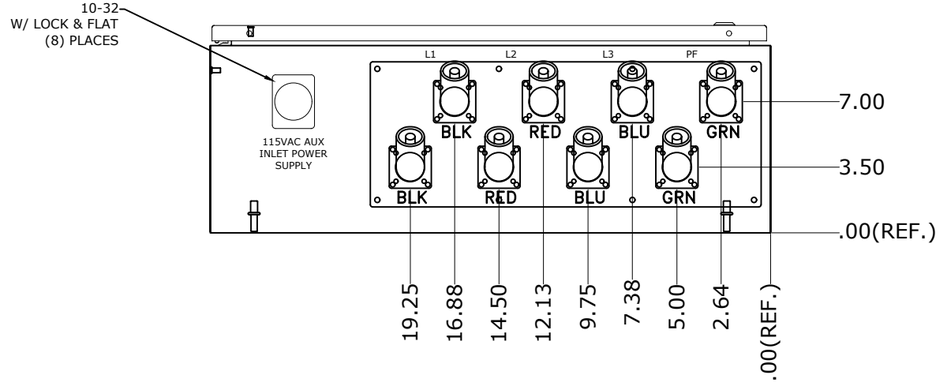
APPROVER: _____ DATE: _____

CAPS NO.: 17F-0878	DRAWING: E1	DRAWN BY: J.OMALLEY	DATE: 12/09/2017	CUSTOMER: HERC EQUIPMENT RENTAL	
CUST. PO#:	SHEET: 1 OF 4	CHECKED BY: DAVID NGUYEN	DATE: 05/04/2018	200 TON SKID MOUNTED & CAGED CHILLER GALV. SKID, GALV. CAGE, 4" CONNECTIONS 600 GPM @ 100 TDH, 460V/3PH/60HZ GP ELECTRICAL DESIGN POWER & CONTROL SCHEMATIC	
SIZE: B	REV: 1	APPROVED BY: LARRY NOVAK	DATE: 05/04/2018		

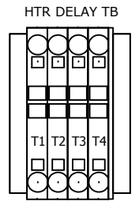




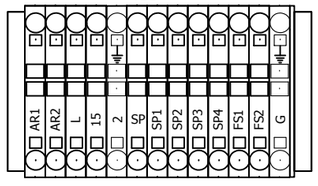




HTR DELAY TB



TB1



NOTES:

1. EACH DEVICE TO HAVE (2) LABELS. ONE ON DEVICE, ONE ON PANEL BEHIND DEVICE.

REV#	DATE	DESIGNER	DESCRIPTION
0	12/09/2017	J.OMALLEY	ISSUED FOR CONSTRUCTION
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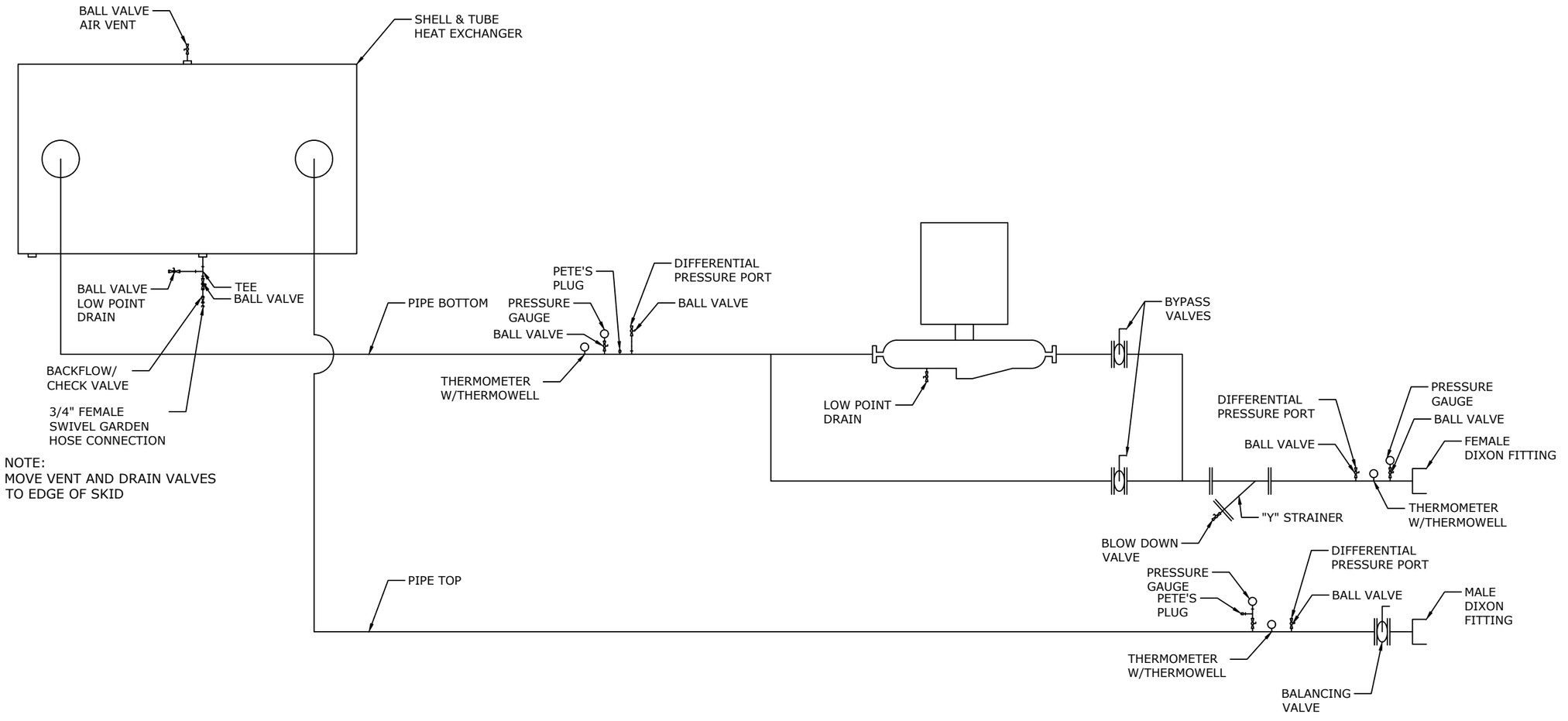
CAPS NO.: 17F-0878	DRAWING: E2	DRAWN BY: J.OMALLEY	DATE: 12/09/2017	CUSTOMER: HERC EQUIPMENT RENTAL	
CUST. PO#:	SHEET: 2 OF 4	CHECKED BY: DAVID NGUYEN	DATE: 05/04/2018	200 TON SKID MOUNTED & CAGED CHILLER GALV. SKID, GALV. CAGE, 4" CONNECTIONS 600 GPM @ 100 TDH, 460V/3PH/60HZ GP ELECTRICAL DESIGN POWER & CONTROL SCHEMATIC	
SIZE: B	REV: 1	APPROVED BY: LARRY NOVAK	DATE: 05/04/2018		



NOTE:
MOVE VENT AND DRAIN VALVES
TO EDGE OF SKID

REV#	DATE	DESIGNER	DESCRIPTION
0	12/09/2017	J.OMALLEY	ISSUED FOR CONSTRUCTION
1	05/04/2018	J.OMALLEY	AS BUILT

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FIRM NUMBER F-14008

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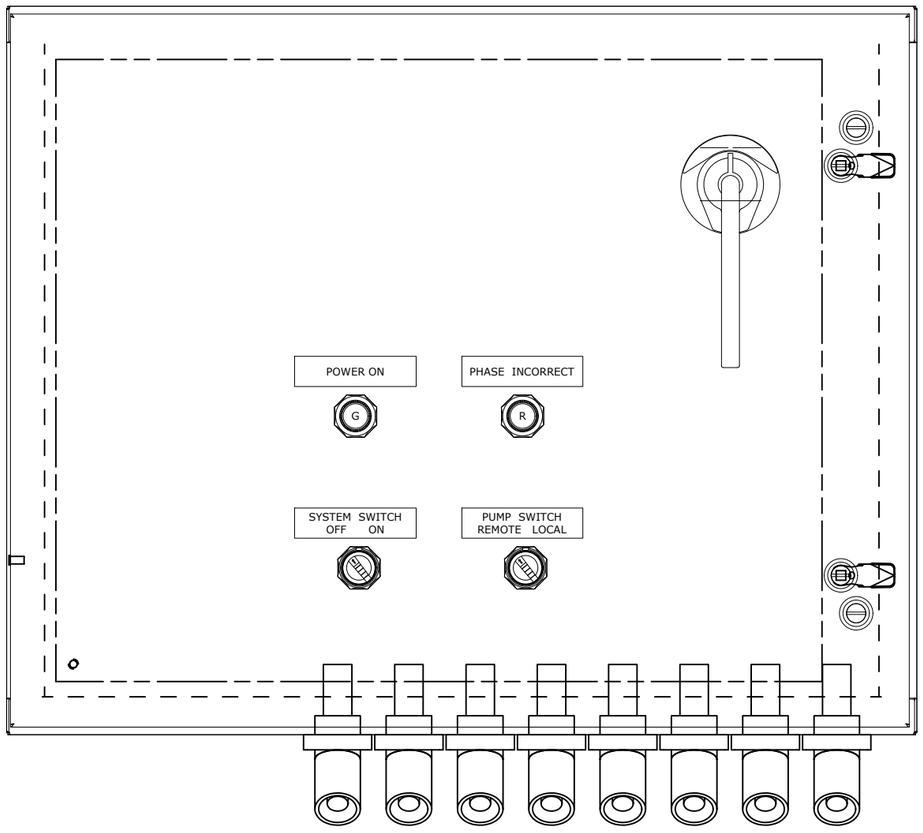
CHECKER: _____ DATE: _____

APPROVER: _____ DATE: _____

CAPS NO.: 17F-0878	DRAWING: E3	DRAWN BY: J.OMALLEY	DATE: 12/09/2017	CUSTOMER: HERC EQUIPMENT RENTAL	
CUST. PO#:	SHEET: 3 OF 4	CHECKED BY: DAVID NGUYEN	DATE: 05/04/2018	200 TON SKID MOUNTED & CAGED CHILLER GALV. SKID, GALV. CAGE, 4" CONNECTIONS 600 GPM @ 100 TDH, 460V/3PH/60HZ GP ELECTRICAL DESIGN POWER & CONTROL SCHEMATIC	
SIZE: B	REV: 1	APPROVED BY: LARRY NOVAK	DATE: 05/04/2018		



CAMLOCK CONNECTORS ARE TO BE OFFSET FROM EACH
OTHER TO ALLOW FOR BETTER ACCESS FRONT TO BACK

SEQUENCE OF OPERATION

The system is placed into initial operation as follows:

- Turn Master Switch and Pump Switch to “OFF”
- Turn Pump and Chiller Circuit Breakers "ON"
  - If the "Phase Incorrect" light is on, turn off the circuit breakers; reverse two (2) phases of incoming power for proper phase sequencing then check the incoming power source to be sure the unit has a good power source - 460V/3P/60HZ
  - If the "Main Power On" light is on and the "Phase Incorrect" light is off, turn Master Switch to "ON": Chiller will be ready for Crankcase Heater pre-heat and can be operated after 60 minute time delay
- Turn Pump Switch to "ON"
- Turn Chiller Switch to "ON" then set chilled leaving water setpoint
- To shut down Chiller and Pump:
  1- Raise setpoint to 70F
  2- Turn off Chiller Switch
  3- Turn off Pump Switch
  4- Turn off Master Switch

REV#	DATE	DESIGNER	DESCRIPTION
0	12/09/2017	J.OMALLEY	ISSUED FOR CONSTRUCTION
1	05/04/2018	J.OMALLEY	AS BUILT

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TEXAS BOARD OF PROFESSIONAL ENGINEERS
FIRM NUMBER F-14008

CERTIFIED AS-BUILT

CHECKER: _____ DATE: _____

APPROVER: _____ DATE: _____

CAPS NO.: 17F-0878	DRAWING: E4	DRAWN BY: J.OMALLEY	DATE: 12/09/2017	CUSTOMER: HERC EQUIPMENT RENTAL
CUST. PO#:	SHEET: 4 OF 4	CHECKED BY: DAVID NGUYEN	DATE: 05/04/2018	200 TON SKID MOUNTED & CAGED CHILLER GALV. SKID, GALV. CAGE, 4" CONNECTIONS 600 GPM @ 100 TDH, 460V/3PH/60HZ GP ELECTRICAL DESIGN POWER & CONTROL SCHEMATIC
SIZE: B	REV: 1	APPROVED BY: LARRY NOVAK	DATE: 05/04/2018	

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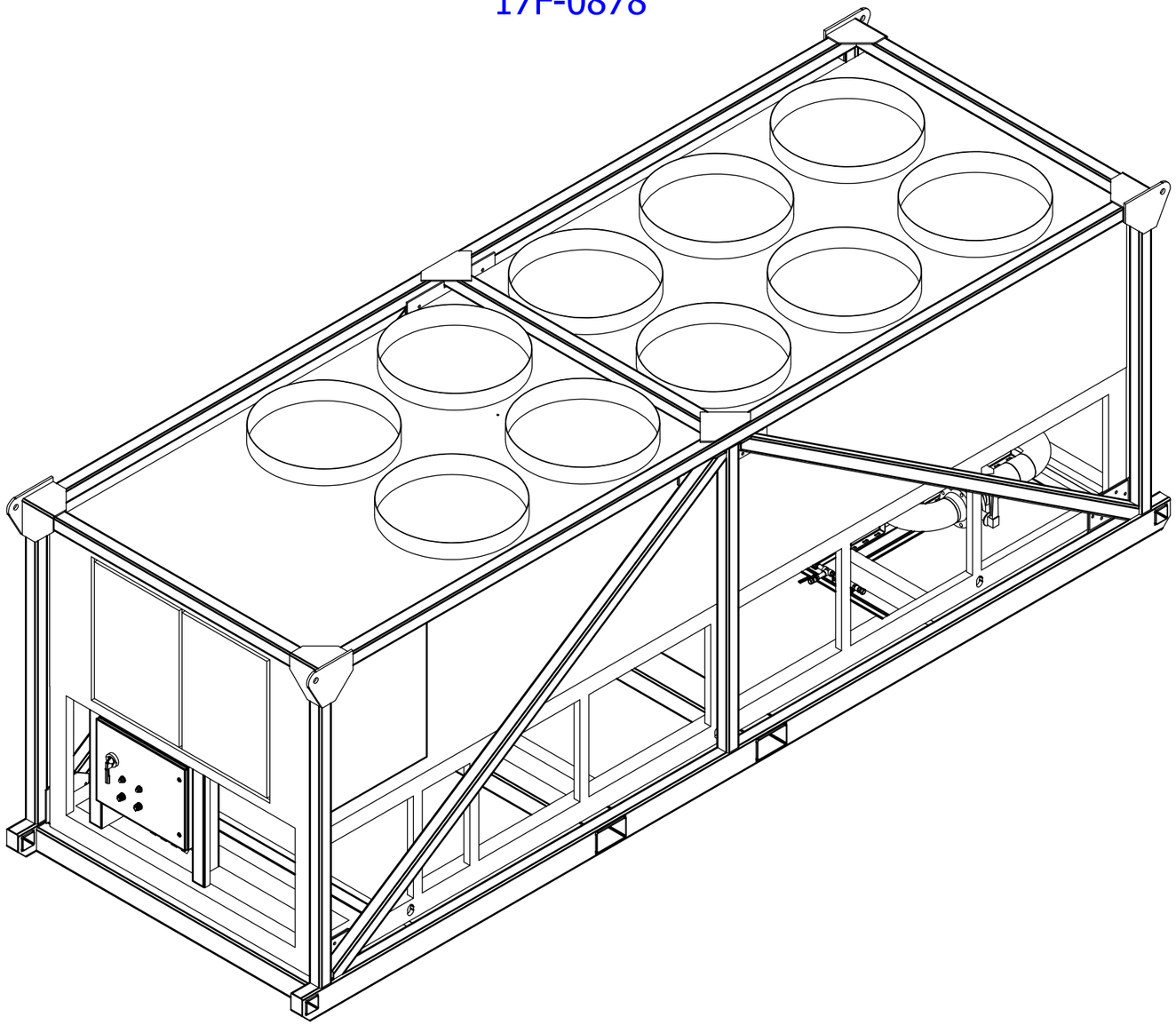
SECTION

06

MECHANICAL DRAWINGS

HERC

200 TON SKID MOUNTED & CAGED YORK CHILLER PACKAGE
GALVANIZED SKID & CAGE, 6" DIXON CONNECTIONS
600 GPM @ 100 TDH, 460V/3PH/60HZ GP
17F-0878



CUSTOM AIR PRODUCTS & SERVICES, INC.

35 SOUTHBELT INDUSTRIAL DR., HOUSTON, TX. 77047
PHONE: (713) 460-9009 FAX: (713) 460-9499
TEXAS BOARD OF PROFESSIONAL ENGINEERS
FIRM NUMBER F-14008

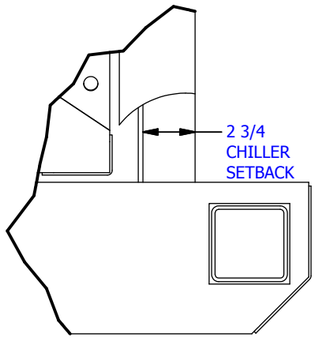
CERTIFIED AS BUILT

CHECKER:_____ DATE:_____

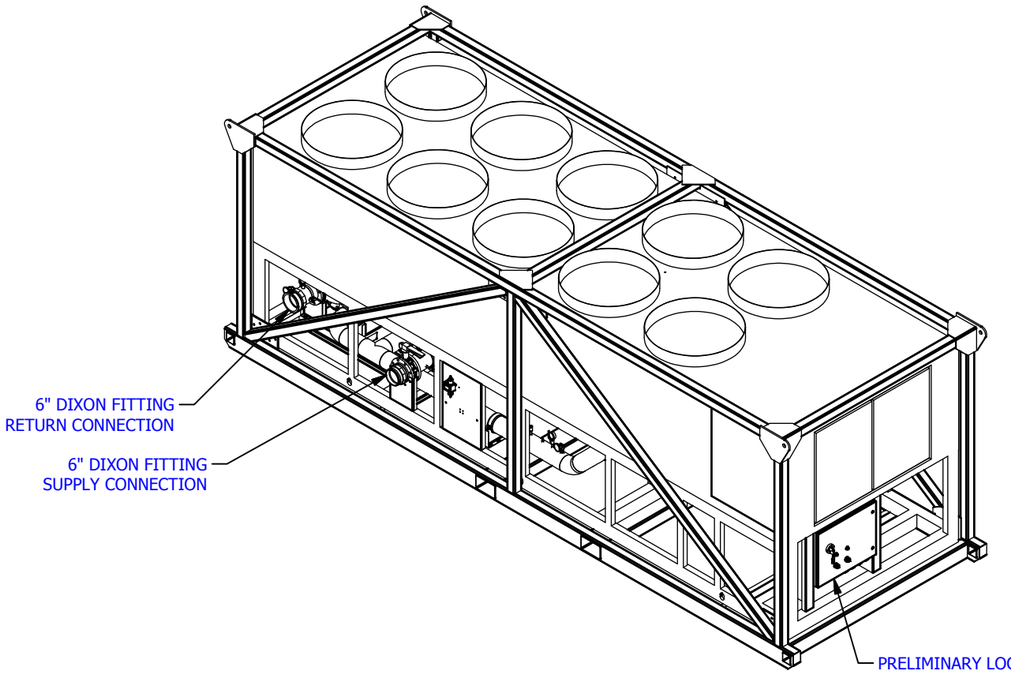
APPROVER:_____ DATE:_____

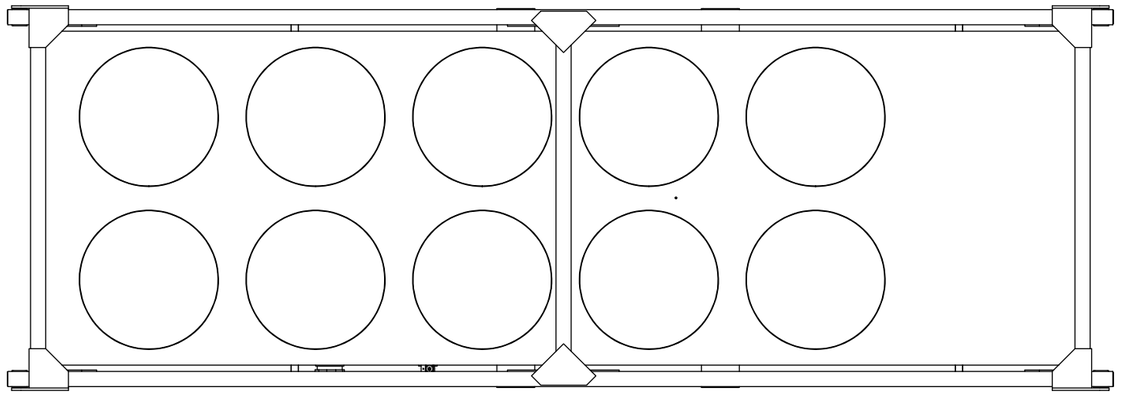
CAPS NO.: 17F-0878	DRAWING: 200T-ACC-000	DESIGNER: DAVID POTTS	DATE: 12/11/2017	CUSTOMER: HERC
CUST. PO#:	SHEET: 1 OF 2	CHECKER: ALEX BANNISTER	DATE: 12/11/2017	200 TON SKID MOUNTED & CAGED YORK CHILLER PACKAGE GALVANIZED SKID & CAGE, 6" DIXON CONNECTIONS 600 GPM @ 100 TDH, 460V/3PH/60HZ GP
SIZE: B	REV:	APPROVER: JOHN PHAN	DATE: 12/11/2017	MECHANICAL DESIGN COVER SHEET

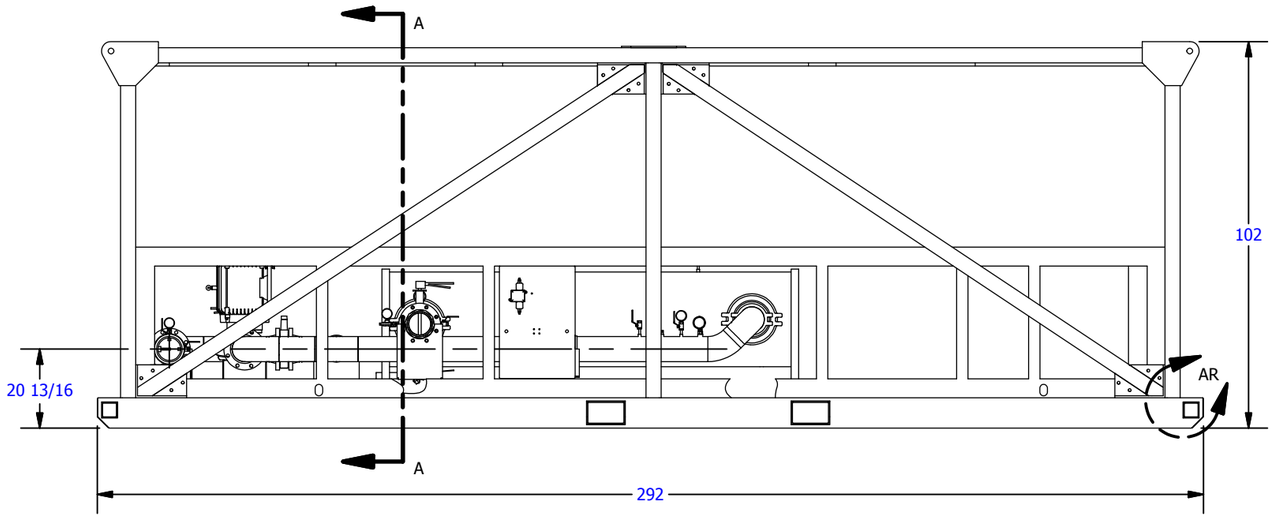
REVISION HISTORY			
REV	DATE	DESIGNER	DESCRIPTION
0.1	4/23/2018	DAVID POTTS	ADDED CHILLER SETBACK DETAIL

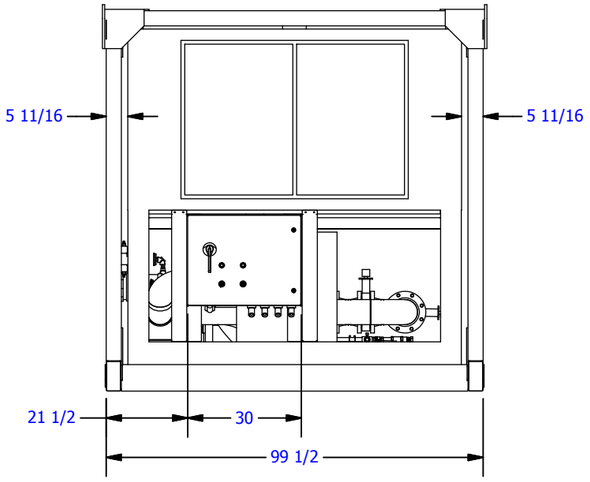


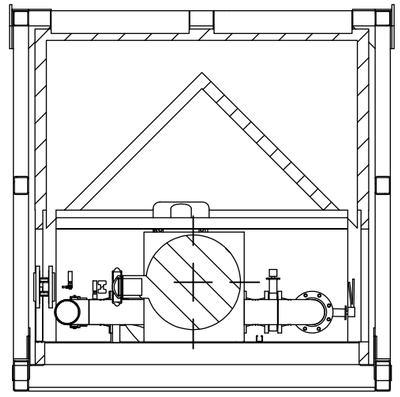
DETAIL AR
SCALE 1 / 8











SECTION A-A
SCALE 1 / 40

200T-ACC-000

GENERAL LAYOUT

CUSTOM AIR PRODUCTS & SERVICES, INC.
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CERTIFIED AS BUILT

CHECKER: _____ DATE: _____

APPROVER: _____ DATE: _____

CAPS NO.:	DRAWING:	DESIGNER:	DATE:	CUSTOMER:
17F-0878	200T-ACC-000	DAVID POTTS	12/11/2017	HERC
CUST. PO#:	SHEET: 2 OF 2	CHECKER: ALEX BANNISTER	DATE: 12/11/2017	200 TON SKID MOUNTED & CAGED YORK CHILLER PACKAGE GALVANIZED SKID & CAGE, 6" DIXON CONNECTIONS 600 GPM @ 100 TDH, 460V/3PH/60HZ GP MECHANICAL DESIGN
SIZE: B	REV: 0.1	APPROVER: JOHN PHAN	DATE: 12/11/2017	

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SECTION

07

SPARE PARTS LIST

SUGGESTED SPARE PARTS

JOB #:	**17F-0878**	**REVISION #:**	**0**
CUSTOMER	**HERC RENTALS**		
PROJECT	**2018 RENTAL FLEET**		

ITEM #	DESIGNATION	BRAND	MODEL/PART #	DESCRIPTION	QTY	CAPS#
1	PUMP	TACO	KV6011	600 GPM @ 100' TDH, 25 HP, 460V/3PH/60HZ	1	
2	CIRCUIT BREAKER	SCHNEIDER ELECTRIC	BDL36070	CIRCUIT BREAKER, 600V, 70A	1	
3	CONTACT BLOCK	SCHNEIDER ELECTRIC	9001KA2	NO CONTACT BLOCK	1	
4	CONTACTOR	SCHNEIDER ELECTRIC	LC1D40AG7	CNTR, EVERLINK 40A, 3P, 120VACVAC	1	
5	DISTRIBUTION BLOCK	MARATHON	1453411	PDB,840A,3P,(2)600-2GA X (4)3/0-6 & (4)4-14GA	1	
6	LIGHT	SCHNEIDER ELECTRIC	9001KP1G31	POWER ON PILOT LIGHT, 120V, GREEN	1	
7	LIGHT	SCHNEIDER ELECTRIC	9001KP1R31	ROTATION INCORRECT PILOT LIGHT, 120V, RED	1	
8	MANUAL STARTER	SCHNEIDER ELECTRIC	GV3P40	MANUAL MOTOR STARTER 30-40A (25hp) WITH ROTARY SWITCH	1	
9	SYSTEM SWITCH	SCHNEIDER ELECTRIC	9001KS11B	2 POSITION SWITCH	1	
10	SP RELAY	EATON	D2RR2A	RELAY DPDT 120VAC COIL eaton	1	
11	FLOW SWITCH	UNITED ELECTRIC	J21K-150	DIFFERENTIAL PRESSURE SWITCH FOR CHILLERS (FLOW SWITCH)	1	
12	SHORE POWER PLUG	HUBBELL	HBL61CM64	15A, 125V 2 POLE, 3 WIRE GROUNDING RECEPTACLE, WEATHERPROOF	1	
13	TIMER	IDEC	RTE-B1AF20	DELAY ON MAKE TIMER	1	
14	BASE	IDEC	SR3B-05	TIMER BASE	1	
15	FU1-3	MERSEN	ATQR1/4	1/4 AMP, 600 VAC, 200kA I.R. TIME DELAY CC TYPE FUSE	1	
16	FB	WAGO	811-430	FUSE HOLDER, 3P, 30A, 600V, CLASS CC, CAGE CLAMP	1	
17	REPLACEMENT FUSE	MERSEN	ATQR15	15 AMP REPLACEMENT FUSE, PLACE BETWEEN L1-L2 & 90 & 91	1	
18	MMP	SCHNEIDER ELECTRIC	GV3P40	MMP 30 - 40A TYPE-E	1	
19	PHASE MONITOR	SCHNEIDER ELECTRIC	RM17TU00	RELAY 5AMP 3P 208-480VAC	1	
20	LUG	BURNDY	KA31U	LUG,6GA-350MCM,ONE HOLE MT,3/8	1	
21	CRIMP LUG	PENN UNION	BLU-030S-45	CRIMP LUG, 300MCM, 1/2 45 DEGREE(200)"	1	